

**AN ANALYSIS OF PATIENT DEPENDENCY DATA,  
UTILIZING THE TREND CARE SYSTEM.**

by

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### **Notice 1**

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## SUMMARY

The allocation of nursing resources in hospitals is a major policy issue and there are controversies about whether a system based on equity ratios or one based on measurement of patient dependency is more accurate.

This study is the first empirical analysis of nurse patient ratio and patient dependency data on the same patient and staff cohort. The analysis was of 103, 269 valid shifts of care representing 1,998,902 nursing hours. It is expected to be of interest to all stakeholders and notably to funding agencies that have established nursing policy using either of these two systems to measure and allocate nursing workloads. Examples of these policies include the introduction of mandated nurse patient ratios in Victoria by the Department of Human Services (DHS), the Safe Staffing Law governing hospitals and nurse patient ratios in California, USA and a staffing by TrendCare agreement incorporated in the Enterprise Bargaining Agreements of some regional Victorian public hospitals. There is a keen interest in the outcome of these policies by observers in other Australian states, New Zealand, the USA and various other international settings as many of the difficulties of accounting for nursing remain unresolved. This study was designed to inform the debate about future policy directions.

The TrendCare system was selected to facilitate this analysis because it is a computerized system which has the capacity to simultaneously measure nursing workloads by a dependency method of nursing hours per patient day (HPPD) by various patient types and by nurse patient ratios. A statistical analysis of nursing hours and patient types was undertaken through retrospective analysis of existing administrative data, provided by 22 acute care public and private hospitals in Australia, New Zealand and Thailand. The results showed that both ratios and TrendCare can predict a fair allocation of nursing resources to patients. Further, the

results showed that TrendCare predicts actual direct nursing care requirements with greater accuracy than ratios for the full range of settings and patient types and this facilitates better allocation of nursing resources. TrendCare predicts more of the variance than ratios, for each hospital level, public and private hospitals, for Australian and New Zealand hospitals, metropolitan and rural hospitals, all patient type categories and morning, evening and night shift. There is no category of variable where ratios predict more of the variability than TrendCare.

The results also demonstrated that the cost of nursing care would be less for hospitals using TrendCare than for ratios, providing the same quality of care by the same nurses to the same patient cohort. In some cases the quality of care may be improved using the TrendCare system since it was designed to ensure quality can be maintained using predicted acuity-based resource allocation requirements. The measurement of quality was outside the scope of the thesis but this is an important outcome for the costs of care and for distribution of the limited nursing resources experienced by most countries in a worldwide shortage of working nurses.

เรียน คุณแอรจันเนีย ที่นับถือ

ขอแสดงความยินดีต่อความสำเร็จในงานวิจัยของคุณ ดิฉันมีความสุขที่ได้  
ร่วมงานวิจัยของคุณ หวังว่างานวิจัยของคุณจะเป็นประโยชน์ต่อนางพยาบาลทั่วโลก  
และเป็นประโยชน์ต่อนางพยาบาลในประเทศไทยด้วย

ขอแสดงความนับถือ  
นิกาวรรณ ศิริประเสริฐ

Virginia

Congratulations on your successful research which I'm so happy we could  
be a part of. I hope that your research will be help all nurses of the  
world, especially in Thailand.

Nipawan Siriprasert

Phya Thai Hospital Group

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## STATEMENT OF DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university and that, to the best of my knowledge and belief, the thesis contains no material previously published or written by another person, except when due reference is made in the text of the thesis.

.....  
Virginia Plummer, September 2005

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## LIST OF ABBREVIATIONS

| <b>Abbreviation</b> | <b>Meaning</b>                                                                                                                    |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| ABI                 | Acquired Brain Injury                                                                                                             |
| ACCC                | Australian Casemix Clinical Committee                                                                                             |
| ACIRRT              | Australian Centre for Industrial Relations Research                                                                               |
| ACT                 | Australian Capital Territory                                                                                                      |
| ADLs                | Activities of Daily Living                                                                                                        |
| ADO                 | Accrued Day Off                                                                                                                   |
| AE 1-3              | Accident and Emergency Department Level - Victoria                                                                                |
| AIHW                | Australian Institute of Health and Welfare                                                                                        |
| AIRC                | Australian Industrial Relations Commission                                                                                        |
| ANA                 | American Nurses Association                                                                                                       |
| ANF                 | Australian Nursing Federation                                                                                                     |
| ANJ                 | Australian Nurses Journal                                                                                                         |
| ANSOS               | Automated Nursing Scheduling Office System - Yale New Haven                                                                       |
| APACHE              | See Acute Physiology and Chronic Health Evaluation –<br>Main outcome measure for death or survival in intensive care units USA/UK |
| ARIA                | Accessibility/Remoteness Index of Australia                                                                                       |
| AWA                 | Australian Workplace Agreement                                                                                                    |
| CNA                 | Californian Nurses Association                                                                                                    |
| CCSA                | Clinical Costing Standards Australia                                                                                              |
| CCU                 | Coronary Care Unit                                                                                                                |
| CEO                 | Chief Executive Officer                                                                                                           |
| COAD                | Chronic Obstructive Airways Disease                                                                                               |
| CPI                 | Consumer Price Index                                                                                                              |
| CTGs                | Cardio Toco-graph                                                                                                                 |
| DENOSA              | Democratic Nurses Association of South Africa                                                                                     |
| DHB                 | District Health Board                                                                                                             |
| DHS                 | Department of Human Services (Victoria)                                                                                           |
| DON                 | Director of Nursing                                                                                                               |
| DRGs                | Diagnosis Related Groups                                                                                                          |
| EBA                 | Enterprise Bargaining Agreement                                                                                                   |
| ENT                 | Ear, Nose, Throat                                                                                                                 |
| EFT                 | Effective Full Time                                                                                                               |

|          |                                                                                                                                            |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------|
| FTE      | Full Time Equivalent                                                                                                                       |
| GEM      | Geriatric Evaluation and Management                                                                                                        |
| GRASP    | GRASP Workload measurement system                                                                                                          |
| HBDB     | Hawkes Bay District Health Board                                                                                                           |
| HCOA     | Health Care Association of Australia                                                                                                       |
| HDU      | High Dependency Unit                                                                                                                       |
| H3L3     | Under Casemix funding arrangements the high boundary point is defined ALOS x 3 (H3) and the low boundary point is defined as ALOS / 3 (L3) |
| HL-7     | Health Level 7 Messaging Standard                                                                                                          |
| HPPD     | Hours Per Patient Day                                                                                                                      |
| HR       | Human Resources                                                                                                                            |
| HTML     | Hyper Text Markup Language                                                                                                                 |
| ICD 9 CM | International Classification of Diseases 9th Revision, Clinical Modification                                                               |
| ICD-10   | International Statistical Classification of Disease and Related Health Problems, 10th Revision                                             |
| ICU      | Intensive Care Unit                                                                                                                        |
| IQR      | Inter quartile range                                                                                                                       |
| IRR      | Inter-rater Reliability                                                                                                                    |
| IT       | Information Technology                                                                                                                     |
| IV       | Intravenous                                                                                                                                |
| LOS      | Length Of Stay                                                                                                                             |
| MDCs     | Major Diagnostic Categories                                                                                                                |
| MS       | Microsoft                                                                                                                                  |
| NISS     | Nursing Information System Saskatchewan                                                                                                    |
| NSW      | New South Wales                                                                                                                            |
| NUMS     | Nurse Unit Managers (Charge Nurses)                                                                                                        |
| NZNO     | New Zealand Nurses Organisation                                                                                                            |
| OCR      | Optical Character Recognition                                                                                                              |
| OR       | Operating Room                                                                                                                             |
| PAIS     | Patient Assessment and Information System                                                                                                  |
| PCS      | Patient Classification System                                                                                                              |
| PDF      | Portable Document Format                                                                                                                   |
| PCU      | Patient Care Unit - Trofino's RBS system                                                                                                   |
| PDS      | Patient dependency system                                                                                                                  |
| PMI      | Patient Master Index                                                                                                                       |
| PND      | Patient Nurse Dependency                                                                                                                   |
| PPS      | Prospective Payment Systems                                                                                                                |

|               |                                                                                  |
|---------------|----------------------------------------------------------------------------------|
| PRN           | Quebec PRN - Patient Classification and Billing system                           |
| PRS2          | Patient Reporting System v2 (Victoria)                                           |
| QLD           | Queensland                                                                       |
| RANF          | Royal Australian Nursing Federation                                              |
| RBS           | Reality Based Systems                                                            |
| RDBS          | Remote Database Server                                                           |
| RHBL 1-2      | Rehabilitation Category Level 1-2, Victorian Public Hospitals                    |
| RIMS          | Resource Information Management System                                           |
| RIMs          | Relative Intensity Measures                                                      |
| RMH           | Royal Melbourne Hospital                                                         |
| RNs           | Registered Nurses                                                                |
| RRMA          | Rural, Regional and Remote Health, a Guide to Remoteness Classifications         |
| RTF           | Rich Text Format                                                                 |
| RVU           | Relative Value Units                                                             |
| SCERH         | Standing Committee on Ethics in Research involving Humans<br>(Monash University) |
| SCN           | Special Care Nursery                                                             |
| SOI           | Severity Of Illness                                                              |
| SPSS          | Statistical Package for the Social Sciences                                      |
| SQL           | Structured Query Language                                                        |
| TC            | TrendCare                                                                        |
| UK            | United Kingdom                                                                   |
| URTI          | Upper Respiratory Tract Infection                                                |
| USA           | United States of America                                                         |
| UTI           | Urinary Tract Infection                                                          |
| VB6 / ASP NET | Visual Basic 6 / Active Server Pages .NET                                        |
| VHIA          | Victorian Hospitals Industrial Association                                       |
| YCM           | Yale Cost Model                                                                  |
| WA            | Western Australia                                                                |
| WAN           | Wide Area Network                                                                |
| WHO           | World Health Organisation                                                        |
| WIES          | Weighted Inlier Equivalent Separation                                            |
| WISH          | Workload Indexing System for Small Hospitals                                     |

**LIST OF APPENDICES**

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## GLOSSARY

### **Actualize**

A function of the TrendCare system: the direct care nurse reviews and updates the indicators. The 'hours predicted for nursing care' are then automatically adjusted to reflect actual nursing hours currently being worked. An update in the categorizing of patients also automatically follows. Actualization facilitates a variance measurement. This variance in the actual hours worked by the nurse that are above or below the hours predicted for nursing care and is recorded as 'Total Variance by hh: mm' in TrendCare reporting.

The process of actualizing does not replace the predicted hours, they remain in the reporting formats as 'Hours required by hh: mm'. All discharges, deaths, transfers and admissions are accounted for in the actualization process.

### **Acuity**

A term used in slightly different ways throughout the literature and used in this thesis to describe the relative requirements for nursing care for patients with a given medical condition or conditions. See also dependency.

### **Acute care hospital**

*A hospital which may provide medical, surgical, obstetric, nursing and other health care services to inpatients, most of whom have acute or temporary conditions and whose average stay is relatively short. (PSCU, 1997:14)*

**AN-DRG**

Australian National Diagnosis Related Group. Versions 1-3 of the Australian system were developed to classify Australian acute in-patients.

**AR-DRG**

AR-DRG - Australian Refined Diagnosis Related Group - Diagnoses classified according to relative values for distribution of costs for hospital budgets and coded alpha-numerically. They include significant complication or co-morbidity severity measurements and are used for reporting casemix to Government Health Departments, Health Insurers and other funding bodies. AR-DRG Version 4.1 has been implemented in both the public and private acute hospital care sectors in Australia and New Zealand. The AR-DRG code is for an entire episode, after discharge and is unlikely to change. See Patient type. Known also as DRG in the literature and in TrendCare Reporting.

**Average skill mix**

The mix of staff by title, qualifications and grade or years of experience. The competency that comprises an overall clinical team, capable of managing a workload of 8 hours per full time equivalent across the shift. (TrendCare 2003).

**Benchmarks**

Benchmarks are used for comparison for measurement of performance and quality improvement both internal and external to the organisation. TrendCare users have provided data to the vendor for the derivation of 2001 Average Clinical Benchmarks in HPPD. The benchmark is a range of hours calculated as average, (or mean). For example, a general surgical benchmark of 4.5-4.9 HPPD in Thailand and 3.8-4.3 HPPD in Australia

**Care model**

Care models are how work is organised, delegated and evaluated. Care models are the nursing work systems in place in a ward/unit setting. Common systems include for example, team nursing, task allocation, patient allocation, case management, or nurse-patient ratios. Some systems work well for a mix of junior and senior staff and others work better where the team is expert. A Nurse Unit Manager will manage the nursing resources well by selecting an appropriate care model. Further, the experienced team leader can act as a mentor or role model to the more junior team member. TrendCare allocates patients to either individuals or teams as required.

**Case mix**

The mix of different patient types in a specific ward/unit or hospital.

**Casemix funding**

A method of funding health services which is similar to out-put based funding. The method involves funding of health care products which are categorized using casemix classifications. Out-put based funding usually includes teaching and research in addition to casemix classifications (PSCU, 1997).

**Categorising**

A function of the TrendCare system: The process begins after selection of the patient type relevant to a patient's diagnosis, treatment and response to treatment, then selection of the appropriate indicators and variables within the indicators for the relevant patient type. (TrendCare 2003). The TrendCare system allocates a category. The category may change at any time throughout the shift or the episode of care.

**Clinical hours**

Clinical hours are recorded in TrendCare. Nursing care is one component of clinical care which is recorded and it includes direct and indirect nursing care. Other clinical care may be recorded such as physiotherapy, or nutrition services but non-nursing clinical hours were not recorded by hospitals in the sample for this thesis.

**Clinical pathways**

*A document describing the usual method of care provision for a particular type of patient and allowing for annotation of deviations from the norm (PSCU, 1997:3).*

**Comorbidity**

*A secondary condition existing at the time of admission which, because of its presence with a specific principal diagnosis, causes an increase in length of stay. In the AN-DRG classification, comorbidity is expected to result in an increased length of stay of at least one day in 75% of patients (PSCU, 1997:9).*

**Complication**

*A secondary condition arising during the hospital stay which, when present in association with one or more specific principal diagnosis causes and increase in length of stay (PSCU, 1997:9).*

**Convalescent days**

*An episode of care involving the provision of maintenance nursing while the patient achieves functional gain through his or her own resources (PSCU, 1997:9).*

**Cost centre**

*An accounting entity where all costs associated with a particular type of activity can be recorded* (PSCU, 1997:9). For example, the cost of training, occupational health and safety or agency nursing hours can be recorded.

**Cost weight**

In general, the cost of one item of production relative to other items. (PSCU, 1997:9).

**DRG**

Diagnosis related groups. See AR-DRG.

**De-identified**

All information which indicates the source of the data has been removed. For example the source could be name, address, date of birth, Unit record (UR) Number or Bed number.

**Dependency**

Nurse dependency, patient dependency, nursing acuity and patient acuity are terms which have been used to refer to the same or similar phenomenon within the literature. The acuity of the patient needs to be measured or determined before describing the dependency. This thesis analyzed patient dependency data, because of the intention to compare two nurse centered practices related to nursing workload.

In the past dependency systems implied that nursing resources were fixed and only patient variables were recognised. In contemporary dependency systems such as TrendCare, a patient's acuity is determined and then the nurse dependency. The nursing resources are no longer seen to be fixed and dependency is measured in hours and minutes (hh:mm) and skill mix. The skill mix may comprise qualifications,

experience, competencies, team models, mentoring and leadership qualities, even languages spoken. For example; a nurse may be proficient in AUSLAN sign language for the hearing impaired. See also acuity.

### **Direct care**

Direct care is a component of nursing care which includes all aspects of the patient's specific care requirements. The direct care requirements may vary from shift to shift with changes in patient acuity. Care given to a patient through direct contact with that patient e.g. hygiene care, administration of medications and treatments. (TrendCare 2003) *Generally care in the presence of the patients. (PSCU, 1997:11)* This thesis focuses on direct nursing care because it is variable and the most difficult to measure and predict.

### **Down time**

Periods of time during a shift when patient activity is low and nurses are able to participate in other ward activities. For example, in-service ward meetings, restocking, cleaning and quality improvement activities such as auditing. Downtime can occur during shift over lap times. This also occurs during the early morning for some night shifts (1.00 am – 4.00 am). If peak activity periods are not adequately staffed work will flow over into low activity periods and hence delete any possible down time. (TrendCare 2003).

### **Episode of care**

*A phase of treatment defined according to the acuity of the patient. There are currently four main types in the Australian casemix context: acute, rehabilitation, and palliation (sometimes called sub-acute), and non-acute (PSCU, 1997:13).*

**Excelcare**

A nursing care planning system comprising units of care which are derived from nursing standards and associated timings. It was developed in South Australia.

**Expert Nurse**

A nurse with special skills, experience or knowledge in one or several areas of nursing.

**Fixed costs**

*The costs of production of a service or product which are unaffected by changes in the production volume, at least within a wide range of volumes (PSCU, 1997:14).*

**Gaming**

See up scaling

**Hours per patient day (HPPD)**

The total number of productive hours worked by nursing staff with direct care responsibilities, per patient per day. In this study, in relation to TrendCare, HPPD is the sum of the total nursing hours worked (or predicted) for 24 hours, divided by the number of patients occupying beds at midnight, plus other separations during the previous 24 hours (discharges, deaths, transfers) (TrendCare, 2003).

**Indicators**

Indicators are areas the TrendCare system prescribes for consideration in measuring nursing care requirements. Examples include mobility, nutrition, hygiene and thought processes. An indicator is selected only if the patients' acuity conforms to the definition of that indicator for most of the shift.

**Indirect care**

Indirect care is the fixed component of clinical nursing care, which includes all activities related to the management of a ward/unit. For example the direct care can be provided by the Nurse Unit Manager, lactation consultant, stomal therapist, or educator, whose hours of work are included, regardless of acuity or occupancy or other measure. Patient acuity has little impact on indirect care. Indirect care also includes completion of tasks relating to a patient which does not involve direct contact with that patient. For example liaison with other health care providers about patient care (TrendCare 2003).

**Inpatient**

A patient who has been formally admitted to a ward / unit.

**Inter-rater reliability (IRR)**

The reliability of raters in the selection of the same indicators for the same patient.

**Length of stay (LOS), Average length of stay (ALOS)**

The time from formal admission to a ward or unit until separation; death, discharge, or transfer out of facility. ALOS – refers to the average or mean LOS, usually for a patient class, such as DRG, surgeon, TrendCare category, ward type or patient type.

**Macro**

A short software program written to automate several steps.

**Major Diagnosis Categories (MDCs)**

*A high level of grouping of patients according to principal diagnoses, as used in the Diagnosis Related Groups, (DRG) casemix classification. The Australian National DRG Variant has 23 major Diagnostic Categories (PSCU, 1997:18).*

**Mandated nurse patient ratios**

Nurse patient ratios which are legally enforceable.

**Medical Illness Severity Grouping System (MedisGroups)**

*A scoring system which involves the extraction of approximately 250 types of clinical data items and computation of a weighted measure of severity of illness. The results can be used for many purposes, including assessment of quality of care and study of variations in casemix within DRGs (PSCU, 1997:9).*

**Medicus**

The Rush Medicus Patient Classification System. It contains 37 indicators that determine patient dependency. It was developed in the USA in 1976.

**Minimum safe staffing levels**

Minimum safe staffing levels are rostering strategies which may be established as 'policy' by individual hospitals. These policies override all acuity measures. For example, night duty may predict 12 hours of direct care time, based on acuity, but policy requires a minimum of 2 nurses to work in each ward or unit on night shift. Two nurses on night shift would equal, for example, 18 hours. Therefore, the night shift would have 12 hours of care time and 6 hours of safety time, to maintain minimum safe staffing levels.

**Night duty unproductive time**

The TrendCare system takes into consideration the 'down time' during the early hours of the morning on the night shift when the patient activity is low and recognises that this minimizes a nurse's opportunity to attend to patient care during this time. The unproductive value selected when setting up ward maintenance should be reflective of

ward activity during this time. Refer to the TrendCare Training Booklet – Clinical. (TrendCare 2003).

**Nurse**

Nurse refers to nurses licensed to practice nursing and are registered with the state licensing authority

**Nurse mix**

The mix of nursing hours, skills and competencies in a ward/unit or hospital.

**Nursing costs**

The total cost of provision of nursing to inpatients. The total cost may be divided by the number of patients, the number of occupied bed days or weighted according to the case mix.

**Nursing diagnoses**

A classification of conditions considered to be relevant to nursing care.

**Nursing intensity**

Nursing intensity was used to develop an allocation method. Nursing intensity measures such as for example, mobility and ADLs and build on PCSs that had focused only on tasks (Prescott and Phillip, 1988).

**Nursing resources**

Nursing resources are the available hours and skill mix of nurses. See skill mix.

**Nursing workload**

The amount of work allocated to a nurse or team of nurses to be completed in a shift.

**Nursing workload variance**

Nursing workload variance is the difference between the nursing hours predicted for care and the actualized nursing hours.

**Occupied bed day**

*A term used in Australia to describe an inpatient day of stay (PSCU, 1997:22).*

**Other clinical and non – clinical hours**

All hours entered into TrendCare that are not clinical nursing hours for inpatient care. (TrendCare 2003).

**Outside Raters (IRR testers)**

Experienced nurses from outside the unit, who have a high reliability coefficient for indicator selection. The nurses have been deemed competent as an IRR Tester and have a good understanding of patient care within the unit being tested.

**PAIS**

Patient Assessment and Information System: It is a factor type patient classification system which was first developed by Hovenga in Australia in 1981. It is used to identify nursing resource requirements on the basis of selected patient characteristics and nursing interventions.

**Pathway variables**

Pathway variables are conditions or events which change the direction for the patient along a clinical pathway. For example, the onset of pulmonary embolism or fall post total hip replacement. Pathway variables may alter acuity and may be clinical, patient, clinician, or organisational in origin.

### **Patient Classification Systems (PCS)**

Systems used to measure nursing resources required for a given classification of patient types.

#### **Patient shift**

Also known as shifts of care. Each shift of care required by each patient. One or more shifts comprise an episode of care for each patient. There were usually 3 shifts of care per 24 hour period, comprising morning shift, evening shift and night shift, except in Intensive Care where it is customary to have 2 shifts of care, known as day shift and night shift, each of 12 hours duration. A fully occupied 30 bed ward (non-ICU) would have 30 shifts of care in the morning and 90 shifts of care per 24 hours.

#### **Patient type**

Patient types are recorded in TrendCare in two ways. The first is a TrendCare descriptor which is applied on admission to establish a TrendCare Patient Type; for example high dependency - surgical. The description is determined by the categorizing nurse and should reflect the patient's condition and care requirements (TrendCare 2003). TrendCare patient type may change throughout the episode of care.

The second way that TrendCare records patient type is by DRG. All in-patient diagnoses and procedures are coded and grouped by the hospital Health Information Service, after patient separation, to allocate a single DRG for the episode of care. This patient type is allocated once and never changes. This patient type is of interest for overall casemix funding purposes, but not for this thesis.

The ratios formula does not consider patient type. See Ward types.

**Patient Type Category**

A category developed for the purposes of reporting in this thesis. Six categories were developed medical/surgical, paediatric, ante/postnatal, adult critical care, non-adult critical care and other. The 41 TrendCare patient types were mapped to these 6 patient type categories. See Table 4.7.

**Patients per day**

The calculation of patients per day in TrendCare is based on the premise that one patient present in the ward for one shift = 1/3 day i.e. 3 shifts = 1 day. If a ward is only utilized for 1 shift of a day e.g. day surgery then the adjustment is made i.e. 1 shift = 1 day (TrendCare 2003).

**Policy Funding**

Funding policy is the rules to distribute resources, with a focus on the public sector.

**Predictions**

Nursing staff categorize patients for future shifts (TrendCare 2003).

**Prospective payment system (PPS)**

*A type of output-based funding formula, whereby health care providers (usually hospitals) receive predetermined payments for each episode of care defined by casemix classes (usually DRGs). The term was first used for US Medicare's DRG-based payment system for hospitals, has since been used for other payment models, but especially those in the USA (PSCU, 1997:25).*

**PRS-2**

Patient Reporting System, version 2, is the system of transmission for the dataset VAED (Victorian Admitted Episode Dataset). Similar methods and datasets are used in other states and countries.

**Ratios**

Nurse patient ratios is a nursing resource allocation methodology. There are various methods of application including formal and informal ratios and mandated nurse patient ratios as applied for example, under the Victorian Public Sector Heads of Agreement. The principal is to ensure that the number of nurses available is commensurate with the number of patients requiring care and that nurses in similar settings care for the same number of patients. Also known as occupancy based nurse patient allocation.

**Rehabilitation**

*An episode of care involving active multidisciplinary therapies to promote significant gains in functional ability. Sometimes defined to be a type of sub-acute care (PSCU, 1997:27).*

**Reliability**

Reliability is a research term which describes whether the measure yields the same value in repeated studies.

**Resource heterogeneous**

The extent to which cases assigned to the same casemix class are dissimilar in terms of resource use (PSCU, 1997).

**Resource homogeneous**

The extent to which cases assigned to the same casemix class are similar in terms of resource use. A goal of the designers of casemix classifications (PSCU, 1997).

**Roster re-engineering**

The process of re-designing the staff roster to match peaks and troughs in patient acuity and ward activity (TrendCare 2003).

**Separation**

*The end of the episode of care that may come about through discharge, death, or transfers to another care facility (PSCU, 1997:28).*

**Skill mix**

Skill mix refers to the mix of nursing team skill. These skills include knowledge, competencies (formal and informal), experience and time management practices. The skill mix affects patient care, staff development, staff satisfaction and costs. An effective team leader and a skill mix of senior and junior staff working together, provides leadership, mentorship, teaching and learning experiences and role models, to ensure quality patient care (Lowe, 2003).

The skill mix can be manipulated by the Unit Manager. For example, an unavoidably poor skill mix may be supplemented by additional nursing hours, or supplemented according to identified deficiency, for example, additional clinical hours, clinical nurse specialist, educator, lactation consultant, stomal therapist or by changing the model of care. It is also possible to enhance the staff skill mix over time. For example, the provision of targeted education for the development of staff competencies and time-based experience.

**Severity of Illness (SOI)**

Used in different ways in the literature to associate complexity of diagnosis or treatment with resource use.

**Staffing**

The recruitment and allocation of nurses to carry out the work of a ward or unit.

**Standards**

Standards in nursing are those professional skills and practices, which by general consent of nurses form a basis of comparison of an approved model, which adheres to legal, ethical, financial and consumer expectations.

**TrendCare**

A computerized patient acuity/patient nurse dependency and clinical pathway management system. It was developed in Australia in the early 1990s.

**Up-scaling**

Up-scaling may occur when a nurse reports a patient acuity level that is higher than the actual level required. It may occur deliberately or incidentally. Up-scaling sometimes occurs when direct care nurses perceive a higher workload, or level of 'busyness', than that which is predicted or actualized by the patient care reporting system. Reporting higher levels of acuity may be perceived by nurses to justify higher nursing resource consumption, although this consumption may have arisen for another 'non-acuity' reason. Examples of non-acuity reasons are requirements for non-nursing tasks by nurses, such as emergency maintenance repairs or locating pharmacy items 'out-of-hours'. Also known as gaming.

**Unpredicted work allowance**

The TrendCare system has a 12.5% unpredicted work allowance built into the patient category hours. Most wards will absorb this allowance during an 8 hour shift (TrendCare 2003).

**Validity**

Validity is the extent to which a measure represents the attribute of interest.

**Variance in TrendCare**

The differences between the predicted and actual care provided.

**Victorian Department of Human Services (DHS)**

Victorian State Health Department

**Ward type**

Within the TrendCare system, ward type is recorded as part of the Victorian public hospital ratio formula. For example, medical/surgical ward, rehabilitation ward. The TrendCare dependency system does not undertake measurements using the ward type parameter. See Patient types

**Yale Cost Model (YCM)**

*A public domain software package which supports product costing. Originally developed at Yale University. An updated version developed in Australia is known as COSMOS. (PSCU, 1997:32).*

**Yale University**

*Important in the history of casemix, because several casemix systems were developed there under the leadership of Professor Fetter (PSCU, 1997:32).*

## CHAPTER ONE

### ACCOUNTING FOR NURSING IN HOSPITALS

#### 1.1 Introduction

Nurses represent the largest professional group in the health care workforce in most Western economies (Diers, Torre, Heard, Bozzo and O'Brien 2000, Cockerill, O'Brien-Pallas, Bolley and Pink 1993; Bennett 1990; Sovie 1988; Barr 1984). The principal reason for admitting patients to hospital is because they require nursing care (Diers 2004, Sovie 1988). Nursing care is one of the most costly care items in a hospital operating budget (Hovenga, 1994) and nursing care costs are now commonly exceeded only by the costs of technology and pharmaceuticals (Diers, 2003). In a policy context, accounting for nursing care should be high on the agenda for hospital managers and funding agencies.

This study was set in the policy arena of the Victorian public hospital experience where a staffing ratio law has been passed that trumped acuity based staffing. It was conducted from the perspective of an observer, attempting to understand the political and clinical landscape of mandated nurse patient ratios and was designed to shed light on a situation where policy has been established in the absence of data and the alternative was never tested. The study is grounded in nursing resource allocation and costs frameworks and is in effect a simulation of two different policy approaches. This is a correlational study of a retrospective cohort of nursing workload reports for the same patients and staff, during same cross-sectional period of time. It is a study that will inform policy decisions on nursing workloads.

The primary aim of this study was to examine the variation between predicted and actualized nursing care for two contemporary nursing workload allocation practices. The analysis was undertaken to determine if a correlation exists between predicted

and actualized hours per patient day for mandated ratios (as in Victorian public hospitals) and/or the dependency system such as TrendCare. The analysis also examined whether either practice reliably predicts the nursing resources appropriate to the variations in patient requirements in 22 acute care hospitals in Thailand, New Zealand and Australia.

## **1.2 Nursing as a resource**

The judicious management of nurses' wages and conditions could reasonably be expected to protect an organisation's clinical and financial future, especially since the outcomes of nursing work impact upon so many stakeholders. An increased sense of consumerism in society has been a catalyst for health service providers to enhance their accountability to stakeholders. In the healthcare setting these stakeholders include patients and their relatives, nurses, other health professionals, ancillary staff, hospital managers, funding agencies and payers such as state and federal health departments, private insurers and compensation agencies. Despite the need for enhanced accountability in hospital service provision, most nurses and their managers continue to experience difficulties in accounting for and allocating nursing work. It is therefore difficult to account to stakeholders with some level of guarantee that patients receive their 'fair share' of nursing care when admitted to hospital.

Many health care commentators and leading health industry officials would suggest that the nurses' contribution to patient care simply cannot be measured; let alone predicted. A dearth of credible evidence for a measure or quantification of nursing care raises the question of how hospital managers are accounting for nursing in hospitals in the current economic climate of accountability and resource rationalization.

The complexity of nursing resource allocation is exemplified in the following quotes which show the diametrically different views of two expert Australian nurses.

*'Equitable resource allocation for the provision of hospital nursing services is dependent upon the use of valid and reliably used nursing workload monitoring systems'* (Hovenga 1994:6). *'Dependency systems cannot provide certainty of nurse staffing numbers, unlike nurse patient ratios which are linked to Government funding and are enforceable'* (Morieson 2003:4). These two experts have advanced two contrasting practices for measuring and managing nursing workloads. The two practices are patient dependency systems and nurse patient ratios.

Nursing was once considered 'invisible because it was difficult to measure' (Doncliff, 2001). Optimum nursing resource management is now known to be the essence of sound clinical and financial outcomes (Wood, 2001). In this thesis, I examine two contemporary management practices which purport to address an issue which has historically been difficult for nurse managers, i.e. predicting the nursing resources appropriate to the variations in day-to-day patient requirements in acute care hospitals. These nursing resource requirements usually occur in a random pattern. The practices examined are a computerized dependency system that calculates nursing hours per patient day by various patient types and nurse patient ratios. The practices underpin key nursing resource management policies.

This study includes an analysis of actual acute hospital data and seeks to identify to inform the development of knowledge for nursing resource management and the evolution of sound nursing policy. The TrendCare system was selected to facilitate this analysis because it is a computerized system which has the capacity to simultaneously measure nursing workloads through both of the practices of interest i.e. a dependency method of nursing hours per patient day (HPPD) by various patient types and nurse patient ratios. These practices have recently been incorporated in policy and Enterprise Bargaining Agreements for nurses in Australia and other international settings. A statistical analysis of the variance between nursing hours and patient types was undertaken through retrospective analysis of existing administrative

data, provided by acute care public and private hospitals in Australia, New Zealand and Thailand.

The study is significant because it is the first empirical analysis of patient dependency and nurse patient ratio data on the same patient and staff cohort. It is expected to be of interest to all stakeholders and notably to funding agencies that have established nursing policy using either of these two practices to measure and allocate nursing workloads. Examples of these policies include the introduction of mandated nurse patient ratios in Victoria by the Department of Human Services (DHS), the Safe Staffing Law governing hospitals and nurse patient ratios in California, United States of America and staffing by TrendCare agreement incorporated in the Enterprise Bargaining Agreements of some regional Victorian Hospitals. There is a keen interest in the outcome of these policies by observers in other Australian states, New Zealand, the USA and various other international settings as the difficulties of accounting for nursing have not yet been resolved. This study was designed to inform the debate about future policy directions by providing data for the first time about nursing hours in a simulation of the Victorian public hospital nurses' experience.

### **1.3 Measuring and allocating nursing work**

There have been many attempts to measure nursing work and allocate resources since the days of Florence Nightingale, when the sickest patients were treated nearest the nurses' workstation and were cared for by the most experienced nurses. Some attempts to measure nursing work have focused on patient requirements. Others have focused on nurses' work or on the costing of nursing services or a combination of these. Over the past fifty years, a wide variety of methods, systems and technologies have been developed at local and international levels. Nursing workload measurement systems are known as nurse dependency, patient dependency, patient classification, nursing acuity systems or patient dependency systems. The meanings and definitions of these terms vary to some extent, however each measurement system attempts to

measure nursing work. In this thesis, 'patient dependency system' is used when I refer to any such systems, including TrendCare. The TrendCare dependency system is discussed further in detail throughout the thesis.

Patient dependency systems measure the nursing resources required for the care of a given classification of patient types. Different patient types occur in various ways, such as by medical or nursing diagnoses, length of stay or severity of illness. For introductory purposes, the concepts of high and low patient dependency can be explained by variations in patient requirements for nursing care. Patients with high dependency have complex or extensive care needs and may require care for long periods of time and often by nurses with high skill levels. In contrast, patients with low dependency have less extensive or less complex care needs, and may require less nursing time and/or nurses with less specialised skills.

The patient dependency systems were commonly used for predicting nursing care requirements and contemporary systems now enable nurses to update or 'actualize' the record to include the care actually provided. This ability to actualize provides nurses with the opportunity to analyse and address the variance between predicted and actualized care. In the past, prediction-only systems were often paper-based. Hospital managers generally ignored them and preferred to operate with the indicator of 'wages paid' in an equivalent historical period. In other words, managers compared the payrolls of a ward or unit rather than the care requirements of patient types or the workload of nurses.

As an indicator of nursing activity this method is often flawed. The wages paid could have been considerably higher than required. They could be higher in a ward with a majority of patients with a low dependency or where there is an unplanned reduction in occupancy i.e., a number of discharges and no admissions after the commencement of a shift. Equally, the wages paid could be considerably lower than required, as in a ward with a majority of high dependency patients or in wards that experience severe

shortages where not enough nurses are available to meet predicted needs. Nursing shortages are of world wide concern, especially in rural areas. Prolonged shortages of nurses would establish a pattern of lower payrolls. The payrolls would reflect the reality of sub-optimal nursing levels, yet hospital managers continue to use them as the cornerstone for fiscal planning for future financial periods. These future periods would foreseeably include increased patient dependency associated with an ageing population and a growth in demand for acute services with subsequent limitations on the availability of convalescent care in acute hospitals. In short, retrospective data that is based on inadequate staffing levels is still commonly used to determine the prospective nursing care requirements of patients.

Hospital managers, who used the patient dependency system data, would often override the results of the measurements by nurses. In response to this practice, nurses sometimes 'fudged' the data, especially when data input time was limited or there was a perceived unfairness in workload. Data gaming, or up scaling, is used to classify patients at a higher dependency level than would be expected, in order to increase nursing resources and ease a poorly defined workload. The practice may occur either deliberately or incidentally. An example of incidental up-scaling may be where higher than expected dependency levels are perceived for patients cared for by overloaded, inefficient or junior nurses. The nurses know they are busy, yet the measurement system fails to demonstrate that satisfactorily. Up-scaling is most common in settings where budget cuts are customary and where associated policy has been implemented without consultation. Such policy, for example, could be the reduction of nursing hours by 10% across the hospital or on public holidays or towards the end of the financial year. Up-scaling is also common where the patient dependency system has little or no credibility with hospital managers, accountants or nurses and serves no major function.

The data input is likely to be more accurate and complete and less likely to be manipulated by nurses or managers, where the measurement of nursing impacts on an important operational function, such as the payment of nurses' wages (Lowe, 2004). For example, some hospitals have abandoned the use of timesheets and pay staff according to the linked roster and patient dependency systems. In these hospitals, patient dependency data is likely to be more reliable than in those hospitals with traditional paper timesheets and the number of pay disputes is also significantly reduced (Lowe, 2003).

In a local study in a Victorian hospital, Heslop (2001) noted that the allocation of nursing staff was made according to ward requirements following negotiation with Nurse Unit Managers (NUMs). Many nurse managers consult their nursing team but continue to allocate nursing resources using what Finnigan, Abel, Dobler, Hudon and Terry (1993) describe as the 'gut override' or an intuitive approach. Essentially, these managers continued to rely on experience as a way of harnessing nursing resources with varying degrees of success. Sometimes this method can be accurate, though it is lacking in a scientific approach and struggles to achieve credibility with hospital finance managers. Clearly, nurses need empirical data for decision-support for their expert opinion, which will legitimately continue to be the predominant workload management tool.

Emerging technologies are now available to record patient dependency and nursing workloads in a way which is increasingly valid, reliable, retrievable and comparable for nurses and their managers. Important enhancements include incorporating the capacity to actualize care requirements, in addition to those predicted, together with the ability to predict and actualize the nursing skill mix. The nursing skill mix is the number, qualifications, experience, competencies and efficiencies of rostered nurses. If information on the trends and variances in patient dependency can be linked

appropriately to nursing services, then managers may be able to more accurately predict nursing resource requirements both in nursing time and skill mix.

Enhanced accuracy of prediction of nursing resource requirements, according to variations in patient type, has some significant advantages when compared to the inflexibility of allocation in accordance with historically similar periods such as monthly nursing payrolls or bed occupancy levels. These advantages are:

- patients receive their fair share of nursing according to clinical need;
- nurses are allocated a fair share of the work; and
- funders or payers receive what they paid for.

An optimum match of nursing resources to patient requirements facilitates sound management of one of the most costly care items in the hospital operating budget. The ability to **predict** this match with a high degree of reliability is essential under prospective payment systems (PPS) of contemporary casemix funding environments.

#### **1.4 Per diem traditions and casemix**

For many years nursing resource requirements have been predicted by hospital managers who have calculated an estimate on a per diem basis, using retrospective information such as ‘wages paid’ and ‘occupied bed days’ from previous years. Nursing resources requirements per patient were calculated by dividing the wages of the total staff resources of the nursing unit over each year, by the total number of occupied bed days. This calculation was referred to as the daily or ‘per diem’ cost for nursing. However, wages paid in the calculation is an entirely different concept to that of nursing resources measurement since it is a reflection of payment for the nurses who actually ‘turned up for work’ rather than the nurses who were required. As already discussed, in some cases the wages will be higher and in others it will be lower than required. In any case the wages are likely to have been an unreliable estimation of nurse staffing and neither reflect actual nursing care requirements nor

direct care provision. The per diem estimate calculates each nurse's working day as though patients had similar requirements and required similar resources. Per diem thus implies the same costs were incurred. Whilst this may be a reasonable assumption for accounting purposes, nurses know that patient dependency varies significantly and that resources must vary according to the level of care to be provided and skill mix of staff available.

Most hospitals continue to use the 'per diem' method for estimating direct care nursing resource requirements which is usually based on the patient census at midnight. The census is the denominator in per diem calculations, purporting to reflect the number of patients in the ward. It is often the number of inpatients at midnight but this fails to reflect the true number of patients cared for in the previous 24 hours period and the dependency of those patients. The true number of patients would additionally include same day admissions and separations. The absence of a reliable and universally accepted method of allocating nursing resources means that the resources continue to be approximated by local and international funding agencies with little input from nurses delivering the care. Nurses and hospital managers know that the per diem method is flawed because all patient days do not have similar nursing resource requirements. Patient dependency and nursing care requirements, can vary significantly from shift to shift, ward to ward, hospital to hospital and year to year (Gillet, 2001). As a result of such variance, nursing resource allocation is often inadequately linked to an organisational financial framework (Finnigan, 1993) Further, nursing resource allocation is poorly integrated with other hospital information systems (Goossen 2000, Diers, 1999).

The implementation of prospective payment systems (PPS) in the USA during the early 1980s brought attempts to measure nursing resource requirements prospectively to the fore, although to date the payment rate remains prospectively based on retrospective casemix data. Prior to the introduction of PPS, concerns about nursing

work were considered conceptual or emotional (Kelleher, 1992). Such concerns were embedded in the assumption that caring work done by a predominantly female workforce was incongruent with the objectivity required for monetary compensation (Hendricks and Baume 1997). Caring work was also perceived to be of a lower status than the work of giving treatment. Caring was also considered to be not tiring, not difficult, less deserving and of a lower pecuniary value than the care provided by other health professionals (Hendricks and Baume 1997). The combination of these factors and the nurses' inability to account for their work financially, have unfortunately been factors that have contributed to the practice that nurses are not distinguished from the components of room and board, that is the costs associated with hotel services. In 2004, following the implementation of a standard chart of accounts for Victorian public hospitals, nurses wages at ward level remain bundled with, for example, ward clerk wages and consumables such as patient meals and dressings. There are several other inclusions which are bundled with nursing services and that do not relate to direct nursing care. With such an aggregate of inclusions in the nursing costs, it is essential that nurses know their patient care requirements or risk cuts to an inflated nursing budget caused by variables which are not attributable to nursing.

As a response to PPS developments, some estimates of nursing resource weights for Diagnosis Related Groups (DRGs) casemix classifications have occurred (Caterinicchio 1983, Thompson and Diers, 1991, Picone, Ferguson and Hathaway, 1993, Hovenga 1994, Diers and Potter, 1997). In some of these studies the weights proposed were based on retrospective wages information or on work sampling observations. The weights were calculated in ways that reflected total case resources or homogeneity across casemix types, such as DRGs. The measurement of total case resources implied that all days of hospital stay were of equal nursing value. By using these weights, nurses and hospital managers had little success in demonstrating the

real requirements for nursing care, or defining measures through which they may obtain appropriate funding for nursing resources consumed.

Prospective payment systems were introduced into Australia and New Zealand during the 1990s. Research conducted by the Victorian Department of Human Services (DHS) on estimating nursing resource weights for DRG casemix classifications established that nursing resources significantly varied between hospitals, for the same DRG (Gillett, 2001). The research by Gillett (2001) also suggested that variance across DRGs was even greater between specialty hospitals and by the same hospitals from one year to the next. The finding is a surprising result considering specialty hospitals would be viewed as having greater nursing expertise and efficiency in caring for a majority of patients of similar types. It is less surprising that a significant variance exists for different years for the same hospital, when the influence of other variables such as an increasing incidence of co-morbidities and advancing of the average patient age are considered.

Private health insurers conducted similar comparative studies. Data showing variations in patient dependency within or between DRGs or between hospitals had not been available until that time. Researchers at the DHS suspected that DRGs may be generally resource homogenous in terms of length of stay (LOS) but nursing heterogeneous (Gillett, 2001). DRGs are grouped according to commonalities in total resource consumption, yet the nursing resource component may vary significantly within and between the groups. This may result in under or overfunding of some DRGs where the nursing care does not match the current weighting. For example, the dependency of a patient in a particular DRG may be more intense due to incontinence and immobility, requiring two nurses for care. However, other patients in the nurses' care, with the same or similarly weighted DRG or health fund case payment, may subsequently receive less care than that allocated. Picone et al (1993) observe that the

outcome of research on nursing resource weights by DRG is that they are limited in many respects, since DRGs do not:

- fully describe actual work done by nurses;
- recognise the complexity of care for patient co-morbidities for example obesity and dementia;
- recognise different or changing environments for example pre-admission clinics;
- acknowledge the patients' contribution to their own care, or lack of contribution for example compliance with physiotherapy exercises or conversely continuing to smoke during respiratory illness.

Diers (1992:139) sums this up by observing that '*DRGs provided a way to pay for care that was defined by what patients need, rather than what was done for them.*'

Nursing dependency systems of the past were paper-based and often without permanency within the patient record. While it seems extraordinary now, it was then common practice to record in pencil to facilitate erasure for the next shift. The nursing dependency records formed no part of the medical record, or the financial reports, and were eventually stored away in an office for many years before disposal, neither informing any one or in any retrievable state should access to the data be requested. Some research has been published on the Australian experience to provide dependency-based costing information for nursing services (Hovenga 1983, Picone et al 1993). However, we now have the technology to combine financial and clinical data to provide integrated information by DRG or other methods which best measure patient dependency and the management of nursing resources.

## **1.5 TrendCare**

An example of this technology is the TrendCare system. It is a computerized Australian product and a commonly used method of providing nursing resource

information in public and private hospitals in Australia and New Zealand. It is also used in the major private hospitals in Thailand. Nurses at over 100 sites routinely collect data and this information is yet to be analysed statistically for its administrative applications.

The system measures the nursing time required to care for specific patient types and for specific dependency categories. There are approximately 41 different patient types including for example medical/surgical, paediatric oncology, psychiatric, high dependency unit (HDU), maternity and cardiac patients and this number is constantly under review in response to user feedback. There are 5 categories of dependency ranging from 1-5, which are calculated by the TrendCare system for day, evening and night shifts. The category level timings for patients include every aspect of nursing care for that patient for each shift. These aspects of care are known as 'indicators'. The base line hours for each patient type are the Category 1 hours. These hours give an average time allowance for a patient who is generally independent of activities of daily living (ADLs). Category 1 average time allowance also includes nursing time for documentation, patient inquiries, doctor's rounds, simple medications, simple treatments, routine teaching and counseling for patients and relatives (under 30 minutes), general care and attention. The TrendCare system will allocate a higher category when more complex care requirements with higher timings are recorded following prediction or actualization, according to prescribed indicators. The timings allocated for the prescribed indicators in TrendCare, vary between patient types. For example, the indicator 'mobility' will have less time allocated for care of day surgery patient types than mobility for rehabilitation patient types. Expert TrendCare hospital sites validate these timings at least every two to three years.

Both predicted and actual nursing care requirements for acute in-patient care are recorded in TrendCare and work allocation by the Nurse Unit Manager is based on

decisions about the variables of nursing time and nursing skill mix. The system provides managers with real time patient dependency data for decision support.

TrendCare measures patient dependency and predicts the nursing hours required. It also records care actually provided to individual patients on each shift. It provides data which can be used by hospitals preparing to develop dependency based budgets, re-engineer rosters, measure nursing resources for specific episodes of care, track variances and patient outcomes, and distribute equitable nursing workloads (TrendCare Systems Pty Ltd. Training Booklet 2002:6). The system has the capacity to measure trends in patient dependency and nursing resource consumption efficiency. In this thesis, I consider whether TrendCare provides accurate and reliable dependency data for apportioning nursing resources to patients in their care and compare and contrast this with nurse patient ratios.

## **1.6 Ratios**

Where data is ignored by hospital managers on the basis of poor quality or quantity, nurses perceive themselves to be at risk of unfair workloads. When nurses perceive that their workloads are unfair, patient care may be compromised, potentially affecting patient outcomes. Nurses also become dissatisfied with their working conditions and in Victoria they have been proactive in lobbying governments for workloads that are manageable and fair. In response to this lobbying and industrial action on pay and conditions by nurses, Commissioner Blair recommended a review of nursing workload conditions in the August 2001 Public Sector Agreement. Under the terms of the Agreement and in an effort to increase the retention of nurses in the Victorian public hospital sector, the Victorian State Government in 2001 introduced nurse patient ratios and also conducted a pilot of a nurse dependency system in 20 Victorian public hospitals in 2003 (AIRC, 2000).

The dependency system agreed upon was the TrendCare system since it was already implemented in 14 of the 74 Victorian public hospitals (the highest number with a common system) and was highly regarded within the industry. The decision to pilot TrendCare was part of a three-year agreement between the Victorian State Government, the Australian Nursing Federation (ANF) Victorian Branch and the Victorian Hospitals Industrial Association (VHIA), and is discussed further in detail throughout the thesis.

The ratios were minimum levels and additional nurses were to be rostered for patients of higher dependency. Data on patient dependency would seem to be essential, even in this negotiated and 'controlled' ratio environment, however the ANF remains opposed to the use of dependency systems (ANF Vic b, 2004). It is reasonable to assume that a history of hospital management practices of overriding the results of dependency reports, would account for this opposition. Mandated ratios are employed in relatively few locations elsewhere in the world, and the Victorian experience together with that of sites in the USA and South Africa will be analysed further in Chapter 3.

## **1.7 Aim and Purpose**

As described earlier in the chapter, the primary aim of this thesis was to analyze patient dependency data in a simulation study utilizing the TrendCare system and statistically examine the variance between predicted and actualized nursing care for two contemporary nursing workload allocation practices. The variance was examined to determine if a correlation exists between predicted and actualised hours per patient day for

- mandated Victorian public hospital nurse patient ratios; and/or
- the TrendCare patient dependency system.

The variance was also examined to determine any cost differential and if either practice reliably predicts the nursing resources appropriate to the variations in patient requirements in acute care hospitals. The purpose was to shed light on a situation where policy has been established in the absence of data and the alternative was never tested

## **1.8 Scope**

This thesis analyzed acute care hospital data that was recorded in the TrendCare system. Data were captured on the range of patient types in the acute care setting such as medical/surgical, midwifery, aged care, rehabilitation, psychiatric and emergency nursing. The sample involved participant hospitals considered to be expert TrendCare users in the public and private care sectors in three countries. Expert users were identified as sites operating TrendCare for greater than 3 months, who were supported by a system of inter-rater reliability testing and with experienced nursing and information technology TrendCare Co-ordinators. The participating hospitals had implemented and maintained TrendCare versions 2.1 - 3.1.2 and all the relevant upgrades. Each hospital was required to provide ethical approval for the project to proceed after approval was granted by the Standing Committee on Ethics in Research involving Humans at Monash University (SCERH).

All data collected was de-identified at the hospital level before being forwarded to the researcher. Data were collected about shifts of care and did not include identifying or personal information about patients or staff. One or more shifts comprise an episode of care for each patient. There were usually 3 shifts of care per 24 hour period, comprising morning shift, evening shift and night shift, except in Intensive Care where it is customary to have 2 shifts of care, known as day shift and night shift, each of 12 hours duration. An episode of care is the period of care between patient admission and separation. Separation includes discharge, death or transfer out of the health care facility to another health care facility.

The data collection period included episodes of care which commenced after the 1<sup>st</sup> May 2003 and were completed (separated) by midnight 31<sup>st</sup> August 2003. Some hospitals provided 2004 data for the same date range but data recorded in the months September to April of either year was excluded. For Australian and New Zealand hospitals, the timing of the data collection focused on the winter demand period.

There are various components of care that a nurse provides to a patient. These components are commonly categorized as direct or indirect care. Both components of care are reported in TrendCare. The thesis examined the direct care component, which is considered by the researcher to be more difficult for prediction of nursing resource requirements, since it is more variable and under greater influence by patient types than indirect care.

There were four main areas of TrendCare data, which were outside the scope of this study. They were:

- Levels, standards and quality of care;
- Data for indirect nursing care. This included all nursing resources that were not directly allocated for an individual patient, but rather a group of patients, e.g. the Unit Manager, infection control nurse, stomal therapist, diabetes educator and lactation consultant. These nursing resources are fixed and are not generally variable according to patient dependency or patient numbers. Such resources are considered to be ‘overhead resources’. They are relatively easy to calculate for budget purposes;
- Patient dependency data, for non nursing clinical hours such as physiotherapy or nutrition services;
- Data for clinical variances and patient outcomes, which were linked to the clinical pathway module of TrendCare.

All other valid dependency and ratio data was included as provided by the participating sites.

## **1.9 Thesis outline**

This study that begins with a discussion about the difficulties faced by nurses and their managers historically, in their endeavours to identify patient care requirements and allocate nursing workloads accurately and equitably.

A critical discussion of the literature is undertaken in Chapter 2. It describes the evolution of allocation practices and the classification of patient care. Chapter 2 also includes an examination of the history of nurse costing studies during the 1990s, when attempts were made to develop a method of measuring nursing work which would be compatible with the casemix funding methodology. Two popular contemporary practices for measuring nursing are identified. A detailed discussion of these practices follows in Chapter 3. Chapter 3 is dedicated to a discussion on the development of the practices of nurse patient ratios and the TrendCare dependency system and their influence on nurse policy in Victoria and other local and international settings.

In Chapter 4 the research design is described, including the design decisions made for mapping data between the ratio method and the TrendCare dependency method. Nurses know that patients contribute to their own care to a greater or lesser extent, and this is reflected as a variable level of dependency which is discussed in that chapter along with other variables. The limitations to the research are also discussed in Chapter 4. The results of this correlational study are reported in Chapter 5 and they are evaluated in depth in Chapter 6. In Chapter 6 the results are extrapolated for application in other hospitals in Australia and New Zealand. That chapter concludes with a summary of the data analysis and it synthesizes the ideas of current nursing workload practice and this research. I reflect on potential influences on the future management of nursing resources and nurse policy. Finally, recommendations are

made for on-going research relevant to understanding nurses' work in this dynamic and exciting area of nursing resource management.

### **1.10 Conclusion**

In contemporary health care environments hospital managers and policy makers are now very aware of the need to solve problems of inequalities in nursing service provision and to produce evidence about nursing resource allocation. Many nurses believe that individual patient care requirements vary considerably and care requirements are not being addressed by the use of traditional patient dependency systems. Other nurses argue that it is entirely appropriate to make variations in care processes systematic and understandable. Diers acknowledges the two sides of both arguments and suggests that there is the need to reconcile the necessity for a per case payment for DRG based payments, while recognizing that for nurses, patient care varies from day to day (1992).

The debate about whether individual care requirements are satisfactorily addressed in patient dependency systems is often couched in the language of measurement. There is now a sense of urgency for capturing clinical and technical evidence for measuring nursing so that we can move on to agendas such as accurate forecasting of nursing budgets. The key questions for this thesis are: Is there a correlation between TrendCare 'HPPD' and/or nurse patient ratios and the nursing care actually provided to patients? Which nursing workload allocation practice has the potential to better predict nursing resource requirements and as a result inform the clinical and financial futures of a health service organisation? The significance of exploring answers to such questions is summarised by a Director of Nursing Victorian Public Hospital who in 2001 stated that,

*'What all Directors of Nursing want is a predictive quality for direct care, comparing patient/ward types and nursing time and skill mix - information that can be used at ward level, at ward decision-making*

*times, not end-of-month. The information is there for modelling the future management of nursing resources. It just needs to be done.*

## CHAPTER TWO

### ECHOES THROUGH THE CENTURIES

#### 2.1 Background

One of the most important observations made in Chapter 1 was that hospital managers require reliable, relevant, nursing data that is comparable over time and between units or hospitals. Since the earliest days of nursing, when the most dependent patients were arbitrarily identified and located close to the nurses' work station, there has been a need for better management of nursing resources in hospitals. The efforts to identify a method for ensuring the optimum allocation of nursing time and skill mix for patient care has resulted in the development of hundreds of patient dependency and nurse staffing systems over the years. These efforts have continued over many years, suggesting that a truly satisfactory formula for accounting for nursing in hospitals remains elusive. The extent of efforts also suggests that similar methods were, and in some cases still are, being revisited or reworked. The literature reveals that some allocation practices, including those using patient dependency systems and nurse patient ratios, echo repeatedly through previous centuries. Although there has been much time and effort spent on development of nurse allocation and staffing systems, their success in informing managers for optimum nursing resource management has been limited. Giovanetti observed that, *'although other complex multidimensional challenges, such as sending men and women to the moon, have been overcome, nurse staffing has not'* (1994:331).

The high number of nurse allocation and staffing systems already developed is indicative of a culture where many health services consider themselves unique in their case mix and services. The measurement tool of one organisation may not be suitable for another. Jackson and Resnick (1982) discussed these difficulties when comparing

classification systems, describing the use of someone else's system as being like trying to fit round pegs into square holes. The range of requirements across health services has resulted in significant 'customization' of existing nurse staffing systems and re-development of others to address particular service needs. New nurse staffing systems have also been developed in response to changes in nursing practice over time. These changes have occurred for a range of reasons such as advances in independent nursing practice, medical treatments, and technology and health-service management models. Some observers say that DRGs have narrowed nursing practice such that it focuses more on economics than caring (Parkes, Picone, Challinger, 1994). Perhaps the most important reason for more recent changes in nursing practice has been the rise in consumerism. Patients reasonably expect their fair share of nursing services. Nurses too, expect a fair and reasonable workload. Consumerism in the workplace has accelerated the need for a dynamic nurse staffing system, which assists nurses and hospital managers to measure and allocate nursing work fairly and equitably.

From the beginnings of the early hospitals to the present day, many systems have been developed to measure and allocate nursing work and to determine a cost for that work. The evolution of staffing methodologies in nursing shows that from an early stage in the history of nursing practice, nurses were grappling with the complex multi-dimensional challenges of trying to find empirical ways of measuring nursing work (Giovanetti, 1994). A critical review of the literature is undertaken in this chapter to provide background to the study of nursing dependency systems and ratios, to discuss past attempts to improve the allocation of nursing work and to identify gaps as yet unexplored by previous researchers. The literature is critiqued within the contexts of the three accepted approaches to measuring nursing work and the nurse staffing systems they inform and presented in the following sections; Classifying Patient Care, Work Sampling and Nurse Patient Ratios, followed by a discussion on the Prospective

Payment Systems and the sequelae, PCS, RBS, RIMs, SOI, RVUs (see List of Abbreviations) and Nursing Cost Studies.

Historically, there have been many reviews of the literature concerning nurse staffing systems (Hovenga, 1994; Picone, Ferguson and Hathaway, 1993; Diers, 1992; Giovanetti, 1978; Aydelotte, 1973; Hearn, 1972). Aydelotte undertook a major review and critique of selected literature in 1973 and outlined the history of nurse staffing and its evolving complexity in the U.S. health care delivery system. Her views about findings in the literature were aimed at enhancing nursing knowledge about nursing care delivery systems. Many reviews questioned the limited theoretical foundations for the development of patient classification systems. Hanson makes this point when she acknowledges that although much has been written about the systems, the literature is not strongly supported by explanations of a theoretical basis for them. *'In my own review of the literature, I have found only one report of a well controlled study to test the validity of a patient classification system. This testing was of a John Hopkins system'* (1976:7). The John Hopkins system is discussed further later in the chapter. Scant theory, however, did not impede the proliferation of systems as nurses continued their attempts to classify patient care and account for their work. By 1980, there were approximately 1000 PCSs for 6000 hospitals in the USA (Giovanetti and Moore Johnson, 1990) and many others were also being developed elsewhere. I review historically the nurse staffing systems that have evolved (section 2.2). I begin in 1860 with the background and theoretical foundations of nursing resource allocation and then I journey through the evolution of nurse staffing and allocation systems to 2004 (2.3). The discussion includes both local and international practice contexts.

## **2.2 Foundations in the Nightingale era**

Some of the greatest influences on health care in the 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> centuries derive from the work of Florence Nightingale. She was the first nurse to consider

outcomes of care, the generation of cost reports on a regular basis for hospital committees, the monitoring of patient throughput, and the introduction of standards of care. Her remarkable skills as a statistician are especially noted. It is a tribute to Nightingale that empirical systems she developed 140 years ago, are still in place today (Tamplet Ulrich, 2002). In 1860, she presented a uniform hospital statistical system to the International Statistical Congress in London, proposing that the statistics would serve hospital managements well. Nightingale said, *'These statistics will enable us to ascertain what diseases and ages press most heavily on the resources of different hospitals. They would show subscribers how their money was being spent, what amount of good was really being done with it, or whether the money was doing mischief rather than good'* (Nightingale 1863, cited in Tamplet Ulrich, 2002:3). This was also an extraordinary insight into the need for hospitals to have data available to support financial accountability to stakeholders.

Accounting for how wisely hospitals spent the investment of their 'subscribers' was one of several reasons which inspired Nightingale to begin training nurses for the first time. She initiated acuity based nursing practices, based on intuition and placed seriously ill, more dependent patients closer to the nursing workstation and less sick patients with a lower level of dependency, further away from observers (Tamplet Ulrich, 2002). Today, for some nurses, intuition remains the most reliable method of nursing resource allocation (Burton, 1999). Even for those organisations using empirical systems or fixed policies for nursing resource allocation, the 'gut override' method continues to be used, as some nurses find that a patient dependency system does not account for what the nurse thinks 'is likely to happen' (Finnigan, Abel, Dobler, Hudon, Terry 1993). In contemporary hospital management, there is no capacity to formally account for any resource without tangible and comparable indicators. Indeed Nightingale herself monitored patient outcomes and supported intuitive practices with reports showing statistical representation. Tamplet Ulrich suggested that this early recognition of the need for sound data for decision support is

evermore vital now, and observed of Nightingale, '*As she led nursing in her own time so does her legacy lead us into the new millennium (2002:1)*'.

### **2.3 The evolution of nurse staffing and allocation systems**

The earliest approaches to systems that informed the allocation of nursing resources simply evolved from the various patient types that nurses cared for and which were categorized in an attempt to quantify the nursing workload (Aydelotte, 1973).

Historically there have been three approaches to measuring nursing work. The first approach is the opinion of the 'expert' nurse (Ferguson and Picone, 1994). This is a subjective evaluation based on decisions made under the power and influence of recognised nurse leaders in given hospital settings (Ferguson, and Picone, 1994). The opinion of the 'expert nurses' dominated nurse staffing allocation from the Nightingale era until the mid 1930's. Bryant and Heron (1974) adopted the philosophy that the Charge Nurse was the only one with sufficient knowledge to understand patient acuity and allocate nursing resources. They described a system of monitoring workloads of nurses at the United Cambridge hospitals, which relied on professional judgment and the experience of senior ward staff. This approach became less acceptable over time as the opinions of expert nurses were questioned and there was little empirical evidence to support their sometimes-diverse opinions. This presented obvious difficulties for comparability of data. Without consensus, there could be no data and therefore no information. Yet expert nurse opinion has had a renewed popularity in recent years, and has been noted in various contemporary studies and used for the determination of nurse patient ratios in California and Victoria.

The second approach to measuring nursing work is more structured and according to Ferguson and Picone, (1994) is known as the observer method . An example is work sampling, which involves observers recording nurses' work by direct observation for

a given period and for a sample of participants. The results are usually then extrapolated to other periods and other nurses. Work sampling is discussed in detail later in the chapter. While expert nurse opinion was useful for designing PCS, work sampling was essential for determining the associated indicator timings for patient care requirements (Ferguson and Picone, 1994). One of the limitations of work sampling was the high number of financial and physical resources required for sample sizes, which would have ensured confident extrapolations of the data (Ferguson and Picone, 1994). In addition, there were limitations in the transferability of classifications and timings across organisations.

The third approach for measuring nursing work is continuous self-recording where nurses routinely record the nursing care provided to all patients. According to Ferguson and Picone, (1994:21) it is the most attractive for the following reasons:

- there is minimal invasion of the patient's privacy;
- there is minimal disruption to work flow;
- nurses can best describe the activities they are engaged in;
- descriptive analysis of current nursing practices is provided by the nurse clinicians; and
- the responsibility for timing nursing activities is placed with nursing.
- there is information on every patient rather than on a subset of similar patient types.

Continuous self-recording generates a large amount of data for the entire patient cohort at a relatively low cost, although there are costs with training all staff, as opposed to a few 'experts' (Ferguson and Picone, 1994). There are also costs

associated with inter-rater reliability testing. Prospective payment systems were the single greatest influence on measuring nursing since Nightingale.

## **2.4 Patient classification systems**

The introduction of patient classification systems for describing nursing practice began in the early 1900's. By 1947, the rising cost of healthcare and in particular nurses wages, and the increasing shortage of nurses, prompted The National League for Nursing Education, USA, to begin work on identifying the right number of hours for care. Hospital managers were increasingly focusing on the amount and skill mix of nursing required. Ten years later, the first concrete effort to classify patients began (Giovanetti, 1978).

Giovanetti (1978) defined patient classification systems as systems, which group patients according to observable characteristics of nursing care requirements. The definition was later refined by Lewis and Carini (1984) cited in Farley Pardue and Dick (1986:23), as '*systematic identification and assessment of the individual nursing requirements of a group of patients*'. Patient classification systems (PCSs), or workload measurement systems, comprise instruments, processes, quantification of nursing time, staffing methodologies and rostering. The TrendCare system is multi-dimensional and includes patient classification functions that comprise each of these elements.

In 1951, the United States Army began using PCSs for staffing (Giovanetti, 1978). The Army identified factors to improve PCSs after a follow up analysis of average hours per patient day (HPPD) modelling. Interestingly at some hospitals, for example the Veterans Hospital in Brooks, USA, the completion of a 4 category PCS by nurses was voluntary. Patients were classified as intensive, moderate or supportive for nursing care requirements.

Bernstein, Cooper, Darling, Felton, Hanson, Kulibert and Moore (1954) conducted a study on direct care while they were graduate nurse students at New York University. They reported on their first efforts to measure nursing work, developing a staffing formula by splitting professional and non-professional work by categories, eg. the bed sponge category. This was a critical development in formally identifying nursing work. The catalyst was the nursing workforce shortage, since it was clearly a squandering of scarce resources and unnecessarily costly to invest nurses in non-nursing activities. Another significant development at this time was the increasing role patients had in their own care (Bernstein et al, 1954).

According to Joel (1984a), the development of the patient's self-care capacity remains a major factor in determining length of stay (LOS). Length of stay is a major influence on nursing resource requirements but it is important to emphasize that, counter intuitively, nursing resource requirements were not reduced in response to patients' increasing self-care. As LOS decreased, convalescent days were lost. Patients were discharged after fewer lower dependency days, and patients of higher dependency admitted to that bed. We now know that as LOS decreases, nursing HPPD increases (Lowe, 2004).

By 1957, the concept of allocating point values to nursing tasks was introduced. Connor began the development of workload measurement systems at Johns Hopkins Hospital, Baltimore, Maryland USA (Connor, 1961 a). He developed the Direct Care Index by using an observation technique in a work sampling study that investigated variations in nursing workload. Connor's work is considered a major influence in PCS development. He shifted the focus from the task required, for example, counting how many patients needed a full sponge, to identifying how long it would take for a full sponge for different categories of patients and for a different skill mix of staff. This represented a significant philosophical shift from the measurement of nurses' workloads based on tasks, to a focus on patients' requirements. In recent years, in

some settings such as Victoria, there has been a shift back to a focus on the nurses' workload. This point is elaborated in Chapter 3. To the contemporary nurse, there were some amusing definitions in Connors' work; patients were known as 'beds' and nursing work was described as the 'floor's workload!' (1961a). The workload was surprisingly only measured from 0700 to 1800. The overnight care was not considered in this study. There may have been two reasons for this, the first being that the workload was considered to be of a negligible level and the second being that night shift had fixed staffing.

During the 1960s, the development of patient classification systems had three distinct phases - all associated with a focus on resource rationalisation. The first phase concerned the professional and non-professional split; the second phase brought a focus on multidisciplinary team care. The third phase included a focus on the efficiency and effectiveness of nursing care (Giovanetti, 1978). The San Joaquin General Hospital and the Virginia Mason Hospital in the USA were early developers in promoting care efficiency and effectiveness. An example of efforts to produce greater efficiency was the decision to purchase pre-packed supplies such as enemas and imprest supplies for medications (Giovanetti, 1978).

In 1962, Young developed patient classification systems further and made attempts to control for variables of staffing associated with direct and indirect care (Young, cited in Giovanetti, 1978). In the same year, Flagle, Giovanetti's mentor, introduced the 'prototype' patient in an attempt to make the requirements for nursing staff more predictable and flexible than in the past (Diers, 1992). This was a subjective evaluation used to establish patient classification by matching patients into categories of care that most closely matched the prototypes by description. Professional judgement was used to match the patient to the prototype. The prototype, for example included instructions that stated 'requires some instruction, demonstration or support' and 'able to assume little responsibility for own ADLs'. Another way of establishing

patient classification was 'factor' or objective evaluation, where the patient is rated for nursing care elements, divided according to business rules for example factor 3 for complete assistance with bathing (Abdellah and Levine, 1954). In Australia, Hovenga (1983) developed a factor-type classification system. It was known as Patient Assessment and Information System or PAIS. PAIS is discussed further in the following section on work sampling.

Most of the work at this time on patient classification systems focussed on medical, surgical, obstetric and paediatric categories of patients in the hospital setting, since these categories were the most frequently occurring and exhibited the most variability (Giovanetti, 1978). Rehabilitation and community care settings did not have the same high degree of variability and there were fewer patients. Workloads studies in these care settings took much longer to establish. Also, in the mid 1960's, minimum safe staffing levels began to be considered as a safety factor, yet safe staffing levels were mostly related to night duty and the minimum safe level was arbitrary (Giovanetti, 1978).

In England in 1967, the Oxford Regional Hospital Board verified and adopted the developments made by Connor at Johns Hopkins Hospital, USA (Giovanetti, 1978). There were many similar findings between these two settings. Both settings identified the inadequacy of the midnight census for reflecting actual care provided. Regression analysis was used at Oxford to provide scores for individual items, rather than care groups and identified incontinence as an effective indicator of nursing care requirements (Giovanetti, 1978). The identification of this indicator significantly enhanced the ability to predict and increase the efficiency of the nursing care at that time. Modern continence aids have since reduced the impact of incontinence on nursing workloads. Other researchers also found that the consumption of linen was a rudimentary indicator of 'busy-ness'. Yet another study found mobility to be the key indicator (Bryant 1974).

The Oxford scheme was the most frequently adopted in the UK although regularly modified to suit local circumstances. Using this system, nurses gained greater control and were even allowed to refuse 'extra beds' (patients!) if there were insufficient staff (Giovanetti, 1978). Clark (1970:24) described chaos as the '*daily menu*' concerning nurse staffing at this time. She noted that the difficulties with staff allocation were exacerbated by nurses' inability to postpone any nursing activity and their need to provide care for the entire 168 hours of the week. There were also difficulties in postponing the duties required on behalf of other departments, who were not in attendance outside of business hours, and whose in-attendance was likely to compromise patient care. Examples of such departments include pharmacy, maintenance, security, waste management and supply departments. Many hours of ward work have traditionally masqueraded as 'nursing hours' but in reality were provided by nurses on behalf of these other departments and also in the event of non-availability of medical services.

More than 75% of the nursing care time is a non-business hour, including evenings, nights, weekends and public holidays. The researcher has observed that during non-business hours, nurses are still often required to assume a range of responsibilities, outside their area of expertise, with fewer resources. Nursing hours are also often reduced at such times for reasons other than patient dependency i.e. conservation of wages expenditure associated with weekend and shift penalty rates. Extraordinarily, many costing studies did not include the de facto allocation of nursing resources to other departments.

According to Giovanetti (1978) during the 1970s in the USA, care was given in an environment where there were limitations to the supply of nurses and where patients had widely variable care requirements. She observed that with the limitations posed by the short supply of nurses, there was a greater need to concentrate on skill mix and

to try and group patients according to care needs. This need meant that it was undesirable to have patients with widely variable care requirements in the same ward. The problem for hospitals was that they could not always manipulate the ward case mix or not admit highly dependent and high cost patients. Hospital managers now attempt to manage the number of some types of admissions to a degree, or spread them across units (Cooper and Kaplan, 1992). The difficulty for hospital managers over the years has been the familiar problem of a mismatch between the resources required and the resources available i.e. supply and demand. High cost patients are now often referred to in stark financial terms as unprofitable products (Athan, 2003).

In the UK, Beat (1970) observed that the old system of determining departmental staffing levels purely on the number of beds occupied had no place in modern management technique. She asked, *'How can a matron convince a group of lay people that a certain number of nurses are required for her hospital? How can she convince the medical staff that her nurses can no longer cope with further admissions? How could all this information be recorded and be put forward in a graph form so that anyone looking at it, either professional or lay could understand what he saw'* (1970:1)? Beat, showing remarkable foresight, began categorising patients with different weightings, such as 'age less than 12' and 'age over 75'. She also allocated a constant for indirect care and for time nurses spent away from the ward. Nurses, for example, would spend time off the ward for matters such as attending lectures, providing escorts, attending meetings or visits to the matron's office.

During the 1970's in the USA, standards of practice were developed and a uniform discharge data set was adopted by some hospitals. Giovanetti and Mayer (1984) linked standards of care to their actual provision in the PCSs and introduced reliability testing. With PCSs barely 20 years old, Giovanetti (1978) considered there had been a consequential improvement in the effectiveness of patient care and cost containment.

Hospitals in the USA and Canada began charging patients based on their nursing care requirements as per the PCS from 1971, but had difficulty charging for psychiatric nursing since these patients were often not in bed but 'wandering', and thus making direct care difficult to measure.

In France, Quebec's PRN System was adopted, and patients were billed using classification information for variable billing. For example, the nursing level 2 was charged at 60 francs. This variable billing separated room and board from nursing care and the income tagged for nursing was changed from a cost centre to a revenue centre (Chagnon, Audette, Lebrun, and Tilquin, 1978). Attempts to separate nursing costs from room rate commenced ten years earlier in the late 1960's, but had limited success. Charging for nursing promoted a view for managers of individualized nursing care, compared to standard per diem charges for all occupied beds that had previously equated all patient care. This was another major advance in accounting for nursing.

Sovie and Smith (1991) observed that no other industry operates by assigning fixed charges for major product lines when the materials and labour vary so significantly. Informed customers would no longer tolerate all inclusive room charges when it was obvious that other customers received more for the same price. The anonymity of the per diem charge devalued nursing and created major consumer inequalities (Flarey, 1990, Mowry and Korpman, 1985). Sovie and Smith (1991) also shifted the focus from room costs to professional and economic accountability by unbundling nursing from room charges and incorporating variable charging. Incorporating nursing costs in room charges was a legacy of the post-Depression years when hospitals saw the bundling of nursing with room charges as an opportunity to increase profit when negotiating contracts with Blue Cross (Thompson 1984). Of note, accounting practices have changed little for some hospitals over the subsequent 70 years and as

Diers observes '*nursing is still buried among the brooms, breakfast and the building mortgage*' (2004:225).

The primary purpose of the PCS was as a tool for staffing which responded to the variable nature of the demand for nursing care. The intention of its use as a staffing tool was to provide information to assist, and not dictate, staffing for the nurse manager. It may not have been a perfect tool, but at least it made nursing workloads measurable to some extent and not simply left to chance. In 1976, the Rush Medicus PCS was developed and many variations of this system remain in use today. Bennet (1990) considers this the best PCS to come out of the USA.

The year 1976 was also significant for the development of nursing service weights by DRG. In the late 1970's, researchers at Yale University, USA, were the first to link the data of each patient for each day of stay and to determine the total resources used during the entire LOS (Abernethy, Magnus and Stoelwinder, 1990). The Yale team's development of nursing service weights by DRG identified two pitfalls of PCSs for costing purposes. These pitfalls were likely to yield erroneous cost data. The first pitfall was that PCSs do not determine actual needs, but rather the care patients were expected to have. The second pitfall was that the PCSs quantify care and do not address quality (Shaffer, 1988). According to Dijkers and Paradise, (1986), there are potential variations in the quality of care delivered by various grades and levels of experience of registered nurses. Hovenga (1983) held a similar view. She regarded the success of the PCSs as dependent on the purpose for which they were designed. She saw the PCSs as identifying the amount of nursing care a patient should have, rather than what they had received or what they would receive. Trofino (1986) observed that the purpose of PCS changes from time to time. Phillips, Castorr, Prescott and Soeken, (1992) also identified that existing PCS did not account for differences in actual versus predicted needs for care. Hovenga (1983:50) explained that; '*Most PCSs fail to*

*account for indirect care and are inadequate in their definitions of the skill level required'.*

During the next decade, the growth of consumerism impacted on health as it did for other industries. Patients and nurses saw themselves as consumers. Nurses raised the profile of better care and made grounds on better resource allocation and job satisfaction. At the Community Hospital of Indianapolis, USA, in 1980, nurses recorded that one in four shifts was understaffed (Boyd, 1982). Nurses there raised the issue of paid and unpaid overtime, together with the issue of what care was not provided when understaffed. The nurses were concerned about how the staffing level affected themselves as well as patients (Boyd, 1982). They recognised that the cost of nursing care included the cost of direct care and indirect care, together with the cost of the availability of nursing care. For example nursing care provided overnight was still available while a patient sleeps. In 1983, Railey and Schaefer estimated that patients were receiving extraordinary value for money for nursing care, when they calculated nursing costs over a 24 hours period and determined that it may have been just \$4.50 an hour (Schaefer, 1985). Although beginning in the mid 1950's, this period also saw the first real attempts to provide uninterrupted time for the head nurse and others undertaking administrative tasks. There was a focus on skill mix and efforts to ensure nurses' duties were commensurate with levels of expertise.

The 1980's saw the introduction of the concept of the consumer focussed 'continuum of care'. PCSs implied that categories of patients had similar needs. The problem according to Philibert (1986) was that those using PCSs assumed that the nursing process was measurable. They also assumed that nursing process activities constituted a set of interrelated functions that were measurable and which addressed individual needs of patients. Charbonneau, Ostrowski, Thomas Poehner, Lindsay, Panniers, Houghton and Albright, (1988:805) questioned, *'the meaningfulness of the PCS to*

*contribute to the understanding of the patient's healthcare status, needs and projected resource utilization'.*

Comparability of patient dependency data in different settings was difficult, both conceptually and practically since the use of PCSs was higher in larger hospitals and lower or nonexistent in smaller hospitals. The data was also unlikely to be comparable between like sized hospitals due to variables other than size. In 1982, a survey by Mijers (Cockerill and O'Brien-Pallas, 1990) found that hospitals from 300-499 beds were the greatest users of PCS but very few reviews were published. Some commentary was available through PCS vendors or developers.

Grimaldi and Micheletti (1982) examined two alternative cost and resource allocation methods. The first being the per diem method where total nursing costs and in-patient days were divided into three groups- for example, neonates, critical care and medical surgical obstetric. The per diem method made no allowances for variation in diagnosis or individual care needs. Secondly, they examined the relative intensity measure (RIMs) where the notion of nursing intensity was used to develop an allocation method. Nursing intensity measures such as for example, mobility and ADLs, build on PCSs that had focused only on tasks (Prescott and Phillip, 1988).

Governments from around the world began to realize that allocating vast amounts of public money to nursing with few comparable reporting systems would not be sustainable. In 1984, Barr observed that the UK government expected to spend £90 per head per annum, equivalent to £4,000 million on nursing yet it did not have a satisfactory nurse staffing system. Barr felt that the UK was at much the same stage of 'non-development' as the rest of the world and with little prospect of developing a system in the short term. Indeed, 7 years later there was apparently little progress with identifying a suitable system. In 1991, the Audit Commission for Local Authorities: National Health Service of England and Wales suggested that;

*There is no consensus on how many nurses or what skill mix is needed, data is poor and there is no consistent approach to setting the ward staffing levels, there is a wide variation in staffing numbers and between similar wards which is not easily explained' National Health Service of England and Wales (cited in Ferguson 1994:20)*

Similar realizations about inconsistent approaches to setting ward staffing levels were occurring in Australia. Industrial action in Victorian public hospitals led to the establishment of a Committee of Enquiry into Nursing in mid 1983 (Hovenga, 1994). The brief for the Committee included the development of staffing guidelines. The then Health Commission of Victoria evaluated PAIS for this purpose. In 1984, the Australian Council for Health Care Standards introduced the requirement for hospitals to show evidence of a staffing pattern for nurses that was established according to patient need in individual wards. The use of a model or proxy PCS was accepted as representing actual resource use at that time (Hovenga, 1994).

During 1986, in Australia, the state governments began to control hospital management information systems and therefore input measures, including nurse effective full-time (EFT) resources and associated expenditure (Hovenga, 1994). In the absence of any meaningful measure of output, variation in costs were claimed to be accounted for in the differences in case mix or intensity, whether this claim was legitimate or not. The Commonwealth Government initiated the National Health Strategy Review where nursing budgets were examined (Hovenga, 1994).

In Denmark, an evaluation of workload management and PCSs looked at quality and staff numbers and evaluated validity, reliability and predictability in a pilot of 6 Danish hospitals. Significant unbundling of nursing services was beginning to occur in most countries (Whitney and Killien 1987).

Meanwhile, in the USA, eight policies for the development of PCSs were submitted to the World Health Organisation (O'Brien-Pallas, Leatt, Deiber, Till, 1989). The policies were based on nursing assessment, diagnosis, interventions and outcomes

instead of task orientated staffing methodologies. The complexity of nursing resource allocation and the costs of associated staffing decisions for the wide variety of PCSs had received little research support until that time (O'Brien-Pallas, Leatt, Deiber, Till, 1989). O'Brien-Pallas, Cockerill and Leatt (1992) subsequently examined the comparability of four PCS, -GRASP, PRN (Version 76 and 80) Rush Medicus and NISS, and found the difference between them could be as much as 4.33 hours per day for the same patient. All systems produced statistically different hours per patient day. Their major criticism of PCSs was the failure to capture the complexity of nursing care and the comparability between wards or hospitals for the same patient type. Nurses gaining experience with reimbursement methods noted that PCSs failed to include severity of illness, physiological stability and the need for teaching and emotional support (Prescott, 1986). Hlusko and Nichols (1996) also questioned if nurses could depend on their PCSs and whether prospective classification data was the correct data to use.

Giovanetti and Moore Johnson (1990) identified a second generation PCS, which employed built-in reliability and validity monitoring systems. Following the first generation PCS developed by Connor in the 1960's, the PCSs predicted staffing from shift to shift and expanded to include productivity monitoring, staff tracking, trend analysis, costing, charging, LOS, quality and the ability to link this information to other data systems.

By 1993, Finnigan had further developed nursing knowledge of PCSs and was of the opinion that their use for nursing requirements alone was obsolete. She identified the need for totally integrated multi-dimensional systems with newer, more relevant values and observed that where PCSs which were once used to justify the need for nursing, were now required to '*support fiscally sound and high quality delivery of care to patients*' Finnigan, (1993:1).

Finnigan proposed six reasons for abandoning PCSs:

- nurses were not consistent in their ratings, i.e. lacking inter-rater reliability;
- nurses claimed they were wasting time by classifying patients with no meaningful outcome in terms of staffing levels;
- management did nothing of value with the data generated;
- nurses learned to ‘game’ the system (by up scaling);
- managers knew that nurses ‘up scaled’; and
- no information was available on acuity level, even if the absolute data were reliable.

Finnigan and Groves (1994) said that PCSs should primarily focus on patients’ needs and provide a clear demonstration of the care provided and the costing of resources consumed. They claimed, at the time, that nurses were wasting valuable time classifying patients and third party payers were not interested in nursing workloads but in patient outcomes (Finnigan and Groves 1994). The lack of interest in nursing workloads by payers sums up the problem precisely. Indeed, the key to success is to measure one’s work by the yardstick by which one is paid. Since nurses are still having difficulty in measuring their work under prospective payment systems, they will continue to have difficulty accounting to payers for the resources required. Ultimately, payers are only concerned about services that provide the right outcome at the right price and the detail of how that comes about is the manager’s responsibility.

Criticism of PCSs generally concerned the limitations of their use of nursing tasks to classify patients. There was a need for inclusion of the cognitive processes of assessing, monitoring and evaluating care and treatment for patients (Ferguson and Picone, 1994). Giovanetti, reminds us that: ‘*Classification is only one means to an end, and by itself is of little value*’ (1978:9).

## **2.5 Work sampling and measurement**

Another of the structured approaches to measuring nursing is work sampling. It has also been described as ‘time point sampling’, and is an example of the observer

method which is accepted for recording nursing work (Hovenga, 1994). Work sampling is a work measurement tool that provides a way of measuring work at the time of observation. It was a key method featured in the work by Bernstein in 1958, who was known as the first to measure nursing work (Hovenga, 1994). Subsequently Connor (1961a), Giovanetti, (1978), Boyd (1982), Hovenga (1984), and others used this method in development of PCSs. Tippett, in the British Textile Industry in 1934, developed the technique (Hovenga, 1999). The technique gathers information by making random observations of workers. This method requires a high number of observations to ensure accuracy making it potentially expensive and time consuming. For nursing, there are also important patient privacy issues. Depending on the number of variables, continuous observation of nurses would not be affordable or practical for most organisations.

Work sampling studies that originated from the health care industry split nursing and non-nursing tasks. Abdellah and Levine (1954) report that with information derived from work sampling studies, nurses providing clerical, cleaning or catering duties began to charge those departments for their time. Unfortunately, the work sampling focussed on the work of nurses, rather than the dependency of the patient, and the patient was rarely mentioned. Abdellah and Levine's (1954) study included direct observers on a one-to-one basis but could not capture private room care. Unfortunately, nurses in this study abandoned the self-recording components on busy shifts and recording was incomplete. Yet, the work sampling worked well when nurses recorded the work sample at set intervals (Abdellah and Levine, 1954).

Connor conducted a work sampling study during the 1960's and tried to measure the relationship between nursing workload, the new concept of a direct care index, the census and the expertise of the nurses (Barr, Moores, Rhys-Hearn, 1973). He even included a category of indirect care for 'nurses moving with an indiscernible purpose'. Work sampling theory is based on the law of probability and includes the

techniques of statistical quality control (Cercone, 1978). Cercone measured nursing activity by work sampling in Canada in 1978, with the aim of staffing according to workload rather than patient numbers. Interestingly, like Connor, he also made no mention of night shift. Three years earlier in 1975, McPhaile also undertook work-sampling studies. This work revealed that for a surgical unit, direct care comprised 30%, indirect care 50% and other work 16% of total nursing time. McPhaile found that nursing judgement was the method for deciding the skill mix (1975). Kawczak, Haggerty, Chang and Spengler (1985) used work sampling as a technique to identify the amount of direct care time for nurses in the psychiatric department of the University of Michigan Medical Centre, USA. They examined the difference between appropriately busy employees and those who either duplicated effort, or engaged in extraneous activities or performed job functions outside their skills or qualifications. They claimed that most managers only had a vague idea of how employees spend their time.

The researcher considers that Hovenga made a unique contribution to understanding the factors that determined nursing resources and costs in Australian hospitals, when she conducted work sampling and random observation studies during the 1980s. Her studies lead to the development of Patient Assessment and Information System (PAIS) (Hovenga, 1994). Her work began, when nursing services became a prime target for cost containment. Hovenga conducted numerous in-depth studies into nursing staffing in public hospitals that were funded by the predecessor to the DHS, the Health Commission of Victoria. Her studies documented the problems associated with having little standardized detailed information on nursing workloads to base informed decisions on staffing. The Commission, at that time, had the responsibility for determining nursing staff numbers, staff mix and budget allocations for all public hospitals (Hovenga, 1994). The Health Commission of Victoria (Hovenga, 1994) commissioned a study on the care requirements needed in general medical and surgical wards where the highest volume of patient types were cared for. Work

sampling was the technique selected to measure the variable nature of nursing work and was seen to be non-intrusive and cost effective (Hovenga, 1994). The cost effectiveness of this technique was later to be disputed by DHS (Hovenga, 1994).

PAIS consisted of two methodologies (Hovenga, 1994). The first was work measurement to assign time and value to dependency categories and the second was PCS methodology for the application of associated time values for staffing and costing purposes. It was available for Australian hospitals to use on a voluntary basis from 1983. PAIS could be used prospectively to predict hours of care/staffing required and retrospectively as a proxy to the actual hours of care provided (Hovenga, 1994). It discriminated between patients based on nursing resource usage and produced statistically valid dependency category timings and variables. There were six levels of nursing identified. Nursing staff availability and LOS were significant variables, the latter being not only a significant variable but also a good predictor of nursing resource usage. According to Hovenga (1994), cognitive aspects of nursing could also be captured using the PAIS method. This was important because these aspects of care which had the potential to be significantly time consuming were not captured in other systems which focused on tasks.

By 1984, there were moves to computerize PAIS and to link the system to DRGs. Some development occurred at the former Prince Henry's Hospital in Melbourne by Kilvert (Halliwell, 1985). Other developments were in Sydney by the Sydney Metropolitan Teaching Hospitals Nursing Consortium, who were able to link PAIS to the Patient Master Index (PMI) (Ferguson and Picone, 1994). Over the next few years, there was an increased focus on casemix and the development of clinical costing systems in Victoria. However the use of PAIS to support claims of excessive nursing workloads during industrial action by nurses, led government policy makers to determine that PAIS was 'an expensive' system and conflicted with government policy to reduce waiting lists (Hovenga, 1994). It is a reasonable assumption that

PAIS was illustrating the real cost of nursing for optimum, safe and sustainable nursing workloads. The higher nursing cost estimations are likely to have conflicted with DHS policy for reducing nursing budgets. Other barriers to implementation may have included the cost of implementation, limited availability of information systems, lack of reliability and face validity for clinicians and managers as well as the financial implications of measuring and documenting the staffing requirements.

Hovenga (1994) says that of the many misconceptions in the health industry, work sampling is the least understood method because it has numerous variables in a contextual framework. A major difficulty was the conversion of work sampling data into a staffing formula relative to identifiable groups of patients, which Hovenga explains when she said that '*empirical data was frequently clouded due to the additional use of professional judgements*' (1994:253). Although PAIS was adopted by approximately 100 hospitals in Australia and New Zealand a change of Health Minister and other changes at this time meant that the cost of a roll out of computerized PAIS to all public hospitals, or indeed that of any other system, was prohibitive (Hovenga, 1994). A disadvantage of not introducing these systems meant that nursing care planning and management continued to form no part of the medical record. PCSs were also losing wide acceptance and were, as Picone (1990) suggests, frequently viewed by health service managers as masonic rituals, rather than information systems.

## **2.6 Nurse patient ratios**

From the foregoing, the researcher concludes that PCSs and work sampling methods used a scientific approach as a basis to inform the optimum allocation of nursing resources for patient care and for considering better ways to determine fair and equitable workloads for nurses. These methods were often also supported by the application of either formal or informal nurse patient ratios. The researcher now draws on clinical and managerial experience to describe the use of ratios in practice in

Victoria over the past 30 years. In formal nurse patient ratio arrangements, a fixed number of nursing staff were rostered for shifts of work according to levels prescribed by management or levels that were customary practice for that ward. For informal arrangements, the decision was based on the experience of the Nurse Unit Manager. For example, he or she might have allocated a higher number of staff for postoperative days or lower numbers of staff when patients had lower levels of dependency; usually with less dependency in activities of daily living (ADLs). The patients may also have been arbitrarily allocated a variable level of dependency arising from individual clinician practices or patient demographics. Management may or may not have supported the professional judgement of the Nurse Unit Manager and justification of the nurse patient ratios allocated by nurses met with varying degrees of success for securing a fair staffing level. Both formal and informal nurse patient ratios formed the basis of many staffing practices.

The ratio of a fixed number of nurses for a fixed number of patients usually varied from shift type to shift type and was usually not flexible between shifts of the same type. For example, more nurses were rostered for work in the morning shift, and fewer during evening and night shifts. An exception to this general rule occurred in California in 2002-2004, where all shifts in the same ward were rostered with the same number of staff over 24 hours (California Nurses Association, 2002). The Californian experience with nurse patient ratios is discussed further in Chapter 3. Ratios in Victoria were generally not determined for a patient type but rather for a ward type and/or shift type. For example, all surgical wards may have 6 nurses on a morning shift, or all wards may have 2 nurses on night shift. In the researcher's experience some organisations adjusted that ratio for weekends and/or public holidays. The adjustments were often made because of the penalties associated with wages on these shift types. Less commonly, staffing would be adjusted according to patient type.

The nurse patient ratios also varied widely across health service organisations. Giovanetti (1978) discussed the arbitrary allocation of nurse patient ratios at one health service organisation in the USA. The allocation was based on a common assumption that distribution of workload should be forty percent day shift, and thirty percent on evening and night shift. Levine (1985) studied two hospitals of identical size and one had a nurse patient ratio twice as high as the other. The reason for this diversity of nurse patient ratios appears to be that the formula for deriving a given ratio is often defined by expert nurse opinion or management rather than empirical evidence. The issue that remains to be identified is the method for establishing ratios in some organisations today. Recently, the setting of the schedule of mandated ratios in Victorian public hospitals was determined by the opinions of Nurse Unit Managers who were members of the ANF (Vic Branch). Nurse patient ratios are likely to remain under scrutiny for cost implications and for possible adjustments to meet changing funding policies. Giovanetti observed that nurse patient ratios were derived '*from the dual forces of precedent and pressure; historical budget allocations served as the precedence, and existing budget constraints and market conditions exerted the pressure*' (1994:332).

The practice of allocating nurses' work by nurse patient ratios repeats throughout the modern history of nursing. Beat (1970) developed a system of ward analysis at Ashludi hospital. The system was a result of work on nurse patient ratios undertaken at John Hopkins Hospital, the Oxford Research Unit, the Scottish Home and Health Department Aberdeen in 1969 and the Manchester Region (Beat 1970). Clark (1970) was the first to mention the notion of total patient care and felt it was better to use nurse patient ratios to address the gap between what was needed and what was done for the patient. Barr, Moores and Rhys-Hearn (1973) discussed the relationship between the dependency level of a ward and the required staffing numbers and noted the considerable variation in nurse to patient ratios between one care type and another, and between wards and between hospitals. High dependency patients were classified

and staffed in comparison with the norm for that ward. Barr et al (1973) identified the obvious limitations of this intuitive method of allocation of staff and recommended defining high dependency patients on a comparable basis on each ward of the hospital. Barr observes '*Were such a policy to be pursued it would undoubtable not be long before these same nursing officers would be searching for some more objective method of performing the necessary categorization*' (1973:196). This observation illustrated a heightening dissatisfaction with ratios due to concerns of nurses about equitable workloads, when compared across different patient types, wards and hospitals.

Despite being perceived by some nurses as a fairer method, the nurse patient ratio system did not ensure equitable workloads even where the overall total number of nurses on the shift is the average number for that ward. Nurses know that the workload differs between patient groups, days of the week and seasons of the year. They also know that nurse patient ratios do not account for skill level and therefore cannot ensure that nurses are allocated work commensurate with their abilities. Dunlop developed the Canadian WISH system for workload management after observing that staffing by ratios and census was inequitable. (Dunlop, Watson, Bryne, 1983).

Recently, senior doctors In New Zealand joined the campaign for a proposal for nursing staff ratios to be developed by the New Zealand Nurses Organisation (NZNO). The doctors had grown impatient with the constant shortage of nurses, especially in operating rooms and community services and they saw a mandated nurse patient ratio system as a solution (Scoop Media, NewstalkZB, 2004:1). However, the Ministry of Health opposed the campaign saying there are other issues that cannot be addressed by nurse patient ratios (Scoop Media, NewstalkZB, 2004:1). New Zealand health spokesperson Heather Roy said, '*a fixed patient to nurse ratio would present difficulties for all hospital wards. When the number of patients exceeded the ratio,*

*patients would be turned away from hospitals. Only the sickest would be admitted, while others still needing care would be sent home'* (Scoop Media, NewstalkZB, 2004:1). Nurse patient ratios were not adopted but the NZNO but the organisation is likely to remain a keen observer of the outcomes of DHS ratio policy in Victoria. Doctors in Victoria made no public comment on nurse patient ratios despite also becoming impatient with nursing shortages.

During the 2004 Victorian Nurses public sector EBA campaign, the ANF (Vic branch) claimed that the introduction of nurse patient ratios was a positive change in nurse workload management and that the introduction of ratios was a simple and critical decision, which addressed the nurse shortage. The ANF also claimed that if nurse patient ratios stayed, nurses would stay and work in hospitals but if ratios were abolished, nurses would resign (ANF Vic, 2004b). This claim may have had some merit but promoted a somewhat ill founded confidence among nurses that understaffing could not occur with mandated minimum nurse patient ratios.

For shift-to-shift variations in dependency, there was little real flexibility in mandated ratios; nurses and the Australian Industrial Relations Commission (AIRC) saw them as minimum ratios and hospital managements saw them as maximum ratios. The latter was the prevailing view in practice in the researchers experience and from feedback from Victorian TrendCare users in public hospitals. In addition to the existing shift-to-shift fluctuations in dependency, it was foreseeable that the overall dependency of patients would rise in the future with increasing age of patients who are likely to have higher frequencies of co-morbidities and complications than younger patients. In order to address the issue of increasing dependency, nurses would presumably need dependency data to accompany them to the negotiating table to apply for an agreed adjustment to the ratios. Expert nurse opinion is unlikely to be acceptable for a third round of EBAs in Victorian public hospitals, despite its acceptance in the Agreements of 2000-2001 and 2004. Even in a 'ratio environment', data on patient requirements

and nursing workloads is likely to be required at some stage in the future. The ANF (Vic Branch) strongly disagrees with this notion, and prefers to use industrial might and political know-how at the negotiating table, on the basis that no other professional group is required to collect similar data (Morieson, 2003).

Prior to the AIRC decision in July 2001, the Victorian public sector was closing 400 beds per day due to the nurse shortage (ANF, 2004b). The ANF argued that the implementation of mandated nurse patient ratios had been the key factor in attracting or retaining registered nurses to the public health system in Victoria (ANF 2004b:2). Prior to this time, there was a wide variety of ratio rules used in Victoria and they were generally applied as nurse to bed ratios whether the beds were occupied or not.

Nurse patient ratios usually means dividing the number of patients in occupied beds by the number of nurses that were available. This is not the same as mandated minimum safe ratios. Mandated minimum ratios ensure that an agreed nurse patient ratio is not exceeded and nurses may close beds when adequate staff numbers are not available. As an alternative to closing beds, nurses at the Ottway Health and Community Service, Victoria, temporarily withdrew their guarantees on safe levels of care during 2002, after a proposal from DHS and VHIA to reduce nurse patient ratios. Acceptable nurse patient ratios were almost immediately re-negotiated (ANF, 2002).

In Victoria today, nurse managers working under the Victorian Public Hospital Enterprise Bargaining Agreement (EBA, 2004-2007) have agreed to work with a formula of ratios according to ward type, shift type and hospital level. Examples of ward type include ante natal, post-natal, medical and surgical. Examples of shift type are morning, evening or night shift and of hospital level are levels 1, 2, or 3. A level 1 hospital caters for the nursing care requirements of the highest volume of patients, many with very complex care requirements and is a teaching or tertiary level hospital. A level 3 hospital has a lower volume of patients, almost all with less complex nursing care requirements (Adcock, 2003).

Formal and informal nurse patient ratio methods have been the only methods available to some organisations over the years. These methods are described further in section 3.3.2 of the next chapter. Scotton and Owens (1990) observe that the general principles of the per diem method can be equated to ratios i.e. a 'sameness' about the resources provided, despite a variance in patient requirements. The 'sameness' is in all patients being funded for the same amount of nursing for each day of stay and all nurses allocated the same number of patients every day. There is little incentive for nurses to assist each other when workloads are inequitable by patient dependency. Scotton and Owens (1990) also note that the per diem reimbursement and ratios provided no incentive to reduce LOS. It could be said therefore, that both per diem and ratio methods may have a detrimental effect on nursing resource use efficiency. Despite the potential for inefficiency, ratios have remained popular because, in the researchers opinion, they are easy to implement and all nursing and managerial staff can calculate the staffing for the ward. In many settings in the past, there was not even a requirement that the bed was occupied to be included in the ratio calculations. Today, in a Victorian public hospital, a bed must be occupied to be included in ratio calculations since it is established in the Nurses (Victorian Public Sector) Multi-Employer Agreements 2000-2004 and 2004-2007.

A Federal Government review predicted that by 2006 the Australian national health system would have 31,000 vacancies for nurses, with a significant majority of the 22,000 nurses leaving rather than retiring (Johnson 2002). Improved wages and conditions are at issue and a method of fair and equitable workload allocation could be expected to stem the flow of nurses from the health system. The only Australian state in which there is now no nursing crisis, is Victoria. In that state, nurses are returning to the workforce following the introduction of mandated nurse patient ratios (ANF, 2004b). The success of the nurse patient ratio system in Victoria has most probably been due, in part at least, to the legislated aspect of a controlled workload, which can neither be negotiated nor manipulated by management. In short, nurses

returned to the workforce because they knew management could not change the ratios, as had been the case previously when the number of patients they would be required to care for could be changed. Nevertheless, wider acceptance of ratios by nurses has not stopped them seeking out more accurate measures. Giovanetti, explains: *'Traditionally, the determination and allocation of nursing personnel resources has relied heavily on global approaches which made use of fixed staff-to-patient ratios. It has long been recognised that these ratios are insensitive to both variations between institutions and among individual patients'*(1978:1).

## **2.7 The influence of prospective payment systems (PPS)**

In this section, the third approach to measuring nursing work is discussed in the context of its greatest influence. The approach is continuous self-recording by nurses for each patient and the context is prospective payment systems. The researcher has observed in her role in hospital management across both the public and private hospital sectors both locally and internationally, that the introduction of prospective payment systems (PPS) put pressure on hospitals to understand their resources better and to provide data on individual patient care. Continuous self-recording is clearly the only reliable method of recording nursing work that has the capacity to provide data on total care for all individual patient requirements. Expert nurse opinion and observer methods are not feasible for providing continuous data on all patients. PPS were considered the greatest single influence on the way nurse managers measured and managed nursing resources.

Nurses providing direct patient care use this method to provide information on the entire patient cohort. Large volumes of data about entire episodes of care are produced. The risk associated with the method is that the data has the potential to be variable due to the high number of different recorders when compared to the two previously described approaches, which were expert nurse opinion and work sampling studies. The high number of nurses recording data has the potential to affect the

quality and comparability of the data collected. However, the risk to quality and therefore comparability can be minimised if nurses receive sound training and participate in regular inter-rater reliability testing. The method of self-recording is the least intrusive for both patients and staff and in the researchers opinion is probably the most accurate.

In the USA, President Reagan signed the landmark prospective payment system into law on April 20, 1983 and it came into effect for the first accounting period on or after October 1 1983 (Maraldo, 1985). This revolutionized the healthcare system for the USA and subsequently had an impact on many other countries. The law was rushed through Congress under the threats of a looming federal deficit and insolvency of the Medicare trust fund. The system chosen was DRGs, originally developed by Fetter and Thompson in 1967, and resulted in savings of over \$50 billion in Medicare hospital payments through 1990 and extended the solvency of the Medicare hospital trust fund well into the next century (Fetter, 1991). DRGs were originally designed to serve as a basis for medical peer review by clinically organised patient orientated categories (Joel, 1984b). They were subsequently used to provide incentives to reward efficient management, encourage shorter LOS, reduce some non-core services and ultimately create profit. Any profits could be kept by the hospitals (Joel, 1984b). The downside was that any losses were also borne by the hospital. Cost data from previous years was used to determine the average and that, in the end, became the ceiling of the reimbursement. Directors of Nursing were prepared to make their significantly large budgets defensible in the face of a greater emphasis on profitability (Maraldo, 1985). As one prominent professional journal commented: *'The health system was about to put on its business suit'* (Business Week, 1985).

The strategy for staffing during the 60s, 70s and 80s reflected the influence of available revenue and reimbursement systems (Barr, 1984). Hospitals had experienced voluntary cost containment since 1979 and the previous methods of cost

reduction had actually increased costs. Prior to DRGs, there were few economic restraints and 50-60% of increased costs under US Medicare were to pay higher payments to doctors and hospitals (Bostrum and Mitchell 1991). The stimulus for rapid change in the USA health care systems and the subsequent focus on costing of nursing services was the introduction of PPS and DRGs in 1983. Although the foundations of DRGs were established in 1967, applications for various purposes such as utilisation and financing were applied much later, during the mid 1980's. Flarey (1990) noted that prior to PPS nursing services consumed approximately 50% of the entire hospital operating budget and were ripe for budget cuts, which inevitably occurred with disastrous results. Due to the concept that nursing was an expense centre and did not generate revenue, cost accounting systems allowed nurse administrators to recover their portion of the total operating budget (Flarey, 1990).

Casemix complexity first came to the attention of Robert Fetter in 1985 through the work of Martin Feldstein during the 1960's, with respect to understanding the cost behaviour of hospitals individually and collectively (Fetter, Brand and Gamache, 1991). Fetter viewed this work through the medium of quality control in hospitals that was ongoing at Yale since 1965. During 1985, USA Medicare law provided hospitals with federal funding on the condition that there was some key review or quality assurance mechanism. This resulted in the progress to a new system to deal with casemix analysis, called ICD 9 CM (International Classification of Diseases, version 9, clinical modification), including 21 sets of procedures and 23 MDCs (Major Diagnostic Categories) (Fetter, 1985).

Financial survival under casemix funding dictated that third parties were paid as billed by DRG, although such payments were moderated by throughput limits where financial penalties applied. Poor quality data for the establishment of nursing costs by DRG made costing and billing for nursing difficult (Barnard and Truman, 1981). A commentary on the influence of this factor is shared by Mitchell, Miller, Welches and

Walker (1984:29) when they say that *'Hospitals across the United States are trying to determine the costs for the DRGs of their patient populations as the prospective reimbursements system tightens its grip upon the incomes it can expect in the 80s'*. Prior to this time, few PCS methodologies had predictive validity, an essential element for PPS. Nurses needed to know the cost of nursing care, support them with empirical evidence and have a system of accounting for those costs prospectively. Edwardson and Giovanetti observed that the *'current trends brought on by the prospective payment bureau will significantly alter the nature and function of workload measurement systems'* (1994:117).

The 1980s saw the use of concurrent and retrospective clinical data for DRG based reimbursement. However, Barnard and Truman (1981) discovered that poor quality data existed for the development of DRG casemix cost protocol and budgeting. At the same time, the social policy statement of the American Nurses Association (1989) recommended classification systems for nursing and that decision-making based on intuition, pressures and precedents was no longer acceptable (Huckabay and Skonieczny 1981). Joel summarised the feelings of many senior nurses at the time *'It would be a travesty within a case mix model for all other diagnostic and therapeutic resources to be charged according to patient need and nursing allowed it self to continue Per diem and anonymity'* (1984:44).

Sovie is identified as the first to predict nursing costs by combining DRG and nursing acuity data i.e. sensitizing DRGs with nursing acuity (Sovie and Smith, 1986). Acuity and dependency can vary in definition. For the purposes of discussion in this chapter, they are both considered to mean the relative requirements for nursing care. Sovie designed a study including a computer program to capture and retain daily classification data on all patients and determine the right number of hours per patient day by patient type. Sovie, Tarcunale, Vanputte and Stunden (1985) also developed a nursing budgeting system for planning, monitoring and controlling at the University

of Rochester's Strong Memorial Hospital, USA. This was one of two of the larger studies, of almost 25,000 patients and 459 DRGs of the then 467 DRGs. The other study was conducted by the American Nurses Association on 1600 medical records for 21 DRGs. Both studies used the Medicus method and concluded that DRGs were not homogenous from a nursing acuity perspective (O'Brien-Pallas, Trichler, Till, 1989). Halloran (1985) described using nursing diagnoses in combination with DRGs as explaining a greater proportion (71%) of the variance in LOS than DRGs alone, and that nursing diagnoses predicted nursing time better than DRGs, at least twice as effectively.

Alward (1983), and later Bigbee, Collins and Deeds (1992), developed systems of measuring actual and predicted needs of direct and indirect components of care and conducted inter-rater reliability with an index of 90 to 95%. In the same year, the APACHE system was developed for ICU patients based on severity of illness and probability of death. It was not useful in the general wards, but was an alternative to the DRG. During the same period, Caterinicchio (1984) developed a linear modelling technique of assessing and recording direct and indirect care by patient age, LOS, multiple diagnoses and multiple procedures, together with a ratio of critical care to length of stay.

Australia, as a country, did not adopt prospective payment systems but various states took actions to base hospital funding on some version of casemix based data (Diers, 2005). This resulted in significant changes to the way finance managers prepared budgets and negotiated with payers, mostly the state departments of health. Importantly, it also changed how they sourced clinical information to support the decisions. This resulted in major modifications to hospital information systems of all types - technological, paper records, billing and work processes (Hickie, 1994).

Information technology advances provided hospitals with the capacity to systematically compare hospital costs. But this created 'open slather' for hospitals

with high costs who claimed that their patient mix was different and that cost comparisons were fatally flawed (Duckett, 1995). During the political, ethical and technical upheavals of the time, nursing budgets were reduced due to lack of evidence that they were justified and because they remained the largest component of the recurrent hospital budget. The American Nurses Association (1989) described the need to name and assign a computer code to all nursing work i.e. the unique skills and knowledge of nursing, or risk not being reimbursed appropriately.

Computers were first introduced for staffing purposes in the USA in 1965 (Giovanetti, 1978) but there was a significant delay before the business rules were articulated. Gaming and manipulation of data was much more difficult with computerized systems when they began to be limited by business decision rules. Brown and Ross (1986) identified the principles of PPSs as the trigger for computerised nursing systems. Brown and Ross (1986) also describe the innovative Virginia Mason Hospital variable billing system, where nurses billed separately for nursing care.

Comi McClosky (1989) looked at the implications of costing a nursing service for reimbursement and her review of costing models revealed that, '*most costing models are atheoretical*' (1989:284). In 1976, Hanson, like many of her colleagues in Aydelotte's review, also observed the limited theoretical foundation of the development of PCSs. Comi McClosky noted that there was a lack of support in PCS development by finance departments where fears were held that nurses would have too much control by knowing the costs, and would raise the costs or attempt to raise the revenue by claims for increased wages (1989). Diers (2004) describes the lack of support more strongly as a systematic and successful way to keep nurses away from the money. Key issues of concern were the lack of patient centred accounting and billing, reliance on retrospective budgeting, lack of communication between administrators, nurses and medical staff, and an inability of a hospital to change its

demographic circumstances. Further limitations were inadvertently imposed by rigid hospital funding and a philosophy of clinician care first, cost second (Diers, 2004).

Several research approaches can be identified that advance nurses' participation in casemix. They include a review of measurement systems of nursing workload (Carr-Hill and Jenkins-Clarke 1995), an exploration into the ways in which casemix data can inform management of the nursing unit (Diers and Potter 1997) and ways to develop nursing specifically as a component of the DRG (Parker, Buckenham, Reid, Crossthwaite and the Victorian Nurses Casemix Consortium (1995). A nurse's workload may have as much to do with circumstances as with a specific disease or treatment, for example emotional status, emergency or elective admission, family support, physician practices (Fosbinder, 1986). Nursing diagnoses change, unlike medical diagnoses that are fixed (Fetter, Brand, Gamache, 1991, Giovanetti, 1985). Despite the impact of these factors on the measurement of nursing, nursing care is the main reason for patients being admitted to hospital, and as Thompson (1984:54) says *'It is somewhat ironic that nursing intensity measurements would be the last element in the DRG system to be developed'* .

Diers et al, (1997) used an expert panel of nurses to allocate the nursing resources of DRGs into six cluster groups, ranging from low care needs in the first cluster, to those whose needs were extremely high in the sixth cluster. The research found that there was a very high correlation between the cluster hours and the actual hours worked ( $r = .91 - .98$ ). The advantage was that the method could be used by other facilities. For DRG funding, the billing process needed to be concurrent rather than historical and Diers et al (1998) looked at measurement of nursing intensity and cost and attempted to find nursing in the hospital data system. The aim was to link patient characteristics and therefore costs. However, she found that such nursing records were discarded or overwritten and no permanent record kept. This was also the practice in most hospitals in the USA and other settings.

Variations in the clinical severity of illness (SOI) among patients with the same DRG resulted in different costs and outcomes (Jencks and Dobson, 1987). There was considerable variation in LOS not explained by medical diagnosis (Halloran, Patterson and Kiley, 1987). Since the reason for admission to hospital is for nursing care, the rationale is that nursing is the reason for the variability in LOS. Talerico and Diers (1988) raised the concept of nursing intensity outliers saying there is always a direct relationship between total nursing time and LOS. It is not the same relationship for all DRGs but they are remarkably similar. The purpose of the Yale nursing intensity project was to devise a way to account for the effect of the across DRG variation in nursing intensity (Thompson and Diers, 1988). The process must be concurrent rather than historical, since it is unlikely that two patients will be the same and the true cost of care must be determined from the patient up (O'Connor, 1988). This bottom up method of costing was an alternative to the top down method used prior to the introduction of casemix funding models.

By 1992 in the UK, there were a high number of patient dependency systems, suppliers and solutions (Coles and Jenkins, 1992). Nurses began using computerized decision support using existing operational computer systems. Coles and Jenkins (1992) were critical of these developments and said they were unable to consider variability in nursing consumption. The previous day's data was not saved and was over-written by new data. Hardware was not networked and a programmer was required to extract data. Ehnfors, Thorell-Ekstrand and Ehrenburg (1991) in Sweden, identified that modern health care was complicated by several difficulties in establishing basic nursing information. These difficulties included the lack of standardised nursing terminology along with the expansion of international communication and scientific exchange.

Policy analysts were frustrated by the proliferation of nursing PCS approaches in the USA (Diers, 1992). The American Nurses Association (1989) argued that DRGs

would not be a suitable alternative because they would not recognise nursing acuity and they were too 'medical' and too tainted with the concept of money. Australian nurses saw the introduction of DRGs as an opportunity to become involved in promoting nursing in mainstream health policy (Diers, 1999). Picone led the research in capturing data for this purpose, using the PAIS system developed by Hovenga to determine nursing acuity in developing nursing cost weights (Diers, 1999). Until we get the information, nurses and nursing will remain central to cost cutting and on the periphery for policy argument (Diers, 1999).

## **2.8 PCSs, RBS, RIMs, SOI and RVUs and other acronyms**

Evidence quickly emerged that there were major differences in nursing time required for patients with the same DRG (Stanford, 1984). This meant major differences in costs for episodes of care that were receiving similar reimbursements (Stanford, 1984). Such an inequity prompted a targeted research agenda for both nurses and funders. The methods most often used initially were PCS, subsequently developed in an attempt to more successfully fit the measurement of nursing into the medically orientated DRG management and funding template. A major shift in focus followed. The previous generation of PCS focused on patient requirements and the new methods such as reality based systems (RBS), relative intensity measures (RIMs), severity of illness (SOI), relative value units (RVU) and a new generation of PCS all focused on nursing resource requirements.

PCSs classify patients to care groups or categories and attempt to quantify their care requirements. Trofino (1986) claimed that the large amount of patient data generated would yield an average cost per DRG. PCS could be used to assign cost by converting a patient's care needs into an index of monetary value (Reschask, Biordi, Holm and Santucci 1985). Trofino called this a reality based system (RBS) aimed at determining average hours and costs for direct nursing by DRG. The RBS was developed at Riverview Medical Centre. One hour of required patient care was defined as one

patient care unit (PCU) and the care needs were assessed on admission and then once daily in contrast to other systems which involved assessment on each of the 3 shifts in 24 hours.

Russel, Robert and Caterinicchio developed Relative Intensity Measures and the RIMs methodology in 1984 (Caterinicchio and Davies, 1983). They describe it as a fourth generation hybrid methodology of three studies conducted from 1977-1979 and the result of extensive research and interdisciplinary involvement over 6 years. Caterinicchio called it '*a stepping stone and a spring board to nursing fiscal responsibility and resource management in hospital systems*' (1983:39). He emphasized that nursing was not a function of the patient day but '*at best a vague aggregate output measure*' (1984:61). RIMs were trialled at eight New Jersey hospitals, as a casemix sensitive measure of nursing resource use. They measured the reality of current care but Caterinicchio claims they were never intended to identify any ideal investment of resources (1983). RIMs provided patient specific, aggregate interval measures of resource consumption. The variables were predictive of nursing resource use and were similar but not identical to the major components of DRG categories i.e. primary diagnosis and procedures. Joel's (1984a) view was that RIMs and DRGs did however reflect the same philosophy, complementing and extending each other. Admission and discharge status were significant in RIMs methodology for quantifying nursing. RIMs quantified the care time by DRG and assigned relative values to determine costs.

Indexed nursing units of service were derived with LOS as the most significant predictor. Linear modelling techniques were used also to explore the effects of age, multiple diagnoses, multiple procedures, and the ratio of critical care days to LOS, admission and discharge status and membership of particular MDCs. Generally, the longer LOS results in greater consumption of nursing services. Grimaldi and Micheletti (1982) had a number of concerns with the RIMs methodology, questioning

the lack of random sampling, the accuracy of the data and the assumptions made about counter intuitive results. They were concerned that these issues severely hampered its practical application. They described it as complex and with limited managerial applications. RIMs were not adopted due to problems with the methodology and the categorising of patients by MDC, which were too clinically heterogenous (Diers and Potter, 1997). However, despite these limitations, Caterinicchio was considered to have provided some valuable insights into the cost of nursing (Grimaldi and Micheletti, 1982).

Severity of illness was perceived by some nurses to be more reliable than nursing care dimensions and to have a higher degree of acceptance for some nurses (Prescott and Phillips, 1986). Others disagreed with this notion. Diers (1992) argued that there is no standard severity measure and even the admission to ICU or CCU was at times discretionary. Endacott (1996) argued that severity could mean such diverse entities as high pathology costs, poor medical prognosis, high family needs or incontinence It could be scored differently at different hospitals depending on the relative severity of the case mix at that particular hospital. The Severity of Illness Index, or SOI was developed by Susan Horn at John Hopkins hospital in 1984, rating patients in severity from 1-4 in an attempt to classify patients into more homogenous groups than DRGs, for the purposes of payment (Buckle, Horn, Simpson, 1991). The SOI index was used to enhance accuracy of resource usage with reference to costs rather than acuity. (Buckle, Horn, Simpson, 1991). Horn was the first to determine the cost of nursing care considering the variation of costs within and between DRGs (Charbonneau, et al, 1988).

The work on severity of illness by Kreitzer, Loebner and Roveti is described in 'The DRG's Missing Link', (1982). They discuss the unexplained variants within DRGs and make two assumptions. These assumptions are that either that the variables are impossible to identify or when identified they are insufficient to explain the variants

within the patient category. They analysed the homogeneity of certain DRG categories by a comparative analysis of SOI versus LOS. In the USA, the Health Care Financing Administration, who continued to use the per diem method of weighting nursing services as a cheaper alternative did not look upon the various methods of measuring nursing intensity favourably (Diers, 1999). Disease staging was another method of sensitizing DRGs with nursing acuity data (Curtin 1985, Jencks et al 1987, Charbonneau 1988, Buckle et al 1991, Fetter, 1999).

Relative value units or RVUs are measures of relative costliness or resource usage per unit, such as a patient dependency category (Hovenga, 1998b). They are typically measured in minutes per episode of care or by DRG. The Yale-New Haven team developed RVUs, which were the DRG specific nursing weights, and these produced nursing weighted patient days (Diers, 1999).

## **2.9 Nursing cost studies**

Casemix, as a source of funding, needed to be distinguished from casemix as a costing device. When you know how much something costs, you can charge for it, when you are paid you can control how the money is spent (Diers, 2004). With the advent of prospective payment systems, hospital managers were directed to concentrate their interest on nursing costs. The development of nursing service weights began in 1976 at the Yale University and New Haven Hospital (Diers, 1992). Ten years later Fetter, and Thompson and Diers conducted the Yale nursing intensity project at nine hospitals in the USA (Tompson and Diers, 1991) and Cuthbert conducted a similar study at three Australian hospitals (Cuthbert, 1990). Chandler (1990) used some of the results of the Yale study and expert nurse opinion to produce nursing service weights for the expanded DRG version 3 (Ferguson and Picone, 1994). In 1991, Palmer, Aisbett, Fetter, Windchester, Reid, Rigby et al published nursing service weights for DRG version 6 using the data from the Yale study of 1986 and Chandlers estimated value (Ferguson and Picone 1994).

In Australia in 1992, the Brand Review recommended the move to casemix based functional budgets and a discussion paper was released in March 1993 (Duckett, 1993). Commencing in Victoria in July 1993, nurses from the Yale executive program assisted the implementation of casemix management in Australia (Australian Casemix Bulletin, 1993). The nursing weights used were called 'ward costs' (Australian Casemix Bulletin, 1993). Retrospectively this was considered an oversimplified model resulting in considerable under and over costing of some resources by bed day and by total cost. It was acknowledged that variations in intensity were not accounted for (Australian Casemix Bulletin, 1993). In Australia, there have been three major nursing service weights studies with the specific objective of deriving Australian National DRG (AN-DRG) nursing service weights. The three studies are summarized by Picone, Philips, Hathaway and Parkes (1993) as follows:

- South Australian Nursing Costing Study.

Commencing in 1990, a sample of 4 South Australian hospitals contributed data on 14,000 patients using Excelcare care plan units of care, that were derived from nursing standards and the associated timings.

- New South Wales Nursing Costing Study.

In 1991, a sample of 9 NSW hospitals contributed data on 35,000 patients using PAIS standard care categories and associated timings.

- National AN-DRG Nursing Service Weights Study, 1993

In 1993, the first national Nursing Cost weights were derived from the two previous nursing cost studies incorporating the work of the Yale team. *The weights were calculated by determining the total cost of nursing for all patients, the average cost for each patient category and the relative costliness of these categories to the overall average nursing cost per patient* (Ferguson, 1994:34).

There was some criticism of the 1993 national study since the South Australian and NSW studies used different research methods to measure nursing, and those methods did not adequately account for the cognitive aspects of nursing (Ferguson and Picone, 1994). In addition, much of the data related to predicted care requirements rather than actualized and the hospitals in the sample were generally larger teaching hospitals with smaller hospitals under-represented. Some DRGs were very low volume and created concerns about validity. However, the data was a useful estimate of nursing costs within DRGs and was incorporated in to the National cost weight data set (Parkes et al, 1994).

According to Picone, Ferguson and Hathaway (1993) valid and reliable measures of nursing service must be established before the cost of nursing services can be determined. Further, the importance of validity of the source data cannot be underestimated. The work of Picone's team in 1983 formed a significant 74% of the development of the set of Australian national DRG nursing service weights (Hovenga, 1994). PAIS data was used to classify clusters or bands of DRGs and from this, relative nursing cost weights or relativities were developed. The other data set used was from the South Australian nurse dependency and costing project that used Exelcare to measure the nursing workload (Hovenga, 1994). A Delphi methodology was used to complete the data set. Where data was not available, expert nurse opinion was sought (Gaston, 1992).

National nursing cost data included all aspects of nursing including Intensive Care (ICU) and Operating Room (OR). Other states began to collect data for identifying nursing service weights at a more local level, most not including ICU and OR which were already the subject of other costing systems (Hovenga, 1994). Victorian data included all ward costs; nursing, non-nursing wages and consumables. In some other states nursing may have also been bundled with nursing superannuation and training, which was a significant variable even between hospitals in the same state (Gillett,

2002). Attempts to address this variability in reporting nursing costs (and indeed most other costs) have been initiated in Victoria, with the subsequent implementation of a standard chart of accounts (Athanasopoulos, 2004). Surprisingly this chart of accounts only became compulsory for Victorian public hospitals in 2004 (CCSA, 2004). Victorian nursing costs weights were developed as part of internal DHS research. In Victoria, these studies include;

- Resource weights for AN-DRG's using patient-level clinical costs: a study of five Victorian hospitals by Jackson, Henderson, Tate, Scambler,(1993)
- 1994 Victorian cost weights: A study of fifteen hospitals patient-level AN-DRG costs (Jackson, Tate, Henderson, Carlin, Bayliss-McCulloch, 1994)
- 1997-98 Victorian cost weights study: final report for the Department of Human Services. (Jackson, Wilson, Watts, Lane, Bayliss-McCulloch, 1998)

In the USA, further work by Diers (1997) focused on the integration of nursing resource information into standard health information systems, the use of expert nurse panels to advise on DRG clusters and the validation of nursing weights and separate weights for ICU, Non-ICU, paediatric, psychiatric, neonatal special care nursery and rehabilitation using Automated Nursing Scheduling Office System, or ANSOS (Diers and Bozzo,1997).

There is a constant need to update the weights to account for technology and practice advances and changes in patient populations (Ferguson and Picone, 1994). An annual update of cost weights is essential (Phelan, Tate, Webster, Marshall, 1998). However, there remains a view that casemix based funding may influence nursing practice as *'the economic perspective is prioritized and the overall caring function of nurses is subordinated'* (Parkes, Picone and Challinger, 1994:6).

## 2.10 Contemporary developments

The contemporary demands of health service provision increased the emphasis on the analysis of nursing acuity or dependency by DRG. Costing studies cited in section 2.9 from the 1990s show a corresponding shift in focus from qualitative to quantitative nursing indices and a steady move away from retrospective measures. In the researcher's experience, there has also been an introduction of midstay reviews and actualizing care to enhance accuracy for prospective modelling. There was also a shift in focus from a dependency concept to acuity. The TrendCare system incorporates both concepts of patient acuity and dependency and reflects the philosophy of the developer Cherrie Lowe for addressing both patient classification and nursing resource requirements. As Lowe stated, '*It was about having the right resources to deliver the right care to the right patients*' (2004). This concept was later mirrored by the DHS in their 2004 EBA campaign for 'Right nurse, right place, right time'.

Finnigan et al raised a new focus on service outcomes in 1993, questioning if it really mattered how long it took a nurse to perform a task if the relevant outcome was not measured. Nightingale first raised the issue in her report on patient care outcomes on May 15, 1854 (Tamplett Ulrich, 2002:3). In 1994, Finnigan and Groves debated whether nurses should classify patients saying that nurses are wasting their valuable time because the value of a service is not merely the sum of the work performed, but rather the results relative to the cost of the service.

In the mid 1990s, Picone received Commonwealth and New South Wales Health Department funding to conduct a randomised clinical trial of the relationship between nursing interventions and patient outcomes and the trial pointed to a new direction in nursing and casemix in practice (Diers and Heslop, 1999). Clinical pathways were developed for the appropriate use of resources and achievement of patient outcomes. Their development was based on the concept of mapping the ideal path from admission to discharge on a given average LOS. Clinical pathways were the first step

in achieving a multi-disciplinary care pathway and managing optimal LOS. They highlighted the need for integrated nursing resource information where nursing resources could be partially measured in the context of the total care.

However, in the researcher's experience, few pathways in Australia are DRG-specific and not all are computerized and therefore not useable by more than one person at a time and by those remote from the patient and/or the medical record. DRG-specific pathways are not in abundance for several reasons. These reasons include a more prominent and less popular association between nursing and funding for nurses, the high number of DRGs (more than 700) and the DRG not being available on admission of the patient when the pathway would be commenced. The DRG is allocated after discharge and a DRG specific care pathway would be commenced on the provisional DRG, which may change if complications arise or co-morbidities are revealed (Athan, 2002).

As discussed, contemporary developments in measuring and allocating nursing resources have been heavily influenced by the introduction of casemix funding systems. The literature describes various shifts in focus as nurses attempt to more accurately capture nursing data. These shifts are reflected in the systems developed to achieve that goal and are summarised as follows;

**A Summary of the Shift in Foci for Development of Nursing Measurement  
Systems under the influence of Prospective Payment Systems**

| <b>Pre-PPS</b>               | <b>Post PPS</b>                             |
|------------------------------|---------------------------------------------|
| Qualitative -> → → → →       | Quantitative                                |
| Retrospective → → → →        | Prospective                                 |
| Patient requirements → → → → | Nursing resource requirements               |
| Top down approach → → → →    | Bottom up approach                          |
| Dependency → → → →           | Acuity                                      |
| Income for providers → → → → | Outcome for payers                          |
| Generating data → → → →      | Influencing practice (Clinical<br>Pathways) |

Diers (1999) observed that not only changes in acuity or dependency but also the patient mix could affect nursing workload. Nurses caring for patients from a wide range of DRGs need more on-going clinical support than if there were a smaller number of DRGs. Diers also noted in a study of outliers that there might be some patterns of predictability that are receptive to nursing which is a very reasonable assumption since nursing is the reason for admission to hospital.

Subsequent developments in capturing patient dependency data include the concepts of the patient as the centre of increasingly multidisciplinary care delivery (Goossen, 2000). The International Council for Nursing Practice, auspiced by the World Health Organisation initiated a project for a unified interface language (Conrick, 2001). Nursing scholars have been telling nurses for more than 30 years that they need to adopt a minimum data set - a universal taxonomy and nomenclature (Werley and

Zorn, 1989, Simpson, 1995). The movement remains very strong in the United States and is an active project of the International Council of Nurses of the World Health Organisation (WHO). Nursing data should be included in the hospital discharge data set as evidence of nursing care received (Ozbolt, Russo, Stultz 1995).

In 1997, the focus of nursing data turned to its integration with other health service information systems. Diers (1997) had begun work at Yale New Haven hospital on using standard hospital information systems to answer questions about the nursing service. Here, the hospital created an information system called Resource Information Management System or RIMS (as differentiated from RIMs) and Automated Nursing Scheduling Office System or ANSOS, the nursing acuity system. The information gained enabled nurses to understand and use the current environment to inform nursing policy without the cost and time associated with creating new data sets.

In 1998, aberrant cases or outliers were debated and Transition Systems International was introduced for patient level costing (Diers, Weaver, Bozzo, Allegretto and Pollack 1998). This provided nurses with one of the few tools to understand the costs, nursing becoming a partner at the policy table using their clinical knowledge for methods and solutions (Diers et al 1998). The use of consultant advisors had a brief role in the measurement of nursing costs but this was short lived and nurses, as managers of their own costs, regained status (Diers et al 1998).

By 1999, patient care requirements were still being calculated using the midnight census. This census posed difficulties by failing to capture the dependency of the increasing numbers of same day cases (Lowe, 2003). Further casemix developments in Australia, New Zealand and the USA moved nursing into political and policy mainstream. Picone (1995) of the NSW Nurses Association lead some developments. In the USA, Diers developed the concept of creditable nursing analytic capacity in finance departments and managerial epidemiology (Diers, Bozzo, RIMS Nursing Acuity Project Group, 1997).

In 2001, Woods conducted a study for the New Zealand Ministry of Health on National Nursing Workload Measurement. She studied the benefits of implementing a consistent approach to this measurement and evaluated the TrendCare system for this purpose at six New Zealand public hospitals. The study revealed amongst other findings that a greater focus on skill mix was required. Skill mix is another developing area of nursing research interest.

Gillet of DHS conducted research on Victorian public hospital statistics and found *'there are measurable differences in the nursing requirements of apparently similar hospitals due to the differences in the types of patient treated within those hospitals. Differences are even greater between the specialty hospitals'* (2001:1). Referring to costing of nursing services by DRG at the time, the following comment could well be applied to the debate on ratios and highlights the problem of not using a system to measure those differences *'The inability to capture variations in nursing intensity between patients or for individual patients over the duration of their hospital stay is likely to lead to significant underestimates of the degree of variation in nursing requirements, both between hospitals and different groups of patients. Assuming that all days within a patient's stay have equal nursing intensity is obviously incorrect* (Gillett, DHS, 2001.) Gillett says that if occupied bed days are accepted as the basic unit of determining the nursing requirements, then it is necessary to classify days of care into categories with similar nursing intensity. The cost in either dollars or FTE could then be determined for each category.

The nursing profession needs to develop its own policy on how nursing costs are to be identified by DRG. An example is the still relevant observation by Buckle, Horn and Simpson (1991) that it is imperative that nursing take the lead in this process before we find a patient classification method imposed on us by the policy makers. In a unique development in Victoria in 2000-2001, the opposite occurred. That state experienced a reversal of this trend and policy was imposed on hospitals by nurses

under the influence of the ANF (Vic Branch), through the AIRC. In Victoria, nurse patient ratios were enforced to stabilize industrial chaos for nursing, because hospitals were unable to provide any other relevant data on nursing workloads (Blair, AIRC 2001).

In 2004, it is relevant to measure outputs by DRG where this is the method of hospital funding. If DRGs are relevant for total hospital funding, then ideally they should be linked to nursing. This enhances the importance for nursing information being integrated with all other information sources. In the past, there have been deliberate efforts to keep nursing 'away from the money' by encouraging a proliferation of PCS, thus avoiding comparability and therefore identification of the real cost of nursing (Diers, 1999). However, we now have both the justification and the technology to combine financial and clinical data to provide integrated nursing information by DRG. Today, some health care commentators are of the opinion that casemix has come and gone as a reform instrument. The funding agencies may now be just looking at the technical artefact or micro refinement of the instrument (Patera, 2004). There is no demand for excellence and the practice of dipping in the money tin at the end of the year has reappeared. The future is a global budgeting approach to measuring efficiency via output and population based, need oriented funding, in an environment of aging population and scarcity of health workers (Patera, 2004). Nursing must identify a way of measuring nursing that will account for these future applications and which demonstrates our fiscal contribution in the future.

## **2.11 Conclusion**

Multiple perspectives on dependency systems and nurse patient ratios have been reviewed and some re-emerging practices have been identified which are associated with a long tradition of efforts directed towards measuring nursing work. One observation made in this chapter is that there is no agreed staffing methodology for the allocation of nurses in the Australian acute public or private health care system,

nor indeed elsewhere in the world. This lack of agreement is compounded by the wide clinically inexplicable variations in staffing levels and nursing skill mix across wards and hospitals.

Nurses themselves are in the best position to identify patient requirements and determine how best to organise their work. Nurses, without measurement of their work, are in a weak position to argue for a fair share of the budget and to have a strong influence on strategic planning. Arguably it is politics above all else which influences financial policy. Regrettably, in the past, nurses have been poor performers in the political environment (Prescott 1986). The researcher has observed the development of an industrial strength in recent times, even if it is rightly or wrongly demonstrated by methods such as walkouts, bed closures and work-to-rule campaigns. These methods are used by nurses to demonstrate the value of their work to improve wages and conditions. Nurses have long perceived that hospital managers did not adequately recognise their work. Nurses need data and empirical information to support their argument for fair and equitable workloads. Equally, it is important for hospital managers to have data on resources and costing in order to contribute fruitfully to negotiations.

Current debate on health care quality proposes less emphasis on individual providers and more on multidisciplinary care. Coordinated, integrated and real time interactive clinical and financial data from multiple providers is essential for clinical and operational decision support and optimal care. Nurses face many critical imperatives for improving health and health care. If nurses are to take an active part in the future of health service delivery, they must consider their impact on health care outcomes. With empirical data on such outcomes, nurses can be better supported.

Empirical analysis of the two most popular contemporary methods of nursing resource allocation is relatively unexplored by previous researchers. The results of this study are expected to identify if either a patient dependency system or nurse

patient ratios captures data that reflects the care actually provided to patients. Such results can inform the development of policy for co-ordinated and comparable nursing resource management that benefits patients, payers, nurses and the multidisciplinary team. After reading an article in the New York Times (September, 2003), Diers (2004:189) has recently commented on the contemporary discourse of measuring nursing work when she said that;

*'The product of nursing is nothing so tangible as a 10-foot long concert grand..... but it is no less beautiful, nor less finely tuned than a Steinway piano, just harder to get one's hands on'.*

## CHAPTER THREE

### MEASUREMENT OF NURSING WORKLOADS

#### 3.1 Introduction

The tangible measurement of nursing work may be perceived as elusive, but it is essential that it is pursued. '*Whatever exists, exists in some amount and can be measured*' is an often quoted view of measurement by American psychologist L.L. Thurstone (Polit, 2001:303). This quote suggests that measurement explains variance, including variance in nursing, and it can be expressed numerically. Since measurement is the language of communication, nurses who have historically had difficulty measuring their work, have also had difficulty communicating that to hospital managers and accountants.

The review of the historical development of patient dependency and staffing systems in the previous chapter identified several practices which have informed policy on the measurement and allocation of nursing workloads. Two of the key practices identified for the allocation of work were nurse patient ratios and patient dependency systems. Each practice remains in use in contemporary health services, despite their contrasting theoretical and conceptual foundations. For both of these practices, the match between the patient requirements and the nursing resources available at the commencement of a shift determines nursing workloads. This match is determined by different criteria for the two practices and potentially results in very different workloads. This may also mean very different quality of patient care, but as outlined in Chapter 1, this is outside the scope of the study.

Nurse patient ratios are determined in clinical practice by dividing the number of patients by the number of nurses available and typically allocating a numerically equivalent number of patients to the care of each nurse. The actual ratios on a given shift may differ significantly from ratios which were predicted or prescribed or

mandated by law. The ratios may be higher than predicted. This could occur, for example, when there is a nurse who is on sick leave and who is not, or cannot, be replaced. In this example, the result could be a ratio of 1:5, rather than the predicted 1:4. Equally, the ratios may be lower, which can occur, for example if there are several discharges, transfers or deaths early in the shift and if there are no new admissions. In such an example, the ratios might be 1:3 rather than the predicted 1:4. Where ratios are not equivalent, such as where 4 nurses are caring for 21 patients, there must be a decision for some nurses to be allocated 5 patients and one nurse to have 6. The decision is usually made by the expert nurse opinion of the Nurse Unit Manager. Rarely, in the examples given above, is a retrievable record kept of which nurse or nurses had a greater number of patients to care for, or how allocation decisions were made. There is a risk that, when no record is kept, workloads may become systematically unfair. This could occur where more efficient nurses are regularly allocated an additional patient and there is no record of how often this happens.

An assessment of patient dependency and a prediction about the time taken to complete care requirements must be made when patient dependency systems are used to allocate nurses work. An assessment of patient requirements facilitates the allocation of the right nursing resources to the right patients. Nurse Unit Managers can ensure that patients are allocated their fair share of nurses according to the changing needs of the patients. This provides a patient-centred approach to care allocation. Whether wards are under or over staffed, or indeed if they are optimally staffed, the work can be allocated equitably for all nurses or teams of nurses by adjusting the match of staff to the patients' care requirements.

Patient dependency systems allocate nurses on dependency equivalent workloads. Nurse patient ratios allocate numerically equivalent workloads. The issue of which nurse has more or less patients is not of concern when dependency systems are used.

In instances where fewer nurses are available for a shift than was predicted, all nurses may be allocated a patient group requiring the same amount of extra time, for example 8.5 hours of care for an 8 hour shift. The extra 0.5 hours is to make up the shortfall of one nurse not being available and the workload of the absent nurse is spread evenly across the rest of the team. The allocation of an additional 0.5 hours work for all nurses in the team is perceivably fairer than it would be using the ratio system where some nurses would have higher ratios than other nurses. This allocation practice also means the ability to allocate dependency appropriate workloads, which may be allocated in consideration of several parameters such as a range of skills, competencies and experience of the nursing team. These parameters are able to be recorded within contemporary computerized PC systems such as TrendCare.

The researcher considers that both nurse patient ratios and patient dependency systems have contributed significantly to decision support for nurse staffing practice and policy development. Since both are popular and in current use, the question arises about how they compare. Which method is more accurate for predicting nursing resource requirements for the range of patient and hospital types?

A unique opportunity to make a comparison has been offered by the TrendCare system which is a patient dependency system that has the capacity to measure data recorded by nurses in two ways, at the same time. The data can be analysed for workload allocation for both nurse patient ratios and TrendCare HPPD, for the same patient and staff cohort. TrendCare can measure both the predicted and actualized ratio of patients to nurses and, at the same time, measure both the predicted and actualized nursing hours per patient day (HPPD) required for care by the TrendCare dependency system. The methodological advantage of using TrendCare in this thesis, compared to previous studies of patient dependency systems, is the capacity to eliminate most extraneous variables related to different patients, nurses or shift types.

With such confounding variables eliminated, the potential validity of a comparison between the two practices is significantly enhanced.

It is important to emphasize that neither nurse patient ratios, nor the various types of patient dependency systems, can recruit extra nurses to fulfil predicted requirements. Both practices are simply systems to assist nursing workload allocation and management. In the researcher's experience, some hospital managers decide not to employ the number of nurses required to meet predicted hours for financial reasons. In many organisations, no extra nurses exist either on a shift to shift basis, where patient numbers or dependency levels change after the commencement of a shift or where there is a mismatch between attrition and recruitment over the short or long term. Nursing staff shortage is an extraneous variable which is difficult to control and highly relevant to actual workload allocation. The effects of an increased ability to predict patient requirements accurately in an environment with a corresponding decrease in ability to actually provide for those requirements is discussed in Chapter 6.

In this chapter, I compare and contrast the two practices by undertaking a detailed description and examination of nurse patient ratios and a contemporary patient dependency system. I examine the methods of data capture inherent to these practices. I then discuss their contribution to contemporary policy development for nursing resource allocation in various international settings. The comparison of the two key practices of nurse patient ratios and TrendCare HPPD begins with a discussion of relevant concepts and frameworks.

### **3.2 Concepts, frameworks and definitions**

The theoretical framework underpinning the development, use and implementation of ratios is the concept of fair and equitable workloads for nurses. Supporters of ratio practices consider that fairness of workloads for nurses can be achieved by the

allocation of an **equivalent number** of patients per nurse. The theoretical framework underpinning the development, use and implementation of patient dependency systems is to assign the right nursing resources to the right patient. Supporters of dependency systems consider fairness and equity is achieved by an **equivalent dependency** of patients per nurse.

Key conceptual and operational definitions that are critical to the research design of this thesis are described in this chapter. Conceptual definitions are definitions that are widely sourced in the literature. The operational definitions underpin the indices for this thesis. I begin with a conceptual definition of ratios. As described in the introduction, this is the allocation of a fixed number of patients to the care of a nurse, so that each nurse on a given shift has a numerically equivalent number of patients. Individual patient requirements are not an element of the formula for the allocation of patients to nurses. The ratios are usually determined at hospital management or funding body level for the purposes of establishing maximum budget targets. They are not generated at the nursing unit level and are, therefore, generally not negotiable with respect to the fluctuating needs of patients.

There are various permutations of the concept of allocation of nurses to patients under a ratio system, including adjusting the ratios arbitrarily within the ward. In these instances, the Nurse Unit Manager uses expert nurse opinion to determine if dependency is significantly different for a patient or a group of patients. The Nurse Unit Manager may decide to allocate nurses 1:4 for four sections of the ward, 1:2 for another and 1:6 for the remaining patients. Although there is some variation in the ratios, the overall result is a nurse patient ratio for the entire ward of 1:4. There is usually no empirical evidence to support adjustment to the fixed ratios within wards. The use of expert nurse opinion often results in a natural tendency to allocate higher numbers of patients to the more efficient nurses (Lowe, 2003). Such a practice essentially penalizes effective practitioners and rewards those less efficient by

allocating them fewer patients. Nurses may challenge their allocation of higher than average patient numbers and an arbitrary justification made by the Nurse Unit Manager can result in ill feeling between nurses. In such situations, the concept of equity is once again challenged by nurses. Over time, the researcher has observed that Nurse Unit Managers have become resistant to allocating numerically different workloads.

In this thesis, **the operational definition of ratios** is the specific ratio formula which has been applied to all hospitals in the sample. The formula is nurse patient ratios applied under the Schedule C of the Nurses (Victorian Public Health Sector) Multi Business Agreement 2000-2004 and modified under the Public Sector Heads of Agreement in December 2001. This operational definition relates to mandated or legally binding ratios for Victorian Public Hospitals. Schedule C is appended as Appendix A. The principle underpinning these ratios is to ensure that the number of nurses available is commensurate with the number of patients requiring care; a decision and recommendation of AIRC Senior Deputy President Watson, Melbourne (2001).

The **conceptual definition of patient dependency systems** is the systematic identification and assessment of individual patient requirements for nursing. In this thesis, **the operational definition** is the identification and assessment of nursing care requirements for individual patients and the allocation of nursing resources to meet those requirements using the TrendCare system. In TrendCare, patient dependency is measured as hours per patient day (HPPD). Patient dependency is read as hours: minutes – hh:mm. Further explanation of the measurement parameters is provided in the second part of this chapter which is dedicated to a description and detailed examination of TrendCare.

The operational definitions of Victorian Public Hospital nurse patient ratios and TrendCare HPPD are the indices of measurement for this thesis. These measurements and the variables which impact upon them are now explored.

### **3.3 Ratios**

#### **3.3.1 Evolution, revolution or going round in circles**

As discussed in the previous chapter, the practice of using informal nurse patient ratios as a method of allocating nursing workload has a long history in nursing practice. In addition to the question raised in the introductory paragraph of this chapter about how ratios and dependency systems compare, some specific questions also arise about ratios and their applications to acute care settings. Are there variations in the use of nurse patient ratios to accommodate changes in clinical practice? Are nurse patient ratios a reliable method for allocating nursing workloads or are they simply used because there has been no reasonable alternative? Have nurses become more sophisticated in using ratios for both clinical applications and political purposes? These questions will be addressed in this chapter and throughout the thesis.

Nurse patient ratios are perceived by some observers as a fair method for allocating nurses work. Others perceive them as inequitable for allocating nurse workloads although all nurses have the same number of patients. Perhaps by continuing to use this method, nurses have simply been going round in circles and have been unable to advance workload management. Since the practice of allocating workload by nurse patient ratios has existed in both formal and informal arrangements over a long period of time, I now examine the elements which have been instrumental in its paradoxically longitudinal success.

In Australia, as in other countries, the uses of nurse patient ratios differ between states and within public and private hospital sectors. In all states of Australia except Victoria, nurse patient ratios for public hospitals have not been prescribed by law.

Regulations governing nurse patient ratios in Australian private hospitals are not determined. In New South Wales, like most other Australian states, attempts have been made to describe principles for nurse staffing in private hospitals by incorporating them into private hospital regulations. For example, Regulation 17 of the Private Hospital Regulations 1996 (NSW) states:

*‘The nursing staff of a private hospital must at all times be ‘sufficient in number and have appropriate experience to perform nursing duties necessary for the proper care of patients at all times by day and by night’*

Western Australia is the only Australian State where minimum nurse staffing requirements for private hospitals are specified. In that state, minimum nurse staffing requirements are specified in hours per patient day by patient type which is more closely aligned to a dependency model of allocation. According to the Private Hospitals Amendment Regulations 1984 (WA), the requirement for nurse staffing is;

*Such nursing staff as will be available to provide each patient other than maternity patients ... with not less than 3.5 hours of general nursing care per day and each patient that is a maternity patient with no less than 3.1 hours of nursing care per day (reg. 36(2)(b), and that ‘a patient who is not a maternity patient, not less than 2 hours shall be given by a registered general nurse’, whereas for ‘a patient who is a maternity patient, not less than 1.6 hours shall be given by a registered midwifery nurse (reg. 36 (3) (b) (ii) (Senate Select Committee Report on Private Hospitals and Nursing Homes, 1985: 137)*

A report by ‘Victorian Private Hospitals’ produced evidence that nurse patient ratios were most favourable in the public sector (175.3 nurses per 100 patients) followed by the religious and charitable private hospitals (140 nurses per 100 patients), and the lowest in the private enterprise hospitals (101.1 nurses per 100 patients), (Senate Select Committee Report on Private Hospitals and Nursing Homes, 1985:139). This report is of historical interest as it makes a comparison of the use of ratios across health sectors. The formula specified in the 1981 report for calculating ratios is not necessarily comparable to today’s ratio systems. A comparison cannot be made

without detailed knowledge of whether the ratios relate to direct care nurses only, or if they are inclusive of indirect care nurses. Indirect care nurses may include, for example, Directors of Nursing, Nurse Unit Managers, nurse educators, infection control nurses and stomal therapists. There is also no information specified in the report on the use of ratio flexibility for variations across shift type or ward types, hospital size or level of patient acuity.

Historically, nurse patient ratio systems have evolved according to a range of influences, including standards of care and financial reasons. The ratios were rarely designed according to a formula based on validated data. In general, since the mid 1930's, the proportions of nurses to patients in Victorian hospitals have been; day shift – 1:10 and night shift 1:15 (Report of Committee of Enquiry into Nursing in Victoria, 1985). The definition of nurse was not defined in the Registered Nurses Awards, but generally it included student nurses and it excluded State Enrolled Nurses who could not then be counted in the ratios (Report of Committee of Enquiry into Nursing in Victoria, 1985). Nurse patient ratios in Victoria appear to have evolved in practice as a common way of allocating nurses to patient care requirements. The evolution has occurred without a great deal of challenge over the past 70 years. However, by 2000 the ANF (Vic Branch) had revolutionized the way nurses used ratios both clinically and politically.

In Australia and internationally, hospitals managers have variably used informal or formal ratios, mandated ratios and patient dependency systems, in order to comply with the intent of hospital regulations, Awards and Acts. A detailed examination of formal and informal ratios is now described.

### **3.3.2 Ratio practices: Formal and informal**

In this section I discuss the concept of nurse patient ratios including both formal and informal ratios for direct patient care. Informal ratios are a method of allocating equal

numbers of patients to nurses in a way that has been built upon by custom and tradition in practice. Although the number of nurses to patients is usually fixed, in many cases there is no particular formula for determining that ratio other than expert nurse opinion. A degree of flexibility for allocating ratios is an inherent feature of informal ratios, which are interpreted arbitrarily at Nurse Unit Manager level. Informal nurse patient ratios can vary significantly from organisation to organisation. In practice the method for determining nurse patient ratios may simply be a matter of combining the nursing expertise of the Nurse Manager with the practice of dividing the number of patients by the number of nurses who arrived for work. Some Nurse Managers apply an arbitrary acuity 'factor' and allocate fewer patients of high acuity to some nurses, others allocate the high acuity patients to the more efficient nurses but at the same ratio. That number of nurses may be sub-optimal for various reasons including human error.

Nursing staff shortages are hardly a new phenomenon and are likely to result in unfair workloads. Short staffing is common during high sick leave periods of the winter months and there are often few replacement nurses available. Shortages are historically problematic across all areas of practice but particularly in acute care and especially in some rural areas. If too few nurses arrive for work (or rarely, too many) the number of available nurses is divided into the number of patients or occupied beds. In some cases unoccupied beds can also be included to determine the workload allocation. Whatever the method, there is a statistically equivalent distribution of patient numbers (or bed numbers) to nurses available. Despite the even distribution of numbers of patients to nurses, the actual workload may not be even or equitable. In a clinical setting, where informal nurse patient ratios are in place, there is a perception held by some nurses that although the workload is heavy, in the absence of the right amount of resources, it is equitably allocated.

Alternatively, formal ratios are used where management predetermines the ratios. Managers often pre-determine ratios according to budgetary and past performance guidelines and this establishes nurse staffing policy for individual or groups of hospitals. Whether established by precedent or policy, formal nurse patient ratios are largely inflexible. This inflexibility is a popular feature for those determining the nursing budget based on occupancy. Formal ratios are perceived as predictable, reliable and the costs are fixed. They are politically popular with nurses, hospital managers and patients.

In both formal and informal ratio settings, the number of nurses who arrive for work is crucial. Variability in workload allocation occurs when the number of patients cannot be divided evenly and some nurses may have one extra patient than their peers. This can be avoided, for example, by allocating work to teams where the number of patients is increased, and where two nurses are allocated. The practice of rounding up or down for an extra nurse has been customary where patient numbers cannot easily be divided between nurses. 'Rounding' rules are now articulated in mandated ratio settings but, whether mandated or not, nurse patient ratios are influenced by budgetary constraints and whether there is an extra nurse available for rounding up. A research report conducted by Australian Centre for Industrial Relations Research, at the University of Sydney (ACIRRT) surveyed a sample from ANF (Vic branch) membership and analysed the working conditions of Victorian public sector nurses in 2003. In the report, ANF members reported *'that rounding up occurred 65.4% of the time and rounding down on 34.6% of occasions'* (Buchanan, 2004:26).

The popularity of nurse patient ratios is enjoyed by many Nurse Unit Managers, since ratios facilitate rostering for months in advance. They can also be calculated 'on the run' and avoid the need for ad hoc rostering and guesswork, especially in settings where occupancy is predictable, such as public hospital wards which are 100% occupied. Computer resources are not needed to calculate nursing resource

requirements. The roster template can be reset easily with new dates, and for annual leave, study leave and sick leave. Rostering is relatively simple for this reason. It is perceivable that all aspects of rostering are more economical where permanent employees can be booked in advance and there is a reduced reliance on agency or bank staff, at a typically higher cost.

Hospitals across the USA spent \$A7.2 billion in 2001 for temporary employees. The projection for 2003 was \$A10.6 billion nationally, most of which was for Registered Nurses (CNA, 2002) California hospitals are responsible for over 10% of the throughput for USA hospitals. The payroll savings in that state would be over \$A1 billion if temporary nurses were replaced with permanent staff (CNA, 2002). The Association calculates the projections based on savings on temporary Registered Nurses alone after the introduction of mandated ratios. The California experience with ratios is discussed in more detail in the following sections.

Nurses in Australia believed that the proportion of agency staff employed in public hospitals was not only more expensive, but they were also less efficient and increased their workload (Work Time Life Survey, ANF, 1999). There may also have been associated safety issues. The benefits of nurse patient ratios for direct care nurses include a perceived minimum safe staffing level, staff satisfaction, retention of staff and an elementary principle of fairness between wards and between hospitals once staff have returned to permanent employment.

As discussed earlier in this chapter, the allocation of a numerically equivalent number of patients to nurses is a quick and easy method to calculate for nurses. It is also simpler for other stakeholders such as patients, consumers, medical practitioners, hospital management, government policy makers and the media. The practice requires little consultation, no technology, no costly infrastructure, maintenance or training and little documentation. Ratios are therefore highly attractive to hospital managers who have historically provided little or no financial support to nurses for nursing

research, including workload studies. Hospital managers are also aware that sophisticated and computerized systems require regular updating and interfacing with other hospital systems. The introduction of such a system which incorporates a patient dependency system would imply an on-going financial commitment and greater management transparency associated with links to other systems such as payroll. These links and interfacing have many benefits for improved efficiency and for nursing. They are likely to reduce the risk of hospital managers trimming budgets without consultation with nurse managers.

Patient dependency systems have historically been considered to be unreliable and easily manipulated and therefore unlikely to be used for budget decision support. In fact, ratios are potentially just as unreliable given that they have evolved without a supporting base of evidence and that they rely on expert nurse opinion of individuals.

Nursing work is clearly difficult for nurses and for non-nurse hospital managers to quantify. Formal nurse patient ratios remain popular with hospital managers because there is no requirement to deal with details of a nurse dependency system. Hospital managers are also comfortable avoiding the ad hoc demands for funds for additional staff and the sharing of financial information with nurses, both of which are minimized when formal ratios are in place. Occupancy is the only allocation variable. The use of ratios to allocate fair and equitable workloads has come under closer scrutiny by nurses (as opposed to managers) in recent years. More recently the definition of a fair workload has evolved to mean not simply an evenly spread number of patients to nurses but also fair and reasonable in quantity and complexity. The use of ratios has evolved to address the perception of fairness. This point is demonstrated by the Victorian ANF 5-4-20 and is campaign explained more fully in the next section.

### 3.3.3 Mandated ratios:

#### **New rules for the game in Victoria and California**

Mandated ratios are legally enforceable minimum ratios that have usually been introduced after industrial action by nurses. They are in place in Victorian public hospitals and for all hospitals in the state of California. In both settings, mandated nurse patient ratios followed industrial action by nurses who were dissatisfied with their workloads and the quality of patient care that could be provided under such conditions. The action by Victorian nurses to achieve mandated nurse patient ratios was undertaken in response to three main issues. The first was constant pressure on Nurse Unit Managers by hospital managers and medical practitioners to re-open beds that were closed under informal ratio arrangements (ANF, 2002a ). The second was a general lack of confidence by hospital managers in the professional judgement of nurses to determine their own staffing levels for quality patient care (ANF, 2002a ).. The third was the distrust of traditional patient dependency systems by hospital managements who were aware of the practice of up-scaling or gaming by nurses to justify additional staff where the dependency system was unable to demonstrate this accurately (ANF, 2002a ). In California, industrial action by nurses was in response to ‘managed care’ models of care which were seen to reduce quality and outcomes of care. Nurse skill mix and staffing ratios have long been reported as being ‘*significant predictors of mortality*’ according to a 1998 review by University of Pennsylvania researchers Aiken, Sloane and Sochalski (December 1998). Interactions between skill mix ratios and outcomes may be examined in future studies.

Mandated ratios are funded by government agreement and give Directors of Nursing the ability to close beds, control their own staffing and provide safe staffing levels. When mandated ratios are in place, there is a perceived measure of control over executive management by nurses at all levels. Supporters of mandated nurse patient ratios in both Victoria and California claim the initiative is directly responsible for

improvement in recruitment and retention of nurses in those states. There has been improvement in those states when compared to other states in Australia and the United States, still struggling with staffing shortages. A causal relationship between the two variables is possible but outside the scope of this thesis. Other possible causes are discussed in the next section.

While acknowledging that the shortage of working nurses is multi factorial, one of the factors is undoubtedly that nurses have left the profession due to unfair workloads. There is evidence that where nurse patient ratios are mandated, the shortage is less severe. Such is the case in California, where ratios came into law on the 1<sup>st</sup> of March 2004 (CNA, 2004a) and in Victoria, since 2000, when nurses successfully negotiated ratios in acute care public hospitals, by Enterprise Bargaining Agreement (EBA). The State Board of Registration in California had 4,200 unprocessed applications from nurses in other USA states seeking licensures in California (CNA, 2004b) just 4 months after the Ratio Law became effective and after previously experiencing a severe nursing shortage.

The ANF (Vic Branch) estimates that more than 3,300 nurses returned to the Victorian public hospital system as a direct result of the introduction of nurse patient ratios. Nurse patient ratios were perceived by nurses as a safety net for minimum staffing levels. The experience in Victoria and California indicates a link between nursing resource allocation by mandated nurse patient ratios and recruitment and retention but not necessarily a cause and effect. Perhaps the element of success was not the practice of nurse patient ratios but nurses' satisfaction about the security in having the allocation method incorporated into the EBA. A comment by a nurse participating in the review of the piloted PND in Victoria said '*Whether it is ratios or anything else, as long as it is mandated then the managers can't manipulate the figures*' (Monash University, draft report, 2004 transcript page).

In mandated ratio settings, the ratios are potentially fairer than informal ratios, since they provide for allocation according to a pre-determined and agreed formula for patient, shift and hospital type (refer to Schedule C, as appended). In Victoria, the ANF generally supports the concept of a team allocation of ratios. This means that agreed ratios apply to the ward, however there is an agreement to flexibility within the overall ratio quota so that some individual nurses may have different numbers of patients as has probably always been the case. Both a schedule of ratios and agreed flexibility contribute to the perception of fairness for many nurses. However, in the absence of any other system to determine who has higher numbers of patients and who has less, many nurses object to an arbitrary allocation and prefer the mandated allocation of equivalent numbers of patients to each nurse. Nurse Unit Managers generally find equivalent allocation is the easiest and least disruptive way to allocate staff in highly industrialized settings. This avoids the threat that nurses with higher than average numbers of patients may close beds.

For departments such as medical/surgical wards, mandated ratios can be maintained where the workplace agreement includes the ability to close beds to maintain agreed ratios. The closure of beds is difficult where available staffing does not match patient discharges and bed closures. This may result in the less than desirable need for patients or nurses to be transferred to other wards. In other settings, such as emergency departments, bed closures are not usually possible. Growing numbers of patients in emergency departments often result in nurse patient ratios being exceeded. Emergency departments are often forced to act as a 'buffer' for the rest of the hospital as nurses there are expected to care for patients who may be unable to obtain a bed on mandated ratio wards. The problem of higher than agreed nurse patient ratios in emergency departments is expected to worsen, where hospitals are required to close beds on wards when minimum mandated ratios cannot be maintained. The inequity in workloads in such situations is evident.

In California, as in Australia and many other countries, budgetary constraints result in attempts by hospital management to reduce costs by restricting admissions. Restricting admissions, along with other factors such as the limited availability of community health care services and the rising uninsured population, has forced many patients to seek emergency departments as their means of access to any type of hospital bed. This occurs even if the requirement is not for acute emergency care. In California, emergency departments now account for almost 34% of all admissions statewide (CNA, 2004c) although state laws do not require hospitals to operate these departments. These laws lower admission rates for hospitals through that source, compared to other states and countries (CNA, 2004c).

In contrast, nominated Australian public hospitals are required to operate emergency departments. Bypass practices for ambulance services have been introduced so that when an emergency department reaches its capacity, ambulance services may transport patients to alternative services. However, nurses are not able to turn away the ever increasing number of 'walk-in' patients and/or Category 1 life threatening emergencies. This results in a sometimes significant increase in nurse patient ratios after the commencement of the shift. The recruitment or deployment of additional staff mid shift is usually unsuccessful. Attempts to maintain agreed nurse patient ratios in emergency departments are further complicated in Victoria by the fact that the mandated ratios are determined on averages of historical presentations of the previous year and may not reflect current or seasonal demands.

Workloads under mandated nurse patient ratios have also been criticized as unfair and inequitable when nurses take tea breaks, escort patients out of the department attend meetings, handover or training. One ANF member was quoted as saying '*Essential ratios are maintained but inadequate staff to provide tea relief, etc*' (Buchanan, 2004:31). There are wider concerns held by nurse managers about the potential for unsafe staffing levels during such instances, which would occur relatively frequently

when each staff member has two breaks, attends two handovers and may or may not be required to attend to other indirect care responsibilities. California has legislated against reduced ratios at any time and, although challenged by The California Healthcare Association, the rules require nurses to maintain those ratios for the entire shift. This is illustrated in the following extract from Modern Healthcare Alert.

*A California judge upheld the state's landmark nurse-staffing law, which requires hospitals to maintain specific nurse-to-patient ratios at all times. The California Healthcare Association, which represents 450 of the state's hospitals, challenged the 'at all times' requirement in a lawsuit filed against the state Department of Health Services in December. The suit contended that the language would require ratios to be met even when a nurse takes a brief lunch, bathroom or coffee break and, if taken literally, would "result in virtually all nursing units in the state failing to comply." Sacramento Superior Court Judge Gail Ohanesian ruled that the regulations clearly state that a nurse who is away from his or her assigned floor would not be counted for purposes of compliance. The hospital must reassign the nurse's patients to another nurse and the reassigned patients must not cause the relieving nurse's patients to exceed the applicable ratios set forth in the regulation, Ohanesian wrote in her 12-page decision -- by Laura B. Benko Modern Healthcare Alert 26/04/04.*

By contrast, in South Africa, it is the skill mix of nurses which is mandated by government. Nurses there remain concerned about the low numbers of Registered Nurses allowed per shift (Zondagh, Democratic Nurses Organisation of South Africa (DENOSA) 2004). The mandated ratio is 35 percent Registered Nurses in public hospital wards. The majority of private employers in South Africa allow just 30 percent of the nurses to be Registered Nurses, with Enrolled Nurses comprising 25 percent and nursing assistants or care workers comprising the remaining 45 percent. Employers in South Africa are pushing for more sub-category staff. In response, the nurses from the Democratic Nurses Organisation of South Africa have turned to patient dependency systems to support claims for higher ratios of qualified nurses, especially in the private sector. Negotiations commenced in June 2004. In Victoria the public sector EBA 2004 included a minimum skill mix of 1/3 RN Division 1 with >3

years experience, 1/3 RN Division 1 with 1-3 years experience and 1/3 RN Division 1 graduates or RN Division 2 nurses for a medical surgical ward.

California is the first state in the USA to introduce mandated minimum nurse patient ratios that are legally binding for licensed hospitals. The ratios became effective after the safe staffing law was enacted in 1999 and they were phased in from the beginning of 2004. Assembly Bill 394, the safe staffing law, required minimum nurse patient ratios for general acute care hospitals in California. The law also requires additional nurses to be rostered as needed. It is based on individual patient care needs and establishes limits on the use of unregistered nurses and on the unsafe allocation of Registered Nurses such as 'floating staff'. Part of the justification for the law was its parallel to minimum safety standards in similar areas, such as staffing ratios for airlines and day care centres (CNA, 2004a). The California Nurses Association (CNA) promoted the implementation of ratios in *'direct response to the erosion of patient care standards in hospitals, and the exodus of nurses who will no longer work in unsafe hospitals'* (2002). In enacting the California legislation, Governor Gray Davis found that *'quality of care is jeopardized because of staffing changes implemented in response to managed care. A decade of market-driven changes in health care has prompted the layoffs of thousands of registered nurses and their replacement often with lesser skilled staff'* (CNA, 2002). A CNA survey conducted at the time found that the 1:5 ratio for medical-surgical wards would improve current staffing patterns in over 80% of hospitals (CNA, 2004a).

CNA's proposal for mandated nurse patient ratios was based on a study of 22 million patient discharge records and the severity of illness documented for those patients (CNA, 2004a). Nurses know that severity of illness is not a good indicator of nursing resource requirements. For example, the care of a patient with dementia, incontinence and a superficial wound is likely to be more resource intensive than an unconscious patient. This difference is not necessarily captured using the severity of illness or

discharge diagnosis methods. In contrast to the large study undertaken in California for the purposes of establishing ratios, the Victorian ratios were established by expert nurse opinion. The ANF consulted member Nurse Unit Managers whom they considered to be the expert nurses. Minimum ratios in Victoria were established using expert nurse opinion for approximately 20 different ward types. They include for example;

- medical-surgical wards, 1:5 ratio after an initial phase in period of 1:6 for the first 12-18 months;
- emergency rooms, 1:4 ratio with a mandatory triage nurse not counted in the ratio;
- step-down/telemetry, 1:4 ratio; and
- paediatrics, 1:4 ratio.

In California the new regulations required one nurse for every two patients in intensive care and labour ward and one nurse per patient in operating rooms and for trauma patient emergency rooms. The ratios are the same for all shifts, 24 hours a day, 7 days per week. A complete list is available on the CNA website, [www.calnurse.org](http://www.calnurse.org). The ratios are minimum levels that must be flexed up, as specified by the law, based on patient and nursing care needs, including severity of illness and judgment of clinical complexity.

The rules for ratio allocation in Victoria have both differences and similarities when compared to California. Table 3.1, provides a summary.

|                                 | California, USA                                                                                                                                                                                                                                                         | Victoria, Australia                                                                                                                                                                                                                                        |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ratio Rules</b>              | Ratios are the same for all shifts, 24 hours per day, 7 days per week.<br>Charge Nurse or Nurse manager is additional and must relieve all nurses during their breaks or when they leave the ward such as for patient transport. Linked to hospital license to operate. | Ratios are variable according to hospital level, ward type and shift type<br>Meal and toilet breaks and other reasons for nurses leaving the floor are not adjusted for. At those times ratios fall below the minimum recommended level. Linked to budgets |
| <b>Medical / Surgical Wards</b> | 1:6<br>1:5 by 2005                                                                                                                                                                                                                                                      | Range from 1:4 plus I/Charge on morning shift of level 1 hospital to 1:10 (no additional I/C) on night shift on Level 3, 3A hospitals                                                                                                                      |
| <b>Paediatrics</b>              | 1:4                                                                                                                                                                                                                                                                     | 1:4 plus I/C morning shift to 1:4 on night shift                                                                                                                                                                                                           |
| <b>Emergency</b>                | 1:4<br>1:2 ICU patients in ER<br>1:1 Trauma patients                                                                                                                                                                                                                    | 1:3 plus triage nurse, plus I/Charge, all shifts for level 1 hospitals, others according to number of annual presentations historically                                                                                                                    |
| <b>Coronary Care</b>            | 1:2                                                                                                                                                                                                                                                                     | 1:2 plus I/Charge                                                                                                                                                                                                                                          |
| <b>Midwifery</b>                | 1:6 (mothers only)<br>1:4 (postpartum couplets)                                                                                                                                                                                                                         | 1:5 plus I/Charge morning shifts to 1:8 on night shifts.                                                                                                                                                                                                   |
| <b>Labour Ward</b>              | 1:2                                                                                                                                                                                                                                                                     | 2 midwives per shift where births < 2 per day on average                                                                                                                                                                                                   |
| <b>Oncology</b>                 | 1:5                                                                                                                                                                                                                                                                     | 1:4 plus I/Charge                                                                                                                                                                                                                                          |
| <b>Determination</b>            | 22 million patient discharge records and SOI (severity of illness)                                                                                                                                                                                                      | ANF expert nurse opinion, mainly union members who held positions as Nurse Unit Managers                                                                                                                                                                   |
| <b>Precipitated mainly by</b>   | Nursing staff shortages resulting from managed care practices                                                                                                                                                                                                           | State Government budget cuts resulting in a loss of 2000 registered nursing positions.                                                                                                                                                                     |

**Table 3.1 - A Comparison of ratio allocation rules**

There are conflicting views about the success of the ratio implementation in California. Some hospitals claim that there are not enough nurses to maintain ratios. In contrast, nurses say they are willing and ready to work but management doesn't employ them for financial reasons (CNA, 2004d). And a third view is offered by smaller hospitals which have closed their services. They claim that wages associated with mandated nurse patient ratios under the Safe Staffing law, have resulted in their businesses no longer remaining viable (CNA, 2004d).

The California Health Care Association represents approximately 500 hospitals and health care systems and says "*our main concern is simply that nurses aren't available,* (CNA, 2004d). The unavailability of nursing staff has been of concern to most hospital managers. The EDD (Employment Development Department) estimated that by 2006, there would be a shortage of over 30,000 nurses in California and further estimated that, by 2010, the shortage will be 109,000 nurses."(CNA, 2004d). According to one hospital CEO, '*We believe that ultimately our ability to comply with nurse staffing ratios is based upon adequate supply of nurses, which we are actively working to develop,*' (Mann, L CEO Kaweah Delta Hospital in Visalia, cited in CNA, 2004d). An example of the threat to the viability of some hospital services posed by mandated nurse patient ratios is illustrated by the following extract from an article in Modern Health Care on line;

*Santa Teresita Hospital, Duarte, California., closed its 39-bed acute-care services and emergency room today, saying it could not meet the state's new requirements for nurse-to-patient staffing ratios. The first-of-its-kind law, which took effect Jan. 1, requires hospitals to staff a minimum of one nurse for every six patients in medical-surgical units and one nurse for every two patients in intensive care. Santa Teresita will continue to operate its outpatient surgery center, fertility clinic and 177-bed long-term-care facility, said Sister Marie Suzanne Stewart, hospital administration secretary. The California Healthcare Association said the hospital's closing was a 'tragic consequence' of the new law, which it called impossible to comply with because of a national nursing shortage. **Modern Health Care, January 9, 2004.***

Nurses in some Californian hospital groups reported that hospital managers were hiding behind the nursing shortage to delay the introduction of ratios. The nurses challenged the Sutter Solano Health System by agreeing to work overtime. They dressed in uniform 'scrubs' and presented themselves to Unit Managers around the hospitals and offered to work to reduce ratios. Some hospital managers responded by refusing to allow the registered nurses to work, or by allocating them to work and sending all unlicensed staff home on full pay (CNA, 2004d).

Some hospital managers tried to influence nurses to reclassify patients into different categories with high ratios (CNA, 2004e). The hospitals lobbied the new Governor Schwarzenegger for a delay in implementing the safe staffing law but the nurses opposed that threat vigorously and lobbied for him not to intervene. An example of the strength of feeling is in the following communication;

*Dear Governor Schwarzenegger,  
I am a California Registered Nurse who is opposed to efforts that may block or interfere with implementing the Safe Staffing Law..... I was recalled to active duty as a Naval Reserve Chief Hospital Corpsman and I have already made two deployments this year to Kuwait/Iraq with the First Marine Expeditionary Force in support of Operation Enduring/Iraq Freedom. I've encountered the unnerving NBC alerts and bunker runs due to inbound Iraqi missiles, accompanied supply convoys through bad-guy territory, dealt with the extreme heat and austere living conditions, and faced the uncertainty of making it home alive. In all seriousness, I feel that these stressors were little to the situation I faced as a nurse on a busy medical/surgical ward with the impractical number of patients being assigned. Finally, it amazes me that I can guarantee quality healthcare and safety for wounded Marines and sailors during battle but not be able to make the same guarantee for civilian patients on a hospital ward back home. Enrique C. Luna, RN CNOR (2003). Cited in CNA, 2003.*

The California Nurses Association is the only organisation to succeed in achieving nurse patient ratios in every hospital in that state. Nurses and policy makers across the USA facing similar nursing shortages are closely monitoring the impact of

California's ratio law on patients, nurses and hospitals. They are concerned about whether the ratios will be established as maximum rather than minimum staffing levels and indeed whether they will be sustainable economically. Massachusetts and Maine nurses associations, New Zealand Nurses Organisation (NZNO) and ANF Western Australia, Queensland and the Northern Territory are pursuing similar legislation (ANF, 2002).

Clearly, regardless of whoever initiates or works under mandated ratios, the rules for nurses and employers have changed markedly from previous informal/formal nurse patient ratio practices. Subsequently, related policy development has also changed. I now explore the experience of nurses in Victorian public hospitals with mandated nurse patient ratios.

### **3.3.4 Mandated ratios in Victorian public hospitals**

The implementation of mandated nurse patient ratios in California followed the success of Victoria's nurse patient ratio campaign. Victoria is Australia's second largest state and implemented mandated ratios four years earlier in 2000. During the 1990s, the Liberal Kennett Government of Victoria made 2000 nursing positions redundant which forced hospitals to rely for a time on agency nurses to staff wards and departments. The requirement for higher casual /temporary wages was an unpredicted and unsustainable expense for hospitals in the Victorian public health sector. As a result of the unsustainable financial position they faced, hospital managers arrived at three common solutions to the shortage: they strongly encouraged nurses to work double shifts and/or overtime (sometimes unpaid); they increased the use of unregistered staff and they recruited nurses from third world countries (Francis, 2005). None of these solutions were ethically sound, if indeed they were financially viable. Public reaction to these solutions was not favorable. The crisis in the health system was undoubtedly one of the reasons that the Kennett government was not subsequently re-elected.

The Nursing Labour Force 1998 Report conducted by the Australian Institute of Health and Welfare (AIHW) found that the number of EFT nurses had fallen 11.8% in three years. After months of trying to convince the government about the severity of the problem, the ANF undertook 2 further surveys which were conducted in early 1999 (Buchanan, Bearfield and Jackson, 2004). The first of these was The Nursing Workforce survey which was held in conjunction with the Australian College of Nurse Management and the Victorian Deans of Nursing. Its purpose was to establish the extent of the nursing shortage. They found 60% of facilities (aged and acute) had nursing vacancies (Buchanan, Bearfield and Jackson, 2004). Of these facilities, 20% had vacancies for midwives and 30% for critical care, operating room and medical/surgical wards (Buchanan, Bearfield and Jackson, 2004). The second survey was the ANF Work, Time, Life Survey. Its purpose was to determine how the shortage was affecting nurses and their ability to maintain standards of care (Buchanan, Bearfield and Jackson, 2004). The results were then analysed by the Australian Centre for Industrial Relations Research at the University of Sydney (ACIRRT), which in 2003 conducted further research on the working conditions of Victorian nurses on behalf of the ANF. The results of the 1999 survey analysed by ACIRRT demonstrated there was concern by nurses about the workloads, declining care standards, increased stress and reduced morale (Buchanan, Bearfield and Jackson, 2004).

In response to the results of both surveys, the ANF (Vic Branch) served a log of claims on the state government in August 2000 on behalf of public sector members. The state government opposed all four components of the claim. After negotiations failed, the ANF (Vic Branch) took the claim to the AIRC. Ten days later, on 31 August 2000, a decision was handed down in favour of the ANF claim and it included the introduction of nurse patient ratios. Commissioner Blair accepted that there was a crisis in the Victorian Health system and the exodus of nurses had to be addressed saying;

*‘Those who choose to say that there is not a nursing crisis, in the Commission’s view are in a state of denial’ and ‘therefore the Commission cannot ignore the issue of nurse patient ratio mix. It is obvious to the Commission that whatever measures (if any) have been put in place by the hospital networks to address the recruitment and retention issues, have failed. During the s.111AA process and the conciliation conferences, there was ample opportunity for the hospital networks to provide alternatives to the nurse patient ratio mix proposed by the ANF and this did not eventuate (Blair, 2000).*

The Commission report suggested that hospitals should have made better progress with alternatives for measuring nursing workloads. The introduction of mandated nurse patient ratios was a significant reversal in circumstances. For the first time, nurses were successful in driving workload policy rather than hospital managers. However, hospital managers retained tight control over the provision for ratio flexibility. The Victorian ratios stipulated minimum staffing levels (or the maximum number of patients per nurse), as they did later in California. The ratios could be lowered to meet the needs of patients with higher acuity if necessary. Lower ratios would require more nurses. If allocated, there was an associated higher cost which could not be counter balanced by allocating fewer nurses in other clinical situations. The Agreement included only a provision to flex ratios down and no corresponding ability to flex up, or use higher ratios when acuity was lower than average. Thus minimum ratios were, in reality, maximum ratios in most Victorian hospitals, despite the position of the ANF that ratios provided for flexibility and accounted for nursing skill mix and patient needs.

The hospitals were required to roster according to agreed ratios or close beds. Nurses considered that, with nurse patient ratios in place, they were able to control their workloads under hospital managements that had previously applied pressure on them to work in unsafe conditions. This was an effective and highly significant political strategy. The ratios were phased in between December 2000 and August 2001 and are

appended (See, Schedule C Appendix A). They do not apply to private hospitals, non-acute hospital care or other states or territories of Australia.

Yet, the dispute between nurses and the state government was not over. The Agreement reached between the ANF (Vic Branch), DHS and Victorian Hospitals Industrial Association (VHIA) was threatened on several occasions. In December 2001, the management of the Geelong Hospital in Victoria advised that they intended to reduce nursing staff numbers in the emergency department as they believed that the Nurses Public Sector Agreement allowed them to do so. The following recommendations are quoted from the decision and recommendations of Senior Deputy President Watson Melbourne, 13 December 2001 and concerned the Public Sector Heads of Agreement – Monitoring Committee;

*The methodology used to apply the nurse/patient ratio needs to be consistent with the principle of ensuring that the number of nurses available is commensurate with the number of patients requiring care. It is noted that average occupancy may not reflect variations in patient numbers and therefore may not match staff to periods of peak demand. Consequently, the nurse patient ratios should be calculated on actual patient numbers in a given ward/unit. The ratios shall apply to the generally occupied number of beds, with the occupancy of additional beds being subject to additional nurses being available. It is noted that average occupancy may not reflect variations in patient numbers and therefore may not match staff to periods of peak demand (Watson, 2001).*

As a result of this decision, the nurse patient ratios were to be calculated on actual patient numbers in a given ward/unit. If a hospital has a particular ward of 30 beds and only 26 beds are usually occupied then the four ‘unoccupied’ beds can only be used when additional staff are available to meet the ratio requirements. On some night duty shifts and in shifts on aged care wards, it was considered appropriate to appoint, what the commission understood to be called a ‘floater’ to make up the part ratio. For example, in two wards each of 22 beds, 5 nurses could be appointed in each ward plus a nurse ‘floating’ between the two wards.

The Agreement also stated that rounding up is required for an additional requirement of more than 50% of another nurse and an additional nurse shall be appointed. Rounding down will occur for requirements of 50% or less. Where the application of ratios results in the determination of a number of nurses together with an additional requirement of exactly 0.5%, prima facie rounding down shall occur. This rounding is subject to the safeguards within paragraph 174 of the decision of Blair C in print S9958. An example is a medical surgical ward of 30 occupied beds in a level 1 hospital (highest level) on a day shift, where the mandated ratio of 1:4 applies for 7 nurses providing care for 28 patients. The care of the additional 2 patients is either allocated to one or two of the 7 nurses who already have 4 patients or a floater may be appointed where patient dependency is high. A further example is a midwifery ward of 29 occupied beds on a day shift. The mandated nurse patient ratio of 1:5 for 5 nurses providing care for 25 patients would apply and for the remaining 4 beds an extra nurse is appointed as the >50% rule would be applied.

In addition, the Agreement included a ruling that pre-ratio staffing shall be taken as being indicative of patient care requirements where there was a dispute and subject to a right of review by the hospital. The EBA also allowed for different models of care such as is provided at the midwifery units of Box Hill, Werribee and Sunshine Hospitals. Variation in the demands on emergency departments was acknowledged and the departments were subsequently grouped according to throughput Groups 1-3. A provision was also made for adjustment for seasonal fluctuations for part of each year. Nurses in some Victorian regional public hospitals requested the EBA to include staffing by TrendCare HPPD rather than mandated ratios, for example Djerriwah Hospital in Bacchus Marsh and Hamilton Hospital, Victoria. Hamilton Hospital requested an EBA with ratios by patient type rather than ward type. The difference is described in Chapters 4 & 5. The modified EBA's were agreed upon for some of the hospitals and although mandated nursed patient ratios did not apply to those sites, ratio equivalence was monitored by the Department of Human Services.

In Victoria, hospital level 1 under Schedule C of the nurse patient ratio formula has been categorized as one of a group of hospitals having the highest level of patient acuity and throughput. Hospital levels 2, 3 and 3A are considered to have lower levels of acuity and throughput. All Victorian public hospitals are listed by name under each level in Schedule C as appended, Appendix A. There is no definitive formula for the allocation of a hospital to a specific level. This is discussed further in Chapter 4. Some hospitals began to negotiate for higher level allocations, particularly in rural areas which did not have the higher numbers of separations but had patients with higher complexity of care requirements (Lowe, 2003).

In associated developments, in 2000, the AIRC determined that agency staff could not be employed in a hospital or network in which they had other employment. Agency nurses could only be used for unplanned vacancies for an agreed percentage of EFT. This was lawfully binding on the ANF, State Government, nursing agencies and public hospitals. The State Government applied to the Australian Competition and Consumer Commission (ACCC) for permission to award a tender to a nursing agency to provide nurses on a casual basis to Melbourne metropolitan hospitals and Barwon Health and this was successful. During 2001, the state government funded advertising campaigns to attract nurses back to the public hospital system. The state government also funded refresher programs for nurses out of clinical practice for >5yrs and nurses transferring from aged care to public acute settings. Re-entry programs for nurses who had lapsed registration for > 5yrs were also state government funded. These developments may have also contributed to the successful recruitment of nurses back to Victorian Public Hospitals.

The developments were supported by an intensive media campaign promoting nursing as a career and Victorian nurses as caring professionals with a wide range of skills and expertise. Victorian universities began seeing an increase in popularity in nursing courses and demand for places in undergraduate degrees increased 26.5% (ANF,

2002). Public approval for the state government was on the increase and the Labour Bracks government was re-elected on 30 Nov 2002.

The ANF (Vic Branch) conducts an annual delegate's conference each year and usually tables approximately 90 resolutions. At the 2003 conference, there were 160 resolutions and most of these were concerned with the issue of ratios. It was clear to the ANF members at the conference that members were concerned that the ratios were not right for some organisations; mostly the ratios were too high. For example, at the Royal Children's Hospital, the ratio on night duty was proposed to be reduced from 1:5 to 1:4. Nurses compared their ratios to the night ratio of 1:4 for a crèche caring for well children and observed that this was lower than that initially mandated for sick children. Lobbying began for the incorporation of other changes in the next EBA, even if it was supported by scant empirical evidence.

After the initial decision of the AIRC in August 2000 (PR S9958), clauses 172-174 were amended. This decision was followed by Heads of Agreement 23 August 2001 which contained further agreed amendments between the parties. This agreement was further amended by the AIRC Monitoring Committee on 13<sup>th</sup> December 2001 (PR 912522). As part of the ratio dispute settlement (August 2000), the ANF (Vic Branch) agreed to a pilot of a patient dependency system. Ratios have been mandated in all Victorian public hospitals since that time and the 3 year agreement was extended by a year to March 2004 to facilitate a dependency system trial. The ANF successfully re-negotiated for a second 3 year term under the 2004-2007 EBA after the completion of the dependency system pilot, which is discussed in the following section, the 2004 campaign.

The action in Victoria had both supporters and detractors internationally. The *Los Angeles Times* reported an article by American journalist and author Suzanne Gordon (2004), who cited Victorian nurse patient ratios as the only example of a constructive initiative addressing the workload problems underlying the global nursing shortage

(2004). The opposite view was held by Sharkey, who had a main role accrediting magnet hospitals worldwide. Sharkey said *'Four expert nurses may be able to handle a greater patient load than five novices'* (2004:6). She further explains, *'there is so much more to a decision about nursing coverage for a ward than nurse numbers. Nurses don't want to be treated as a number or a commodity – they want to use their professional skills and knowledge'* (Sharkey, May 2004:6).

### **3.3.5 The 2004 campaign**

Whatever view some experts had, the role of ratios in stabilising the nursing industrial climate in Victoria is acknowledged by many stakeholders as is articulated by Phelan, Tate, Webster and Marshall, in their comment;

*'The nurse to patient ratios brought some level of sensibility to nursing work at a time when nurses were highly stressed with out of control workloads. The cost cutting strategies of the health services placed tremendous pressure on nurse administrators to rationalize nursing costs. Ratios provide a basis for protecting nursing care. They were a welcome start to quantifying the unquantifiable dimensions of their work and the vulnerability for exploitation when the philosophy of dedication on which nursing care is built'* (1998). There was surprise amongst nurses and international observers that the successful outcome of 2001 was required to be renegotiated when there was evidence that Victoria was one of the few places in the world which had experienced a reversal of the trend in increased nursing shortages.

Victoria had recruited 3,300 nurses back into the system in the previous 3 yrs. Whether this recruitment success could be attributed entirely to the introduction of mandated nurse patient ratios is outside the scope of this thesis. The success would have undoubtedly also been influenced by the AIRC ruling on restrictions to agency staffing, which had become a popular way of working for nurses, even if highly unpopular with employers or funding bodies. Further positive effects on the

recruitment of nurses would probably have resulted from the Victorian government media campaign and the state government funded initiatives for nurses who were considering re-entering the public hospital workforce.

There were also plans for the next round of enterprise bargaining negotiations to extend to public psychiatric services. Private sector members were also working on a similar log of claims. Ratios were commonly seen by nurses as a positive move towards a simple rostering system with no administration costs, no risk of management making arbitrary adjustments and there were no maximum ratios imposed. The ANF (Vic Branch) promoted their ratio policy with a strong media campaign using a simple message to promote the 5 nurses for 20 patients ratio for medical surgical wards i.e. 5-4-20. Simplicity is likely to have been a key contributor to the campaign success.

Nurses who had re-entered the public hospital workforce because of the introduction of mandated ratios and those that had stayed through the industrial campaign did not want to experience a repeat of their hard won battle of 2000. They did not want to rely once again on any system which was not mandated and they saw no reason for change or for trials of another system. The following view was held by 80% of ANF members interviewed during the 2004 campaign, '*Few nurses in the Victorian public health system trust management to get the issue of shift staffing levels correct and almost all believe the nurse to patient ratios are essential for an effective long term solution to the systems' problems*' (Buchanan, 2004:7).

A reasonable workload ensures patient confidence, satisfaction and quality care. The potential loss of already established ratios threatened the confidence of nurses who were likely to leave the hospital workforce and not re-enter a second time (Morieson, 2003). Nurses felt that existing conditions established in 2001 were threatened by a pilot of a dependency system. They favoured ratios but wanted to improve some of the allocations in the 2004-7 EBA. In the 2004 campaign, nurses lobbied for

improved ratios such as 1.4 plus an In Charge nurse for both day and evening shifts in medical/surgical wards and 1:1 in Labour Ward for all shifts plus In/Charge nurse for day and evening shifts. Nurses also lobbied for abolition of the 50% rule as contained in part 1B of the 2000-2004 agreement.

A widely held view within the ANF membership is that nursing evidence of practice, such as that recorded in association with dependency systems, is irrelevant for workplace agreements (Morieson, 2003). A common argument is that such evidence is not required for any other health professional group. They claim that no other health professional has a dependency driven formula for workload allocation. The membership consider that the power and strength of the ANF is far more relevant for the achievement of improved wages and conditions than any evidence of practice system. Former ANF (Vic Branch) Secretary, Belinda Morieson, suggests that industrial reality for nursing wages and conditions is about money, politics and influencing the government. Ms Morieson says that negotiations are about who is the toughest and who will concede the least. She claims that successful outcomes occur using the only useful instrument – industrial action. Industrial action by nurses is always considered a last resort, since the ANF never gets 100% support for industrial action from nurses and the public. The ANF's view is that if industrial action is so successful, then there is little point in recording data for nursing services, as historical data is useless.

The ANF consider themselves to be the main industrial power group in nursing; more powerful than the nursing colleges, the Directors of Nursing Groups, the nurse leadership of RCNA or the Peak Nursing Body which includes the Deans of Universities conducting nursing degrees (Morieson, 2003). Admittedly, there was no other nursing leadership evident at the time of negotiations at the end of either the Kennett era or with the AIRC during the 2000 and 2004 EBA campaigns. Negotiations with Government are difficult when they have the numbers in both

Houses as was the case in Victoria in the two previous state elections. The success of the ANF (Vic Branch) at the negotiating table during this time was remarkable. Indeed the success was achieved without data, evidence or use of dependency systems.

### **3.3.6 The Pilot Evaluation of TrendCare dependency system**

At the same time as the ANF (Vic Branch) was preparing for the 2004-2007 EBA, one part of the previous agreement remained unfulfilled. This was the agreement between the parties to pilot a patient dependency system in 20 Victorian public hospitals for the purposes of collecting patient dependency data. The dependency data was to be compared to ratio data for the same period. The objective of the pilot was to *'provide a robust clinical decision support system that was effective, easy to use and that would assist in the management of resources by providing clinical information technology tools that engaged nurses and enabled them to utilise evidence based guidelines in planning and provision of care'* (Monash University, 2004b:7). The pilot was managed by the Nurse Policy Branch of the DHS and supported by the Pilot Advisory Committee. The dependency system selected was TrendCare and it was evaluated under tender to the DHS by the School of Nursing at Monash University.

The pilot was actively supported by the DHS and VHIA. The ANF (Vic Branch) supported the pilot while actively maintaining its position of 'no support for patient dependency systems'. The conflicting standpoints of the ANF meant that a genuine pilot of any dependency system was going to be extremely difficult. The outcome of the pilot was pre-empted by the ANF (Vic Branch) and their membership by an extensive media campaign which supported ratios and criticised the piloted TrendCare dependency system, various written and verbal directives to members on how to complete evaluation survey forms and threats of bed closures if ratios were not maintained.

Although the ANF (Vic Branch) was highly cognisant of the capacity of the preferred system for the agreed pilot, they remained philosophically opposed to dependency systems, Morieson saying *'Let's face it, TrendCare is probably the best there is, it is an excellent system and getting better all the time, constantly upgraded with user input - as long as it is not used to abolish ratios'* (2003). In an unusual paradox, the ANF considered the 'individualness' of patients to be threatened by care paths, a function within TrendCare and a function within many other manual and computerized systems. The ANF contrasts this concern about a threat to individualness with active promotion of ratios i.e. 'sameness' for the care of each patient on each day. The sameness is exemplified in the simple allocation of nursing care resources in the same way for all individuals cared for in the same ward type, shift type and hospital level.

The government described TrendCare, the agreed system for the pilot, as more sophisticated and transparent than nurse patient ratios. Ratios were considered by DHS to be the first step along the path of achieving manageable workloads. The next step was to look to a system which was able to produce data for the formulation of a favourable funding policy for nursing services in Victorian Public hospitals (Adcock, 2003). A dependency system was promoted by DHS as a system which would provide empirical evidence for support for staffing requirements and which protected individual nurses from excessive workloads (and equally from too light a load, if indeed they need protecting from such a possibility). For example, a dependency system may address the variability in dependency occurring in the winter demand period or casemix differences.

DHS conducted the pilot in 2003 with data collection from 1<sup>st</sup> April to 31<sup>st</sup> December 2003 and evaluation in December 2003 and January 2004. There was a strong emphasis by DHS that the pilot was to evaluate dependency systems generally and not specifically about piloting the TrendCare system. DHS reported being oversubscribed

with hospitals interested in participating in the pilot. Many hospital managers demonstrated a keen interest in understanding nursing workloads but this enthusiasm was not matched by the nurses on the wards, who felt disenchanted at the lack of consultation with them (Monash University, 2004a). Nurses were also concerned that in the USA, computerized systems equated to supporting systems of corporate financing, verification of care and benchmarking (Gordon, 2004). DHS finally selected 10 expert TrendCare users and 10 new user sites from a range of hospitals across the metropolitan and rural sectors of the state. The hospitals in the pilot agreed to record and submit data to DHS from TrendCare.

The pilot involved nurses recording patient care in TrendCare. Staffing throughout the pilot in Victorian public hospitals continued to be by ratio allocation as in the previous 3 years. For most nurses compliance with the requirements of the pilot was pointless in an environment where no change depended on the results. Ratios were in place and actively used for workload allocation. The pilot was seen by nurses on the wards as an additional and unnecessary time consuming exercise in an already busy work environment. Many nurses reported that at the end of busy shifts, there was little time to complete essential documentation and therefore recording for the pilot was often incomplete. Nurses expressed a lack of enthusiasm about working overtime to record data about which they were not consulted anyway (Monash University, 2004a).

Nurses at participating hospitals, perceived that TrendCare data recorded during the pilot was for high level management and government purposes only. Nurses were not sympathetic to the real or perceived cost cutting agendas of the government or to the threat of losing their hard fought political win in achieving mandated nurse patient ratios, of three years earlier. The lack of support of the pilot by nurses raised suspicion among observers about the TrendCare data quality and quantity recorded. Elsewhere, in other TrendCare sites, in the Victorian private hospital sector and other states and countries, staffing and payroll depended on TrendCare reporting in addition

to management reporting. Clearly TrendCare data is more likely to be reliable and valid where it is depended upon for various work allocation functions or payment.

At the time of 2004 EBA negotiations, the DHS vision for nursing in Victoria was promoted by the 'Right nurse, Right place, Right time' campaign. The campaign was used to promote a workload system that could be responsive to the changing needs of patients and allow nurses 'time to care'. The campaign itself began at the 'wrong time' in the researcher's view. It was launched in December 2003. The timing of the launch was too late for nurses because many had already made up their minds that ratios were the only successful method of workload allocation. The ANF had already begun a campaign for the 2004 EBA and claimed that the improvement in nurse recruitments in Victoria was due to the successful incorporation of mandated nurse patient ratios in the previous Agreement.

In addition to the concerns about data quality and quantity already discussed, there were additional concerns held by the Monash University evaluation team about which nurses would be able to contribute responses to a questionnaire. Under the terms of the tender, the evaluation was conducted in the weeks immediately preceding Christmas 2003 and in the following January holiday period when many regular staff were on annual leave. These key nurses were therefore excluded from the evaluation. Also there was no expert Level 1 hospital included in the pilot and all hospitals in this category were new users of TrendCare. This is likely to have influenced results since level 1 hospitals employ higher numbers of nurses. This may have skewed the number of responses for new users.

The major findings of the pilot evaluation by Monash University were;

- 90% of respondents rated the 'user-friendliness' of the (piloted dependency system) PDS as 'reasonable' to 'very good'.

- 85% of respondents rated their understanding of the components of the piloted PDS as 'adequate' or better.
- Nearly 87% of respondents perceived access to computers in their work place as 'reasonable' or better.
- Over 60% of nurses reported that the time taken to enter TrendCare data for the patients allocated to them on a shift was less than 10 minutes (commonly around 2 minutes per patient).
- The ability of the PDS to adequately capture the acuity of particular patient groups was rated as 'sometimes' to 'most of the time' by around two thirds of respondents.
- The PDS was reported to reflect the staffing needs of nurses' patient care areas 'sometimes' to 'most of the time' by 63% of respondents.
- More experienced users and those in more senior positions were more likely to report positively that TrendCare provided useful information which, in addition to other decision-support data, could assist them to quantify and cost nursing work and to allocate resources.
- The PDS system engaged nurses at a number of levels.
- The system appeared to have potential benefits across a range of services and other software systems, e.g. clerical requirements of the nursing staff were reduced when the system was interfaced with the Patient Master Index, though the capacity for this was not extensively recognised.
- Despite training on use of the Staff Allocation Systems, the majority of hospitals did not use the PDS to allocate resources. It should be noted that the existing ratios continued to apply at the pilot sites throughout the pilot period.

- Elements of the PDS pilot process were well managed, however, areas for improvement included: computer access, feedback relating to the pilot process and resource allocation.
- Implementation and staff education: over 75% of participants reported that they had 'adequate' (or better) training and skills to use TrendCare. And 60% indicated that they had received sufficient training in how to use TrendCare.
- Training and support personnel: the majority of respondents reported positively on the helpfulness (when used) of: the PDS pilot project officers, Nurse Unit Managers, nursing management, ANF (Vic Branch) TrendCare representatives, hospital IT department, the DHS pilot project officer and support from TrendCare. The utility of the PDS pilot project officers appeared to increase with experience. The more experienced the project officer, the more useful they were to the user.
- There was a very high level of cooperation with the study at both an organisational level and from participants of focus group discussions and key informant interviews. This willingness to contribute views, opinions and experiences suggests that consultative and participatory process could be used effectively in further development and implementation of a PDS.
- A tangible benefit of the project was that it resulted in an increase in the IT literacy of many clinical nurses.
- The main advantages of the piloted PDS were reported to be:
  - It enabled nursing work to be measured and quantified;
  - Utility of the systems' such as handover sheets and Ward Allocation
  - The HR features were found to be appropriate and useful;

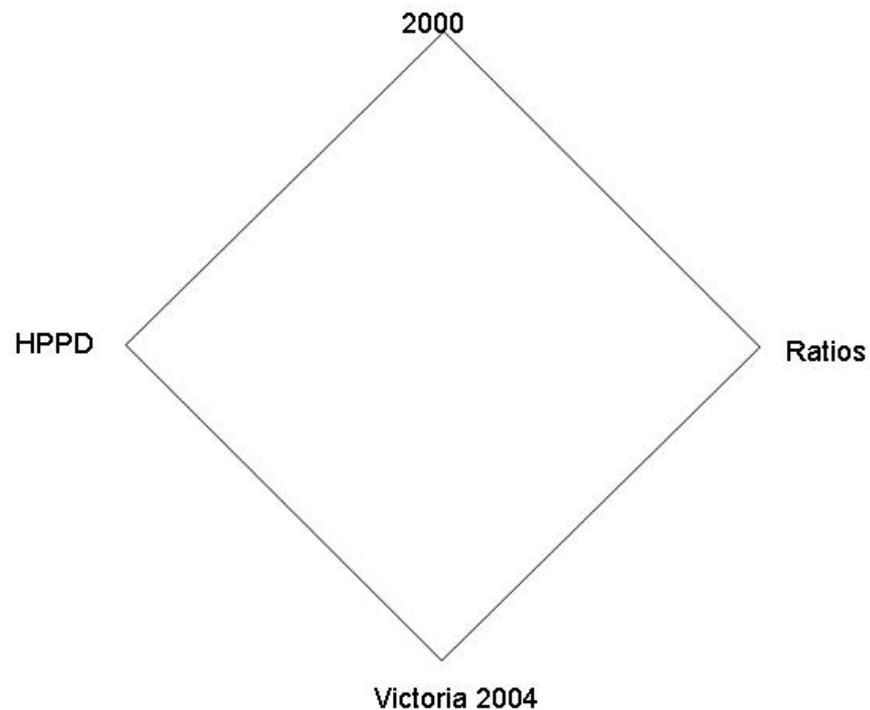
- It allowed real time reporting of trends in patient acuity;
- Easy to install and could interface with other systems.
- The disadvantages of the PDS were reported to be that:
  - The system did not consistently capture patient acuity in some patient care areas such as maternity, paediatrics, ICU care settings;
  - There was a lack of confidence in the piloted PDS where it indicated that resources should be removed from the unit.
  - It did not consistently reflect perceived requirements of night shift and (to a lesser extent) evening shifts.
- The support provided for the actual roll-out of the PDS pilot was regarded by respondents as very positive and largely effective, though the initial decision to engage in the pilot could have engaged with end-users (clinical nurses) in a more satisfactory way (Monash University, 2004b)

The pilot had an ongoing influence on work practices at the sites and although it officially ceased on 31<sup>st</sup> December 2003, some further funding was provided to any of the participants who indicated a willingness to continue contributing data. By April 2004, all acute hospital sites continued to use TrendCare and contribute data to DHS, while still maintaining workload allocation by the mandated ratio method. Despite the high cost and relative success of the pilot, any relevant outcomes were overshadowed by the industrial action by nurses in May 2004. This resulted in the re-negotiation of ratios for a further 3 years for the 2004-2007 EBA. See Appendix B, Heads of Agreement 2004-2007. Morieson's view of industrial action as the most successful method of negotiating policy for nurses' conditions and wages appeared to be a reality (Morieson, 2003). The Agreement included maintenance of existing nurse patient ratios but provided some flexibility by permitting negotiation at local hospital level

using ballots and committees. Variation could be made on the basis of but not limited to:

- clinical nursing assessment of patient needs;
- demands of the environment such as layout;
- statutory obligations, including work place safety and health legislation;
- the requirements of nurse regulatory legislation and professional standards;
- workloads; and
- occupancy. (ANF, VHIA & DHS Heads of Agreement 1/4/04-30/9/07)

The use of a dependency system had apparently modified the previously inflexible practice of mandated nurse patient ratios in Victorian public hospitals. The ratio agreement was hybrid of both practices, and except for the following areas, the 2004 workload rules in public hospitals had largely returned to what they were in 2000. See the following diagrammatic representation:



In Victoria, there is now;

- compulsory, mandated but now flexible nurse patient ratios for all Victorian public hospitals similar to voluntary allocation of informal ratios at local level, in 2000,
- flexibility in workloads by protracted negotiation processes except where patient care may be compromised, similar to shift by shift flexibility in 2000.

It is a reasonable assumption that the Victorian government considered the unlikely possibility that nurses would negotiate to flex ratios up when acuity was lower, and incorporated the cost of that unlikely event in a moderated wage increase offer.

### **3.3.7 Policy development**

After the 2004 EBA was agreed upon, the ANF (Vic Branch) circulated to its members an alternative Executive Summary to the Monash University PND

evaluation report. The alternative Executive Summary suggested that an accurate evaluation of TrendCare should entail a direct comparison with ratios. This thesis which had already been established in 2001 after the first EBA, examines this direct comparison and the results follow in Chapter 5.

Several observations can be made about the evolution of ratios from informal or formal arrangements, to mandated nurse patient ratios that are enforceable by law. The first is that any method of allocation which is mandated is likely to succeed because it is an enforceable agreement between stakeholders. Since the ANF (Vic Branch) and later the CNA successfully negotiated ratios for the purpose of establishing a policy to ensure fair and equitable workloads in preference to a patient dependency system, the ratios system had established an unprecedented popularity with nurses. The second is that any system which contributes to stabilization and improvement of recruitment and retention in the current shortage of working nurses is also likely to maintain on-going popularity. Thirdly, industrial action is currently more effective for influencing government funding and hospital management resource allocation policies than any data nurses currently record. It is evident that nurses were beginning to use ratios in the Victorian public sector in a sophisticated way which has clinical, political and human resource management implications.

Nurses may be satisfied that ratios have been successful inclusions for two successive EBAs in Victoria and for the establishment of safe staffing laws in Californian hospitals. It is undeniable that there will eventually be a requirement to account for nursing workloads empirically. Governments are destined to negotiate ratios less favourably in the future in the absence of any substantiating evidence. For example maintaining existing ratios despite the predictable increase in age, acuity and co-morbidities of the patients in the future. This prediction may be a factor in the decision by so few other hospitals to follow Victorian public hospitals in their world-first initiative to introduce mandated nurse patient ratios. It may also be a factor in

decision by Victorian public hospitals to purchase PND systems such as TrendCare in the months following the completion of the pilot.

The ageing nursing workforce wants a simple effective method of workload allocation that is not negotiable by hospital managers, yet incorporates a degree of flexibility which reflects variations in patient acuity and which can be determined using their expert nurse opinion. A chasm remains between the views of the ANF (Vic Branch) who advocate no need for dependency data and those who require the detail of patient requirements and nursing resources for sound policy development.

### **3.4 Dependency**

#### **3.4.1 Introducing the TrendCare system**

TrendCare is the most widely used computerized clinical information system for nursing in Australia, New Zealand and Thailand. It was developed by an Australian nurse, Cherrie Lowe, who in her role as Director of Nursing at several hospitals, identified a need for a computerized and reliable product, which would assist health service managers and nursing professionals in the areas of patient acuity and nursing resource management. At Greenslopes Private Hospital, a 402-bed teaching hospital in Brisbane, Queensland, Ms Lowe was responsible for a nursing budget of approximately \$48 million in the early 1990s. She found that the Finance Department were neither fully aware of the nurses' workloads nor the real cost of nursing care. Ms Lowe, in her role as Director of Nursing, and the finance managers were responsible for the financial management of nursing and lacked decision support that could record patient requirements and nursing work.

Inadequate decision support for nursing work was common in most hospitals at that time. With no data or information on patient requirements and nurses' work, nurses' chances for negotiating for improved staffing levels or other resources were diminished. Nurses' negotiations were inhibited in a climate where there was little or

no time allocated for research in the clinical setting. Many nurses lacked expertise in statistics and computer skills in the early 1990s, although such skills have increased over the past 10-15 years. An increasingly wide range of nursing specialties was developing for inclusion in data collections and these collections were supported by few technological interfaces between nursing and other hospital systems.

TrendCare was initially developed to measure patient requirements and inform managers for the recruitment of the right nursing resources. It is an evidence gathering system for current and future decision support. The decisions made by Directors of Nursing using TrendCare are about identifying and matching the needs of the patients to the nursing time and skills available. This provides decision support for the allocation of fair and equitable workloads where the right nurse or team of nurses are matched for best fit by allocating actual staff to actual patients. The criteria for establishing the match may include:

- patient dependency;
- skills, competencies and experience of the nurses;
- mentoring of graduate nurses by placing them in experienced and supportive teams;
- role modelling;
- languages spoken; and
- other professional or human resource parameters.

The TrendCare system evolved after many years of research and development by Ms Lowe, including eight years developing clinical indicators and patient category hours. The product has had 9 major upgrades since its first version which was released in 1993 and these are discussed in a later section of this chapter. In its present format,

TrendCare focuses on patient acuity, patient nurse dependency and clinical pathways management and is supported by comprehensive human resource and bed management modules. It has been developed with application to a wide range of specialties in acute, sub-acute and aged care. The range of patient types and care requirements is extensive and currently numbers 41, which include specialties such as medical, surgical, maternity, labour ward, Special Care Nursery, Coronary Care, ICU, paediatrics, paediatric ICU, rehabilitation, day surgery, short stay, psychiatric, emergency department, palliative care and aged care patients. The specialties and care requirements continue to be expanded in TrendCare as upgrades are completed in response to user requests (Introduction to TrendCare Management System, 2001:3). TrendCare is PC – based and is designed for use at both hospital ward and operational management levels.

The TrendCare system captures a range of clinical and non-clinical data and the workload function is derived from the dependency measurement information. Nursing care is one component of clinical care which is recorded and it includes direct and indirect nursing care. Other clinical care may be recorded in TrendCare such as physiotherapy. This thesis focuses on direct nursing care because it is variable and the most difficult to measure and predict. Indirect care is fixed for a ward or unit and is significantly easier to measure, for example the care provided by the Nurse Unit Manager or the clinical educator. The cost of nursing for indirect care is largely not affected by patient numbers or patient dependency. Also excluded from the study is the clinical pathway component of TrendCare, non-nursing clinical data such as data captured for allied health hours of care and non-clinical data as provided, for example, for ward clerk duties, as outlined in Chapter 1.

TrendCare records nursing workload information in two ways, by nurse patient ratio and TrendCare HPPD. Both workload measures may be recorded simultaneously. Simultaneous recording was available to each hospital in the Victorian pilot and also

for any other site if a ratio dataset is included in the system. Examples of ratio datasets could be those Victorian or Californian ratios described previously or any other customized ratio data set.

### **3.4.2 Major features**

TrendCare performs several functions that assist in the allocation of nursing resources. These functions are driven by the nurses' assessment of patient requirements, which is then used to determine optimum patient care by equitable and appropriately skilled staffing allocation. The functions of TrendCare purport to enable predictable nursing costs. In the current version of TrendCare (3.1.2, Oct 2004) the system analyses data recorded by nurses and presents data in a report format. It undertakes the following functions which are of greatest interest in this thesis:

- measures patient acuity;
- predicts patient dependency;
- distributes an equitable workload (across wards, individual and teams of nurses); and
- actualizes the care provided.

In addition the TrendCare system:

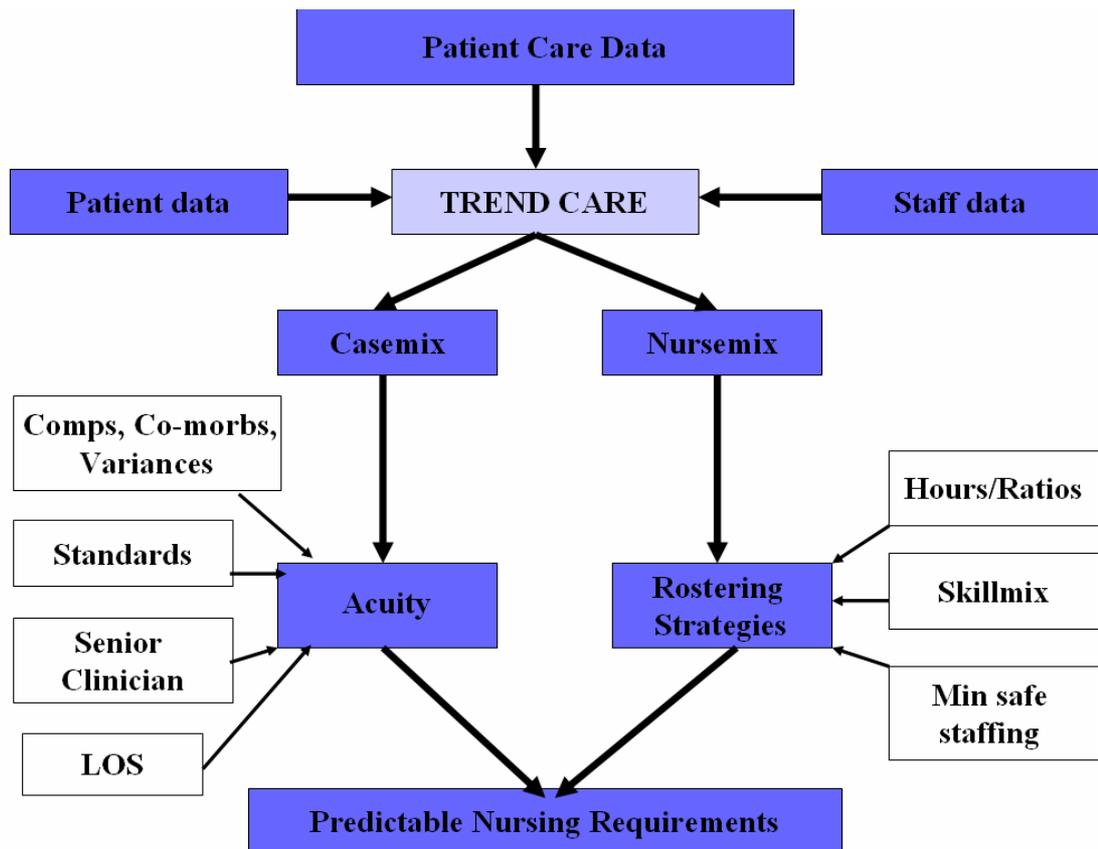
- produces efficiency reports (nursing, ward, whole of hospital);
- analyses variances;
- identifies acuity and efficiency trends;
- re-engineers rosters;
- orders and monitors patient diets;

- develops acuity-based budgets;
- measures nursing costs by specific episode type e.g. DRG;
- tracks variance in patient outcomes, acuity profiles and clinical pathways;
- facilitates benchmarking in patient acuity (by hours per patient day, HPPD);
- tracks and monitors staff training and competencies;
- facilitates bed management;
- undertakes discharge analysis; and
- reports for human resource management (TrendCare User Handbook, 2004).

Subsequently, from these functions a full range of reports can be generated for use at the ward or operational level. Customized reports are also available through the use of Structured Query Language (SQL) capabilities. Reports can be saved as PDF or HTML files for the purposes of emailing to a third party. The system includes comprehensive variance tracking and reporting and all reports have print-preview ability. These report features have been essential elements of the data collection methodology for this thesis and are described further in Chapter 4. In the next section, the flow of data in TrendCare is described.

### **3.4.3 Data flow**

The flow of data in TrendCare has been designed to measure patient acuity and facilitate the prediction of nursing requirements and subsequently rostering strategies. Figure 3.1 below is a data flow chart which illustrates data and inputs and outputs through TrendCare.



**Figure 3.1 - Data Flow in TrendCare**

Figure 3.1 shows that data inputs in TrendCare is collated from three sources. Patient care data is entered by direct care nurses. Patient demographic data is entered by admissions staff, including patient type, for example 'antenatal'. Staff data is entered by the Human Resources Department. The staff data would include for example, staff names, qualifications and shift preferences. It would also include a ratio schedule if required. TrendCare then produces information about patients, shown above as the casemix, together with information about staff, shown as the nursemix.

Information about patient acuity is derived from the casemix. Patient acuity also has four influences;

- complications, co morbidities and other variances;
- standards of care;
- the practices of the senior clinician, which are likely to impact on length of stay; and
- length of stay (LOS), since a longer length of stay will have more days of lower acuity.

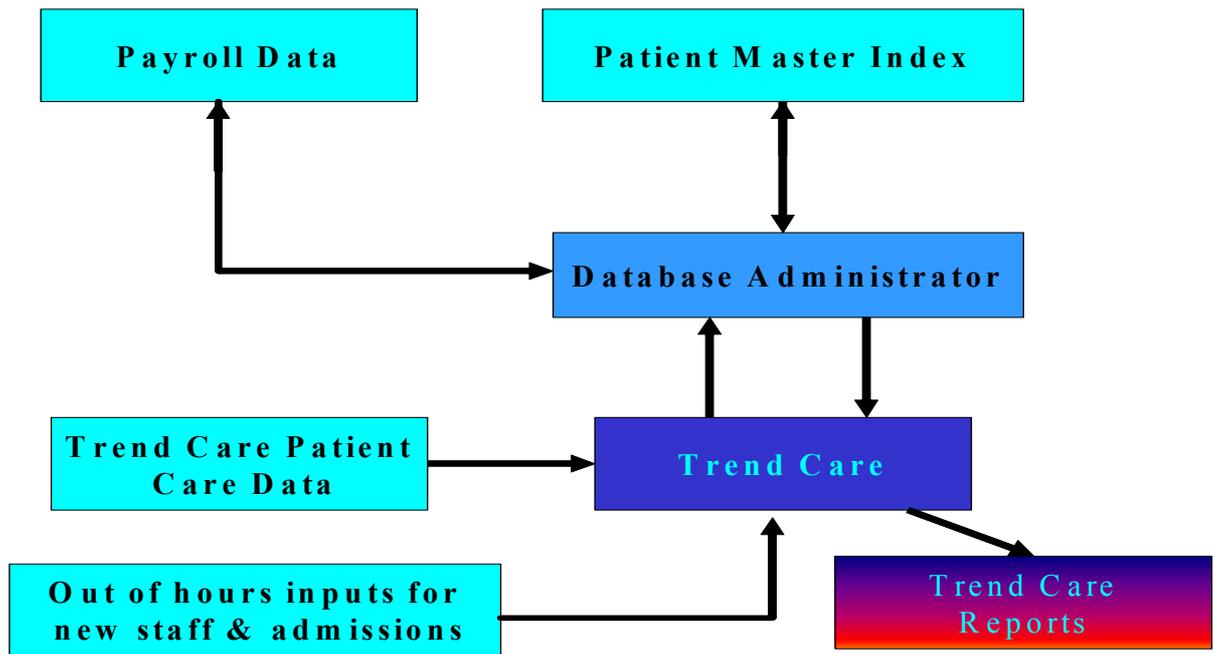
Information about rostering strategies is derived from the nurse mix. The rostering strategies may be influenced by;

- hours available for nursing or regulated ratios;
- skill mix; and
- minimum safe staffing levels.

Nurse Unit Managers then make decisions about rostering strategies which would suitably match the patient acuity, resulting in predictable nursing requirements.

The TrendCare data set is a self contained information system. It accepts inputs from other interfaced systems but is separate from patient demographic and administrative data of the Patient Master Index (PMI). Hospital data base administrators are responsible for appropriate payroll and PMI security and ensure there is no access to these systems from the TrendCare system. The interfacing of TrendCare with other systems ensures data quality and that patient and staff data are recorded according to the mandated government requirements. Interfacing also resolves problems associated with repeated data entry to the TrendCare system which is costly and has potential for

error unless manual cross checking occurs. While most hospitals have interfaced systems, TrendCare also has the capacity for the Nurse Unit Manager to enter details manually for new staff, such as an agency nurse, and for 'out of business hours' admissions. This ensures that all nursing and patient data is captured, even when the links are not active such as when the PMI administrator is off duty. The data is updated when operators for the PMI or payroll are next on duty. See Figure 3.2, System links, on the following page.



**Figure 3.2: - System Links**

Figure 3.2 demonstrates TrendCare as a discrete information system that can be interfaced to other hospital information systems by the database administrator. For example, staff data from the Human Resources Payroll System can be interfaced with TrendCare. TrendCare also has a roster system and clinical pathways features and can support importable rosters from other software programs and customized clinical pathways. Inputs from these three systems generate data about both the casemix and nurse mix of a given ward or unit (Refer to Figure 3.1).

### 3.4.4 Timing and input of data in TrendCare

Almost all data input is option based with little text input required. Data can be entered by 4 categories of staff. Some staff enter data on a once only or ad hoc basis and others at least twice per shift. The four categories of staff and their responsibilities for TrendCare reporting are:

1. **Administrators of Patient Master Index (PMI)**, enter patient demographic details.
2. **Nursing administration** - enter staff details on appointment, clinical pathway coordinator maintains templates, nursing supervisors monitor and manage admissions and discharges, oversee staff numbers, staff development and staff details maintenance;
3. **Direct Care Nurses for care of patient/s** – predict and actualize nursing care, clinical pathway reporting and variance management;
4. **Ward Manager/Team leader** - download rostered hours, allocates staff, meal breaks and indirect care responsibilities such as checking resuscitation equipment.

The demographic data is entered by either automatic download from the Patient Master Index (PMI) or it is manually entered by the admitting Nurse Unit Manager. The first data to be entered is the patient type. Direct care nurses enter patient care data on the computer for all patients in their care and this usually takes 2 – 5 minutes in total. The data is entered on two occasions. First in mid shift in order to predict staffing requirements for the on-coming shift and secondly at the end of the shift to actualize the care provided.

### 3.4.5 Patient types

Patient type is the first of four aspects of data input to be considered. The other aspects are the indicators, timings and categories which will shortly be described. There are currently 41 patient types, as listed in Table 3.2, including a boarder category for baby, child or spouse, who remains in the care of an in-patient.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Medical</b></p> <ul style="list-style-type: none"> <li>▪ Medical</li> <li>▪ High Dependency Medical</li> <li>▪ Short Stay Medical</li> <li>▪ Oncology/Haematology</li> <li>▪ Day Oncology</li> <li>▪ Palliative Care</li> </ul> <p><b>Surgical</b></p> <ul style="list-style-type: none"> <li>▪ Surgical</li> <li>▪ High Dependency Surgical</li> <li>▪ Short Stay Surgical</li> </ul> <p><b>Paediatric</b></p> <ul style="list-style-type: none"> <li>▪ Paediatric Babies</li> </ul> | <p><b>Maternity</b></p> <ul style="list-style-type: none"> <li>▪ Maternity Antenatal / Postnatal</li> <li>▪ Maternity Mother &amp; Baby</li> <li>▪ Labour and Post Natal</li> <li>▪ Labour Ward</li> <li>▪ Labour Assistance to Independent Midwife</li> <li>▪ Baby Post Natal</li> </ul> <p><b>Psychiatric</b></p> <ul style="list-style-type: none"> <li>▪ Adolescent Psychiatric</li> <li>▪ Psychiatric</li> <li>▪ Psychiatric Geriatric</li> </ul> <p><b>Sub Acute / Extended Care</b></p> <ul style="list-style-type: none"> <li>▪ Rehabilitation – Fast</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Contd/...

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Under 12 Months</p> <ul style="list-style-type: none"> <li>▪ Paediatric Medical</li> <li>▪ Paediatric High Dependency Medical</li> <li>▪ Paediatric Short Stay Medical</li> <li>▪ Paediatric Oncology / Haematology</li> <li>▪ Paediatric Day Oncology</li> <li>▪ Paediatric Palliative Care</li> <li>▪ Paediatric Surgical</li> <li>▪ Paediatric High Dependency Surgical</li> <li>▪ Paediatric Short Stay Surgical</li> <li>▪ Paediatric Psychiatric</li> </ul> | <p>Stream</p> <ul style="list-style-type: none"> <li>▪ Rehabilitation – Slow Stream</li> <li>▪ Geriatric</li> <li>▪ Nursing Home</li> </ul> <p><b>Critical Care</b></p> <ul style="list-style-type: none"> <li>▪ Emergency</li> <li>▪ Intensive Care</li> <li>▪ Coronary Care</li> <li>▪ Paediatric Intensive Care</li> <li>▪ Neonatal Intensive Care</li> <li>▪ Special Care Nursery</li> </ul> <p><b>Acute Special Areas</b></p> <ul style="list-style-type: none"> <li>▪ Renal Dialysis</li> </ul> <p><b>Boarders</b></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 3.2 - TrendCare® - Patient Types**

The patient type must be entered with the patient details before any other care data is recorded. Patient type determines which indicators are available for the nurse to select

and record. The selection of patient type also determines the timings of those indicators and subsequently the patient category. The selection criteria for all 41 patient types are recorded in the system and a sample extracted from the TrendCare System (2004) is shown on the following Table 3.3, Selection criteria, for 4 types of medical patient.

## ***TREND CARE CRITERIA FOR PATIENT TYPE SELECTION***

**MEDICAL** All adult inpatients who fit the following criteria:

Patient whose primary diagnosis and treatment relates to their medical condition.

*Some examples of medical patients include:*

- COAD
- Diabetes
- Abdominal pain
- UTI
- URTI

**HIGH DEPENDENCY MEDICAL** All adult inpatients who fit the following criteria:

- Patient whose primary diagnosis and treatment relates to their medical condition.
- Medical patients who requires;
  - multiple hourly documented observations
  - complex medications (2<sup>nd</sup> hrly or more frequent IV medications or IV push medication for greater than 30 minutes)
  - hourly NG / Tracheal suctioning

*Some examples of high dependency medical patients include:*

- severe respiratory infection
- septic shock
- severe gut obstruction

**SHORT STAY MEDICAL.** All adult ‘day only’ patients who fit the following criteria:

- Patient whose expected length of stay is expected to be less than 24 hours
- Patient whose primary diagnosis and treatment relates to their medical condition.

*Some examples of short stay medical patients include:*

- Blood transfusion
- Liver biopsy
- Bronchoscopy

**ONCOLOGY / HAEMATOLOGY** All adult inpatients who fit the following criteria:

- Patient whose primary diagnosis and treatment relates to their oncological or haematological condition.

*Some examples of oncology / haematology patients include:*

- Neutropenia
- Patient receiving cytotoxic treatment
- Patient undergoing treatment for malignancy

**Table 3.3 - Selection Criteria – medical patients (extract)**

**Reproduced from TrendCare System User Handbook (2004)**

### **3.4.6 The Indicators**

Once the patient type is entered, the recording of nursing care can proceed. Indicators for a patient include everything that a nurse does on his or her shift which relates to

the care of that patient. This care includes all direct care nursing including where two or more nurses have attended to the same patient. Examples of these indicators include mobility, hygiene, nutrition, thought processes, continence, communication, observations, medications, treatments, counseling, teaching, emotional support, isolation, discharge planning, transfer, specialling and part-specialling. The indicators are customized by patient type such as midwifery, psychiatric, medical or surgical patient and they are selected according to acuity levels built into the system. The mobility indicator has options which the nurse selects and can record in one of 3 ways:

- Self - patient is able to mobilize independently or with minimal supervision or assistance. This includes patients using walking aids independently;
- Partial assist – patient is independent of some of the functions of mobility, for example may require significant assistance to get out of bed by one or more nurses, or can walk but requires constant supervision especially in shower or toilet; and
- Total assist/bedfast – patient is bedfast or totally dependant on nursing assistance over a full shift, for example frequent pressure area care and positioning by one or more nurses, mechanical lifting by one or more nurses, regular pans or urinals.

An illustration of customizing indicators to patient type is the mobility and continence indicators which would not be options for a neonate category but would be for most other patient categories. Both the indicators and the options available have full descriptions installed in the system and the nurse simply holds the computer ‘mouse’ over the indicator and the definition will be available. This ensures that all users record data based on the same definitions and criteria.

Specializing is an indicator used where a patient cannot be left unattended for a selected period. It may be required when a patient is seriously ill or unstable or who has had a critical incident such as a cardiac arrest and requires constant observation. This indicator must only be used if the patient cannot be left unattended for the selected period. Generally these patients are authorized 'specials' by doctors or team leaders, for example;

- seriously ill child requiring constant observations;
- immediate post-op - major surgery;
- critical incident requiring a high intensity of nursing time;
- immediately post critical incident e.g. haemorrhage or cardiac arrest;
- parents requiring 2 hours or more of nursing time for counseling or support following a child's death; and
- child requiring constant observation.

Specializing for 2 hours would be selected where the child is specialised 'one to one' for a two hour period during the shift. The child may have experienced a critical incident which absorbed two hours of nursing intensity.

Standards and comparability between nurses' data entry for patient indicators are scrutinized using inter-rater reliability testing, which is discussed in data quality section in Chapter 4.

### **3.4.7 Timings and categories**

The nurse selects the patient type and records the indicators that fit the type of direct care he or she intends to provide (predicted) or has provided (actualized). Then the TrendCare system calculates timings and totals them behind the screen available to

the nurse (this could be viewed by nurses prior to and including version 2.1). The total timings are then automatically processed to allocate a patient acuity category for the patient on the shift for both predicted or actualised care. The total timings and the category are available to the nurse on the screen. These timings are manifested in patient categories from Category 1 – 5. For example, in medical/surgical patient type with Category 5 allocated to patients requiring high dependency nursing. Some patient types have up to 9 categories, for example babies in special care nursery.

The category timings estimate includes all the direct care a nurse provides for a patient. However, the category is more than just these timings because it includes allowances for critical incidents such as delivery, cardiac arrest or specialing. For example a Category 3 patient may be derived for 6 hours by timing and 2 hours specialing. The baseline hours for each specialty are Category 1 hours. The hours relate to time required to provide basic care for a patient who is generally independent for activities of daily living. This baseline indicator timing allows for documentation, simple medications and treatments, routine teaching and counseling, enquiries from relatives and general care and attention. The baseline hours contained within all categories vary from specialty to specialty. They are regularly validated averages and will not exactly fit individual patients. The timings were constructed using validated averages generated by TrendCare users on hundreds of patients at many sites and are updated every 2-3 years or more frequently if users require it.

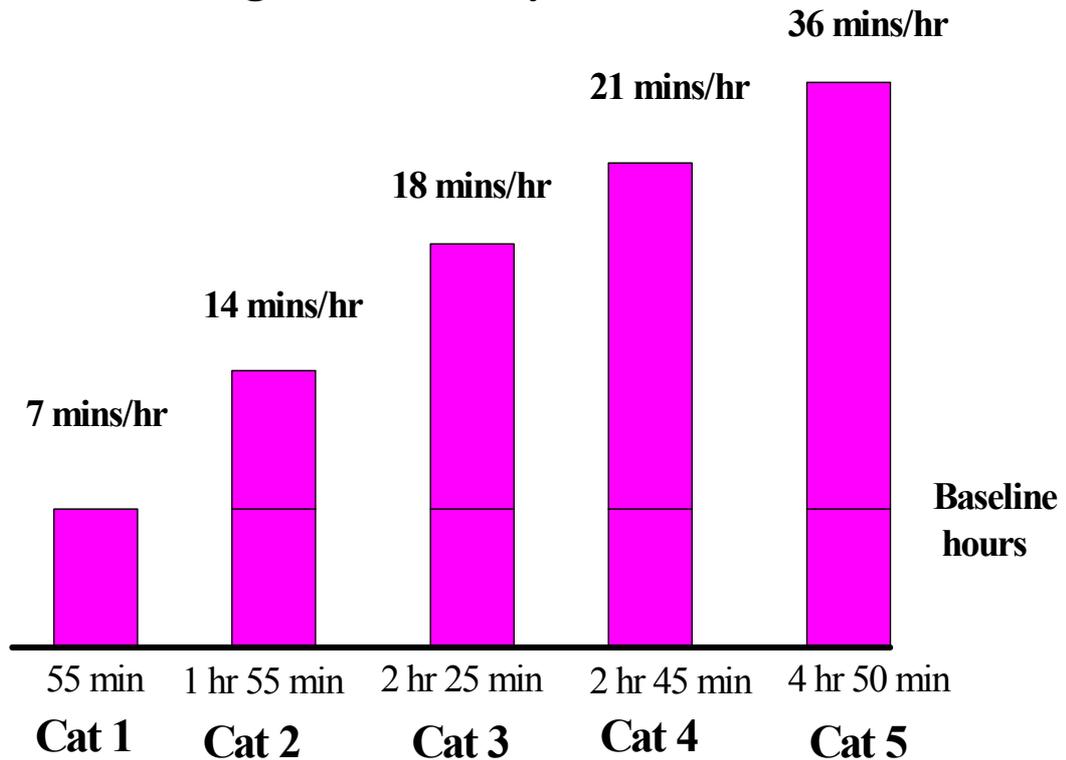
Different times are allocated for the same category of patient over different shifts because there is significant variation in direct care time from shift type to shift type. For example, there would be different contact times on day or night shift. Contact time is lowest on night shift when most patients sleep and highest on day shift. During day shift there are two meals and two mini meals served; breakfast, lunch, morning tea and afternoon tea in most settings, but this may be different for other cultures. There is a higher frequency of activities on day shift, including toileting, questions,

buzzers, doctors rounds, treatment changes, hygiene activities, internal and external enquiries, discharges and transfers to the operating room (TrendCare Systems Training Booklet Clinical 2003). Night shift has the lowest direct care time, but includes patient care which is constant across all shifts such as medications, observations, pressure area care. In more acute areas such as ICU, CCU, Labor Ward and Special Care Nursery, the workload is more constant throughout and between shifts.

See Figure 3.3, which illustrates that a Medical/Surgical/HDU patient on a day shift would require 7 minutes of care on average per hour, or an average of 55 minutes for the total shift of care. Subsequent categories relate to patients who require more complex care and extensive documentation. A single category 4 patient requires the same amount of care time as 3 category 1 patients for this patient type.

|

### Medical/Surgical/HDU - Day Shift



**Figure 3.3 - Patient categories and timings**

This thesis has not undertaken an analysis of the categories but they are discussed for completeness. The theory behind ratios is that they are calculated for an average Category 3 type patient and that this category represents the average requirements for all patients (Lowe, 2003). The peaks and troughs of the requirements of patients in higher or lower categories are expected to even out on balance. In reality hospitals will have fewer and fewer Category 1 and 2 patients, due to shorter LOS, and fewer patients have convalescent days. The Category 3 patient will often be the minimum rather than the average category and evidence of a trend to greater numbers of higher category patients would be helpful in future ratio negotiations as well as workload allocation.

### **3.4.8 Unproductive and unpredicted care allowances**

Within the timings, as described, there are systematic inclusions within TrendCare, or adjustments for two elements of the peaks and troughs of nursing workload. The first of these elements is unproductive time. The peaks and troughs in workload are most obvious on night shift and especially in medical and surgical wards. They are less common in maternity wards and virtually non-existent in critical care areas such as ICU, where there is little variance in patient requirements from shift to shift. The uneven distribution of workload on night shift is depicted in Figure 3.4 Night shift allowance – unproductive hours.

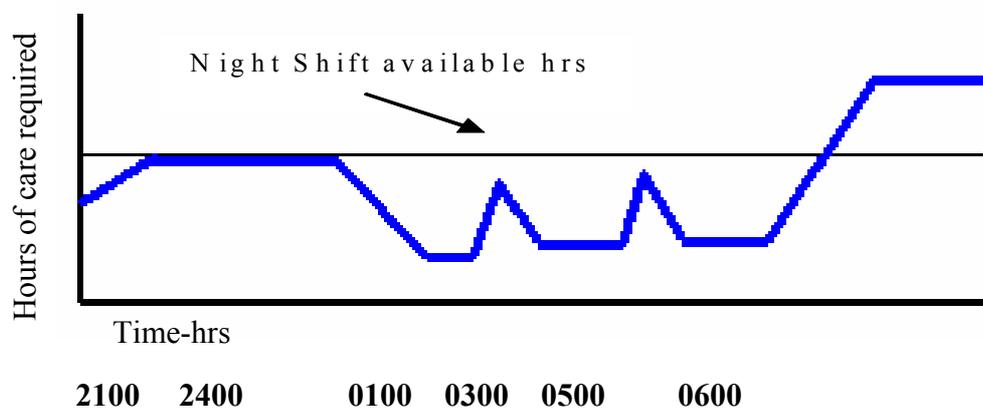
Within TrendCare, there is an allowance for unproductive time during night shift on general wards which can be adjusted according to ward type. During night shift when patients are mostly asleep, minimum safe staffing levels are applied. This level may be higher than that otherwise recommended using TrendCare patient categorization. Most hospitals staff wards require at least 2 nurses on night shift as a minimum safe staffing level. TrendCare may indicate that just 1.2 nurses are required. The variance between actual and predicted hours will vary for night shift in these circumstances. Clearly 0.8 of a nurse cannot be deployed elsewhere in the middle of the night and some of the nurses' time may be directed to indirect care responsibilities. For example, the Night Nurse Manager may be allocated 1.5 administration hours and the balance in clinical or direct care hours.

The TrendCare system includes an adjusted variance for night shift to ensure that enough nursing hours are available for the 'peaks', i.e. between 0530 and 0700 hours. In short, the system ensures that patients will have enough nursing resources to meet those peaks. This adjustment is known as an unproductive care allowance. If this was not built into the system, and a floater nurse was allocated across two or more wards to make an 'on-paper' match of simple hours required, the requirements of patients

could not be met when they were needed, i.e. the floater nurse cannot be in all the wards at the same time between 0530 and 0700hrs.

This unproductive allowance is a percentage of the entire night shift. The system builds it into both the predicted and actualized night shifts. The % can be customized for individual wards or hospitals. The suggested/default allowances are as listed;

|                 |     |
|-----------------|-----|
| Medical Wards   | 8%  |
| Surgical        | 10% |
| Maternity       | 5%  |
| Paediatric      | 5%  |
| Palliative Care | 5%  |
| Rehabilitation  | 5%  |
| Geriatric       | 5%  |



**Figure 3.4 - Night Shift Allowance - unproductive hours**

**(Reproduced from TrendCare systems Training Booklet Clinical 2003:15)**

In Figure 3.4, the constant 'Night Shift' line includes the allowance for safe staffing levels during peaks.

The second element of the peaks and troughs is an unpredicted care allowance. The TrendCare system has built in a 12.5% buffer or one hour in an eight hour shift for unpredicted care requirements. This buffer would account for time required for that which is affected by unknown work and skill mix, including such things as spilled body fluids, medications not being available or distressed relatives. The allowance is built into the system in the same way as described for the night shift allowance. It has been built in for nurses because hospital managers were unprepared to staff for an unpredicted care component. The 12.5% can be adjusted up or down for specialties, for example the adjustment can be 10% for surgical wards. Wards are now trending the unpredictable by subtracting the predicted care from the actual and refining the unpredicted percentage. An analysis of a negative variance of greater than 12.5% would indicate that the workload on a ward for that shift was exceptionally high. In contrast, a positive variance of greater than 12.5% would indicate that a workload was lower than predicted.

#### **3.4.9 Prediction timetable**

Direct care nurses record predicted care requirements on the TrendCare system for a 24 hour period on each day shift. Predictions are for the evening shift, night shift and day shift of the following day. The predictions are for the purposes of rostering the right number and skill mix of staff for whom workloads will be allocated. Nurses on subsequent shifts update the predictions for the remainder of the 24 hour period. Each nurse actualizes the predictions at the shift half way mark and at the end of each shift. The system does not allow actualizing until half way through the shift. See Table 3.4 TrendCare prediction timetable.

| <b>Day Shift</b> | <b>Day</b> | <b>Evening</b> | <b>Night</b> | <b>Day</b> |
|------------------|------------|----------------|--------------|------------|
| 0930 – 1030      |            | P24            | P24          | P24        |
| 1400 – 1530      | Act        |                |              |            |

| <b>Evening Shift</b> | <b>Day</b> | <b>Evening</b> | <b>Night</b> | <b>Day</b> |
|----------------------|------------|----------------|--------------|------------|
| 1700 - 1800          |            | Act            | PE           | PE         |

| <b>Night Shift</b> | <b>Day</b> | <b>Evening</b> | <b>Night</b> | <b>Day</b> |
|--------------------|------------|----------------|--------------|------------|
| 0400 – 0500        |            |                | Act          | PN         |

**Table 3.4 - TrendCare Prediction Timetable**

**Key:**

**Act =Actualized care (can only be completed after midway point of current shift)**

**P24 = Predictions for next 24 hours (can only be done on a day shift)**

**PE = Predictions for future shifts made on evening shift**

**PN = Predictions for future shifts made on night shift**

The importance of actualizing is that it identifies the nursing hours worked, it provides a basis for future roster patterns, it enables accurate calculation of nursing hours provided for each patient potentially by DRG and it tracks staff work profiles. Actualizing accounts for all discharges, transfers and admissions, changes to patient condition or nursing interventions, variances in pathways and changes in nursing hours available such as for escorts or deployments to other wards.

### 3.4.10 Allocating nursing workloads

The allocation of nursing workloads can be undertaken by the Nurse Unit Manager of the current shift for the on-coming shift when all patient and staff data is completed. Allocations can be made for individual nurses or teams of nurses. The system has been designed to allocate workloads by nursing clinical HPPD and the process is as follows;

1. Allocate staff
2. Categorize patients
3. Allocate nursing work loads

The three steps in the process are now explained.

1. Allocating staff involves rostering staff to the shift either manually by selecting from a list of ward staff or by interfaced hospital rostering systems. The first step is for the Nurse Unit Manager to log onto TrendCare, see Figure 3.5.

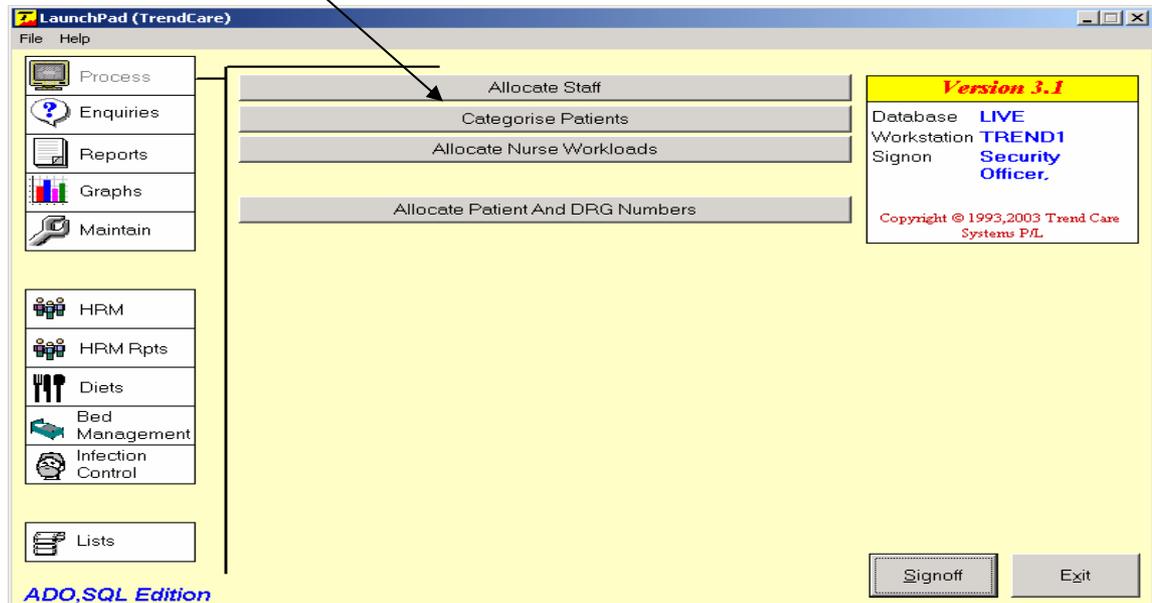
1. To access the allocate staff “*Signon*” to TrendCare



**Figure 3.5 – Signon in TrendCare**

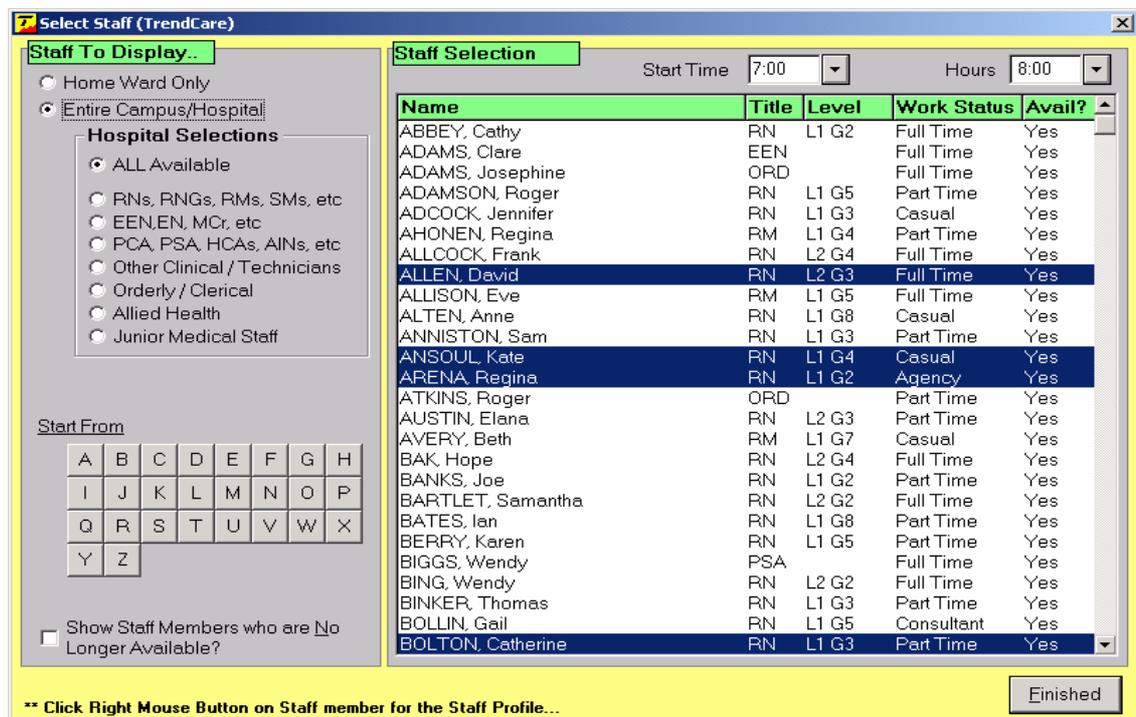
The following screens and instructional text to allocate staff is reproduced from the TrendCare User Handbook, 2004. See Figure 3.6 to 3.7.

Click on "Allocate Staff" button in process menu.



**Figure 3.6 – Allocate Staff – Launch Pad**

The select staff window appears and the Nurse Unit Manager selects the staff from either the home ward or the entire campus or hospital, as shown in Figure 3.7.

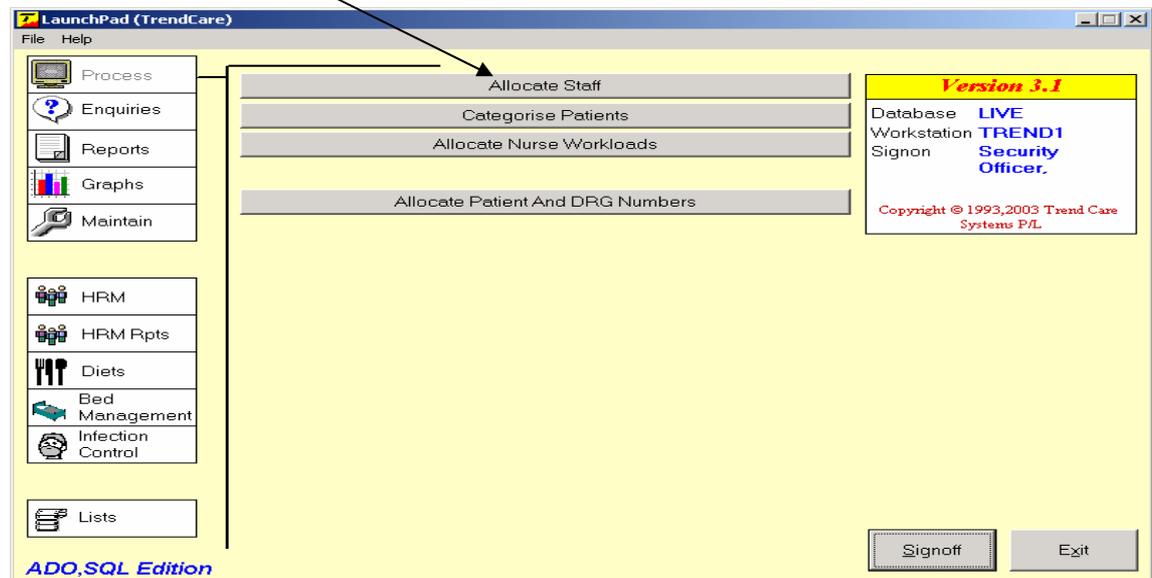


**Figure 3.7 – Select Staff**

Note: All patient, staff names and data are fictitious.

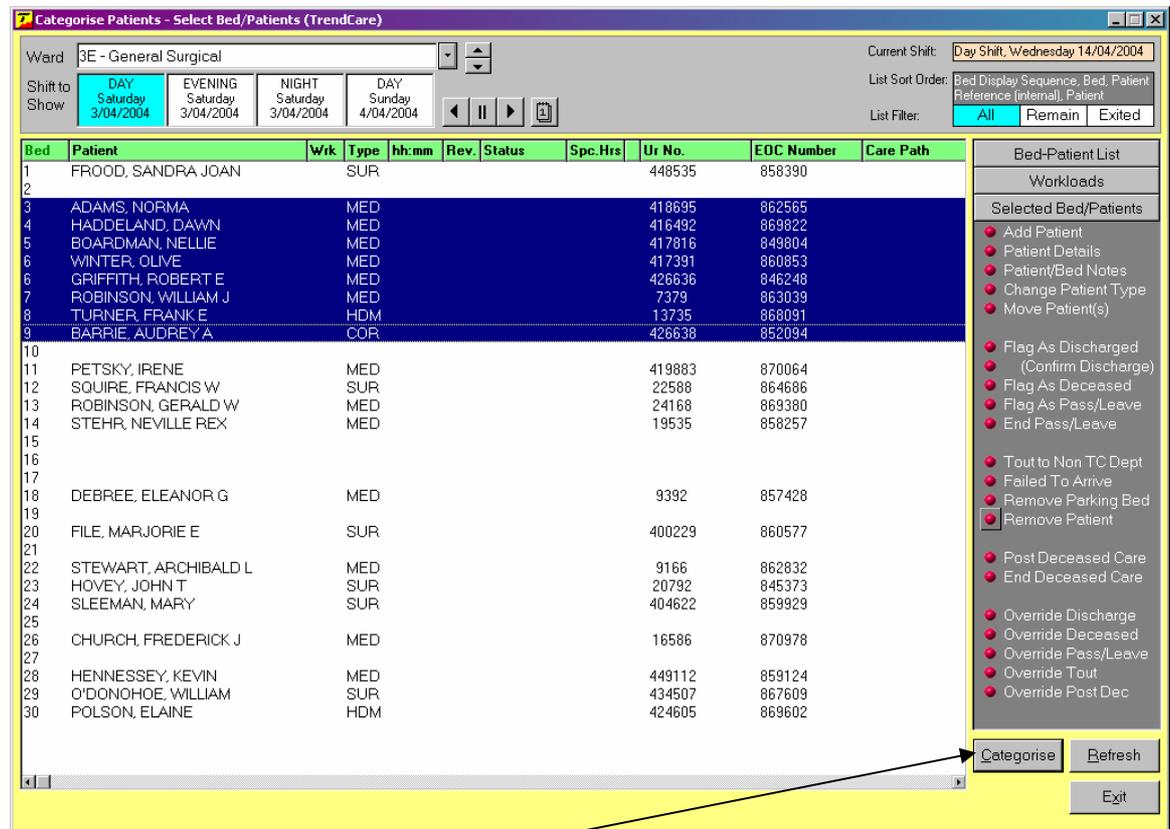
2. The next step is to categorize patients; See Figures 3.8 to 3.11.

Click on “Categorise Patients” button in the process menu.



 **Figure 3.8 - Categorise Patients – Launch Pad.**

Select patients to categorise by clicking on each patient. They will be highlighted.  
See Figure 3.9



Click “Categorise” button.

**Figure 3.9 - Categorise Patients**

Note: All names and data are fictitious

The following view will appear. See Figure 3.10.

**Categorise Patient (TrendCare)**

Ward: **3E - General Surgical** Shift: DAY Monday 13/10/2003 **EVENING Monday 13/10/2003** NIGHT Monday 13/10/2003 DAY Tuesday 14/10/2003 Phase: **P24**

Bed: 2 Patient: **ADAMS, NORMA** Diag: **ORTHOSTATIC**

Acuity: **Medical** Diet:

|                                                | 2 Hours                       | 3 Hours                          | 4 Hours                             |
|------------------------------------------------|-------------------------------|----------------------------------|-------------------------------------|
| <b>Specialling</b>                             | 8hr (1 Nurse/Patient)         | 9hr (1 Nurse/Patient + 1hr)      | 10hr (1 Nurse/Patient + 2hrs)       |
| <b>Mobility</b>                                | Self                          | Part Assist                      | Total Assist/ Bedfast               |
|                                                | Heavy Total Assist            |                                  |                                     |
| <b>Hygiene</b>                                 | Self or N/A                   | Part Assist                      | Total Assist                        |
| <b>Nutrition</b>                               | Self or N/A                   | Part Assist                      | Total Assist                        |
| <b>Thought Processes</b>                       | Minor Impact                  | Moderate Impact                  | Severe Impact                       |
| <b>Continence State</b>                        | Frq.Incontinent (2 - 4)       | Frq.Incontinent (5 or more)      |                                     |
| <b>Communication</b>                           | Communication Problem         |                                  |                                     |
| <b>Observations</b>                            | 1/2-1 Hourly                  |                                  |                                     |
| <b>Medications</b>                             | 1st Involved Medication (1)   | 2nd Involved Medication (2-4)    | 3rd Involved Medication (5 or more) |
| <b>CVline/Portacath</b>                        | CVP Monitoring/ Nutrition     |                                  |                                     |
| <b>Treatments</b>                              | Extensive Treatments (30 min) | Extensive Treatments (60 min)    | 2hr Extensive Treatments            |
| <b>Teaching/Counselling/ Emotional Support</b> | Routine                       | 30 min Extensive for Pt/Relative | 60 min Extensive for Pt/Relative    |
| <b>Isolation</b>                               | Total Isolation               |                                  |                                     |
| <b>Discharge Planning</b>                      | Routine                       | Extensive (30 min)               | Complex (60 min)                    |

Bed Name

|   |             |
|---|-------------|
| 2 | ADAMS, N    |
| 3 | PETSKY, IR  |
| 4 | HAROLD, D   |
| 5 | HADDELAN    |
| 6 | GILLIGAN, J |

This Patient

Diet

Acuity

Chg PType

Chg Note

Finish

**Figure 3.10 – Acuity Screen**

This is the “Acuity Screen” for the first patient selected.

Note: All names and data are fictitious.

Patients now appear with acuity weighting and review phase. E.g. P24. (24 hour prediction) See Figure 3.11

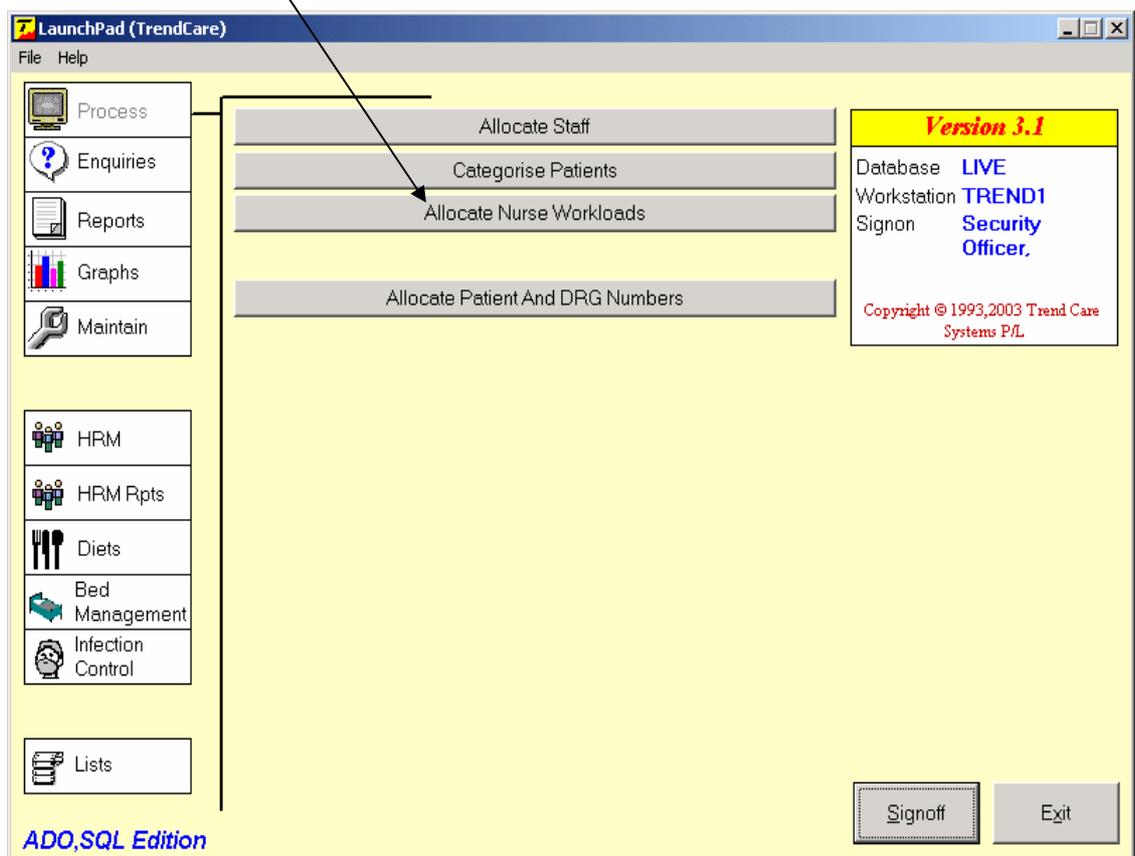
| Bed | Patient            | Wrk | Type | hh:mm | Rev. | Status | Spc.Hrs | Ur No. |
|-----|--------------------|-----|------|-------|------|--------|---------|--------|
| 1   | COFFEY, NOEL C     |     | SUR  |       |      |        |         | 415180 |
| 2   | ADAMS, NORMA       |     | MED  | 2:05  | P24  |        |         | 418690 |
| 3   | PETSKY, IRENE      |     | MED  | 0:45  | P24  |        |         | 419880 |
| 4   | HAROLD, DOUGLAS T  |     | SUR  | 2:05  | P24  |        |         | 425940 |
| 5   | HADDELAND, DAWN    |     | MED  | 1:25  | P24  |        |         | 416490 |
| 6   | GILLIGAN, JOAN     |     | MED  | 0:45  | P24  |        |         | 429940 |
| 7   | FOLSTER, MARX      |     | SUR  |       |      |        |         | 437170 |
| 8   | O'NEIL, HAROLD     |     | SUR  |       |      |        |         | 438320 |
| 9   |                    |     |      |       |      |        |         |        |
| 10  | DONNEY, BARRY      |     | SUR  |       |      |        |         | 412210 |
| 11  | WINTER, OLIVE      |     | MED  |       |      |        |         | 417391 |
| 12  | CHARLES, WALLACE F |     | SUR  |       |      |        |         | 449261 |
| 13  | OGDEN, ANTHONY     |     | MED  |       |      |        |         | 449780 |
| 14  | MCHARG, DAVID L    |     | MED  |       |      |        |         | 448210 |
| 15  | BAKER, KAREN       |     | MED  |       |      |        |         | 443370 |
| 16  | SHORT, MAUDE       |     | SUR  |       |      |        |         | 418610 |
| 17  | RATTEY, JEANETTE   |     | MED  |       |      |        |         | 445800 |
| 18  |                    |     |      |       |      |        |         |        |
| 19  | BANKS, LESLEY      |     | SUR  |       |      |        |         | 448720 |
| 20  | BLYTON, NORMAN H   |     | MED  |       |      |        |         | 448170 |
| 21  | SHARRY, NATHALIE E |     | SUR  |       |      |        |         | 403770 |
| 22  | MILLER, JOHN GLYN  |     | MED  |       |      |        |         | 449810 |
| 23  | FRAZER, MITCHELL L |     | MED  |       |      |        |         | 405167 |
| 24  | STELLA, ANTONINO   |     | MED  |       |      |        |         | 449200 |

**Figure 3.11 – Acuity Weighting**

Note: All names and data are fictitious.

3. The next step is to allocate nursing workloads. See Figures 3.12 – 3.14. The work may be allocated to nurses or teams of nurses with the aim of ensuring a fair and equitable distribution. This function is also located in the process menu. The steps are as follows;

Click on “*Allocate Nurse Workloads*” Button.



**Figure 3.12 – Allocate Nurse Workloads – Launch Pad**

The “*Allocate Nurse Workloads*” window opens

To allocate patients to this team of nurses click on each patient until the workload is as close as possible to the total hh:mm for staff assigned.

The variance between the workload allocated and the staff hours available appears near the lower part of the screen.

Continue processing for all staff aiming to have equal distribution of workload between staff. Work can also be allocated to individual nurses.

Allocate Nurse Workloads (TrendCare)

Ward: Ward 3 East Current Shift: Day Shift, Sun, 02/11/2003

Shift to Show: DAY Monday 27/10/2003 EVENING Monday 27/10/2003 NIGHT Monday 27/10/2003 DAY Tuesday 28/10/2003 Phase: Actual

**Workload** Staff And Beds Assigned (Right Button=Split times) **There are 2 patients still to be categorised!**

| n/a | 40:54 | Staff Position | Staff Member     | Total hh:mm | Remain. hh:mm | Workld hh:mm | Bed | Wrk | Patient             | Type | hh:mm    | Status |
|-----|-------|----------------|------------------|-------------|---------------|--------------|-----|-----|---------------------|------|----------|--------|
| w01 | 24:00 | RN L2 G3       | SNIRT, Mary      | 8:00        | 8:00          | 8:00         | 1   | w01 | BRD: SMITH, Mary    |      |          |        |
| w02 |       | RN L2 G2       | CORBETT, Vanessa | 8:00        | 8:00          |              | 2   | w01 | WALKER, CYRIL E     | MED  | 2:45     |        |
| w03 |       | RN L2 G2       | ALLEN, David     | 4:00        | 4:00          |              | 3   | w01 | ROBERTS, Ann        | SUR  | 2:25     |        |
| w04 |       | RN L1 G8       | SAUNDERS, Rebec  | 8:00        | 8:00          |              | 4   | w01 | HALE, ROBERT        | MED  | 2:45     |        |
| w05 |       | RN L1 G5       | STEPHENS, Tanya  | 8:00        | 8:00          |              | 5   | w01 |                     |      |          |        |
| w06 |       | RN L1 G4       | PLUS, Susan      | 4:00        | 4:00          |              | 6   | w01 | YOUNG, BOB          | PCU  | 1:55 Dsc |        |
| w07 |       | RN L1 G1       | RIX, Alison      | 8:00        | 8:00          |              | 7   | w01 | SANDERS, Ivy        | MED  | 2:25     |        |
| w08 |       | RNGL1 G1       | SAYMOUR, Catherr | 8:00        | 8:00          |              | 8   | w01 | DAVIS, GREG         | PSY  | 2:35     |        |
| w09 |       | EN             | RAVEN, Betty     | 8:00        | 8:00          |              | 9   | w01 | GEER, RICHARD       | HDM  | 4:50     |        |
| w10 |       |                |                  |             |               |              | 10  | w01 | TIMMS, Ned          | MED  | 1:55     |        |
| w11 |       |                |                  |             |               |              | 11  | w01 | ROBINSON, WILLIAM J | ONC  | 2:25     |        |
| w12 |       |                |                  |             |               |              | 12  |     | GILLIGAN, JOAN      | MED  | 1:55     |        |
| w13 |       |                |                  |             |               |              | 13  |     | DOORS, BRIAN        | MED  | 0:55 Dsc |        |
| w14 |       |                |                  |             |               |              | 14  |     | ADAMS, NORMA        | MED  | 1:55     |        |
| w15 |       |                |                  |             |               |              | 15  |     | RAINS, Ann          | SUR  | 1:55 Dsc |        |
| w16 |       |                |                  |             |               |              | 16  |     | BRD: GREER, Wendy   |      |          |        |
| w17 |       |                |                  |             |               |              | 16  |     | GREER, Wayne        | MED  | 0:55 Dsc |        |
| w18 |       |                |                  |             |               |              | 17  |     | DALE, Clive         | SUR  | 1:55     |        |
| w19 |       |                |                  |             |               |              | 18  |     | DICKENSON, SAM      | MED  | 2:25     |        |
| w20 |       |                |                  |             |               |              | 19  |     | WEELER, Sue         | MED  | 0:55 LvS |        |
|     |       |                |                  |             |               |              | 20  |     | SHARRY, NATHALIE E  | MED  | 1:55     |        |
|     |       |                |                  |             |               |              | 21  |     | GATES, MICHEAL      | MED  | 2:25     |        |
|     |       |                |                  |             |               |              | 22  |     | CLOSE, HARRY        | MED  | 3:49     |        |
|     |       |                |                  |             |               |              | 23  |     | JONES, ADAM         | MED  | 1:55     |        |
|     |       |                |                  |             |               |              | 24  |     | SMITH, Sue          | MED  | 0:55     |        |
|     |       |                |                  |             |               |              | 25  |     | FITZ, Laurie        | SUR  | 1:55     |        |
|     |       |                |                  |             |               |              | 26  |     | TOMAS, WENDY        | MED  | 0:55 Dsc |        |
|     |       |                |                  |             |               |              | 27  |     | REED, THOMAS        | SUR  | 9:00     |        |

| <u>Workload</u> |             | <u>Shift Total</u> |             |
|-----------------|-------------|--------------------|-------------|
| Available Hours | 24:00       | Available Hours    | 64:00       |
| Required Hours  | 24:00       | Required Hours     | 64:54       |
| Variance        | -0:00 UNDER | Variance           | -0:54 UNDER |

View Workload Summary Close

Figure 3.13 – Allocate Nurse Workloads

Note: All names and data are fictitious.

The Nurse Unit Manager can then view the workload summary and view all workloads. He or she can allocate additional work using the team variance for guidance. See Figure 3.14.

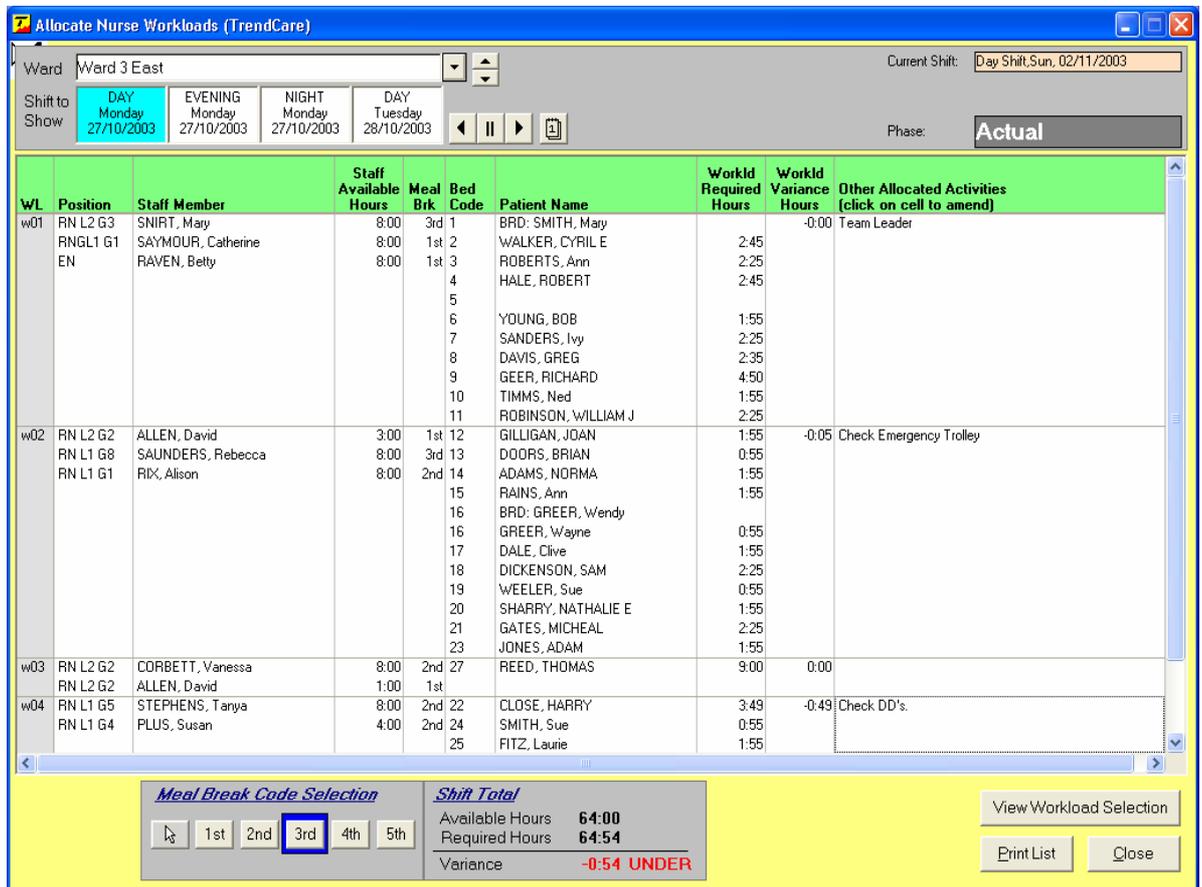


Figure 3.14 – Workload Summary

Note: All names and data are fictitious.

The workloads are predicted and then actualized for each shift and provide decision support for the Nurse Unit Manager for nursing resource management for shifts up to 24 hours in advance. The patient categories are not shown on the screen to prevent the possibility of up-scaling.

From the vast amount of patient and staff data recorded, there is an opportunity to analyse trends. A number of standard reports in TrendCare facilitate trend analysis. As discussed earlier, in contrast to ratio allocation by numbers of nurses, the

allocation of nursing resources in TrendCare considers of skills, competencies and team leadership abilities in addition to nursing time. In this thesis, nursing time is the parameter of interest as reported in the Hospital PND/Ratio Variance Summary Report in TrendCare. See Figure 3.15 Hospital PND/Ratio Variance Summary report.

### Hospital PND/Ratio Variance Summary Report

17,1492

Date Range: 1/05/2003 to 31/08/2003  
 Hospital Classification: Level 2  
 Hospital: DEFAULT

| Calendar Date              | Shift                      | Ward Name           | Patient Type               | No. Of Patient Shifts     | TC PND Required (hh:mm) | Ratio Required (hh:mm) | Actual Inpat. Clinical (hh:mm) | TC PND Admin (hh:mm) | TC PND Variance (hh:mm) | Ratio Variance (hh:mm) |      |
|----------------------------|----------------------------|---------------------|----------------------------|---------------------------|-------------------------|------------------------|--------------------------------|----------------------|-------------------------|------------------------|------|
| 1/05/2003                  | Day                        | AAU - 4th Floor     | Medical                    | 26                        | 50:15                   | 52:00                  | 57:00                          | 3:00                 | 6:45                    | 5:00                   |      |
|                            |                            | Intensive Care Unit | High Dependency - Medical  | 3                         | 13:40                   | 5:00                   | 14:16                          | 0:45                 | 1:06                    | 8:46                   |      |
|                            |                            |                     | High Dependency - Surgical | 2                         | 9:40                    | 4:00                   | 10:24                          | 0:30                 | 6:44                    | 6:24                   |      |
|                            |                            |                     | Intensive Care             | 3                         | 27:15                   | 24:00                  | 28:21                          | 0:45                 | 1:08                    | 4:21                   |      |
|                            |                            | Med Resp & Renal    | Medical                    | 24                        | 50:10                   | 48:00                  | 50:00                          | 11:00                | -0:10                   | 2:00                   |      |
|                            |                            | Medical Coronary    | Coronary Care              | 5                         | 19:10                   | 20:00                  | 24:00                          | 1:00                 | 4:50                    | 4:00                   |      |
|                            |                            | Medical B1          | Medical                    | 18                        | 28:00                   | 36:00                  | 34:15                          | 3:00                 | 6:15                    | -1:45                  |      |
|                            |                            | Medical B2          | Medical                    | 21                        | 46:19                   | 42:00                  | 50:00                          | 3:00                 | 3:41                    | 8:00                   |      |
|                            |                            | Paediatrics         | Paediatric ***             | 31                        | 50:55                   | 62:00                  | 62:00                          |                      | 11:05                   |                        |      |
|                            |                            | Surgical A2         | Surgical                   | 25                        | 46:50                   | 52:00                  | 49:30                          | 3:00                 | 2:40                    | -2:30                  |      |
|                            |                            | Surgical A3         | Surgical                   | 21                        | 34:45                   | 42:00                  | 46:30                          | 3:00                 | 11:45                   | 4:30                   |      |
|                            |                            | Surgical B3         | Surgical                   | 28                        | 62:30                   | 50:00                  | 52:30                          | 3:00                 | -8:50                   | -3:30                  |      |
|                            |                            | Evening             | AAU - 4th Floor            | Medical                   | 27                      | 36:00                  | 43:00                          | 43:00                | 1:00                    | 7:00                   |      |
|                            |                            |                     | Intensive Care Unit        | High Dependency - Medical | 3                       | 10:21                  | 5:00                           | 10:47                | 0:36                    | 0:26                   | 5:47 |
|                            | High Dependency - Surgical |                     |                            | 4                         | 14:21                   | 6:00                   | 14:55                          | 0:48                 | 0:34                    | 8:55                   |      |
|                            | Intensive Care             |                     |                            | 3                         | 26:53                   | 24:00                  | 27:18                          | 0:36                 | 0:26                    | 3:18                   |      |
|                            | Med Resp & Renal           |                     | Medical                    | 28                        | 47:20                   | 45:00                  | 47:00                          | 1:00                 | -0:20                   | 2:00                   |      |
|                            | Medical Coronary           |                     | Coronary Care              | 5                         | 13:15                   | 20:00                  | 13:00                          |                      | -0:15                   | -7:00                  |      |
|                            | Medical B1                 |                     | Medical                    | 19                        | 20:55                   | 30:00                  | 26:00                          |                      | 5:05                    | -4:00                  |      |
|                            | Medical B2                 |                     | Medical                    | 24                        | 42:30                   | 38:00                  | 45:00                          | 1:00                 | 2:30                    | 7:00                   |      |
|                            | Paediatrics                |                     | Paediatric ***             | 23                        | 32:00                   | 37:00                  | 37:30                          |                      | 5:30                    | 0:30                   |      |
|                            | Surgical A2                |                     | Medical                    | 2                         | 1:30                    | 3:00                   | 2:04                           | 0:05                 | 0:34                    | -0:56                  |      |
|                            | Surgical A3                |                     | Surgical                   | 23                        | 32:30                   | 37:00                  | 38:56                          | 0:55                 | 0:36                    | 1:56                   |      |
|                            | Surgical A3                |                     | Surgical                   | 18                        | 27:15                   | 29:00                  | 33:00                          |                      | 5:45                    | 4:00                   |      |
|                            | Surgical B3                |                     | Surgical                   | 26                        | 48:45                   | 42:00                  | 44:15                          |                      | -4:30                   | 2:15                   |      |
|                            | Night                      | AAU - 4th Floor     | Medical                    | 25                        | 16:50                   | 30:00                  | 27:00                          |                      | 10:10                   | -3:00                  |      |
|                            |                            | Intensive Care Unit | High Dependency - Medical  | 3                         | 7:40                    | 4:00                   | 10:51                          | 0:36                 | 3:01                    | 6:51                   |      |
| High Dependency - Surgical |                            |                     | 5                          | 15:05                     | 8:00                    | 20:08                  | 1:00                           | 5:02                 | 14:08                   |                        |      |
| Intensive Care             |                            |                     | 2                          | 20:00                     | 19:00                   | 22:01                  | 0:29                           | 2:01                 | 3:01                    |                        |      |
| Med Resp & Renal           |                            | Medical             | 27                         | 20:55                     | 32:00                   | 23:30                  |                                | 2:35                 | -8:30                   |                        |      |

NOTES: This report identifies the variances between the TrendCare acuity required hours, the actual clinical hours worked and the equivalent ratio required hours.  
 NB: The ratio required is calculated by applying the set ratio across all patients (e.g. 1:4 or 1:5) and does not apply the 50% rule.

Figure 3.15 - Hospital PND/Ratio Variance Summary Report (Fictitious data)

The Hospital PND/Ratio Variance Summary report compares nursing workload allocation by predicted and actualized ratios, and predicted and actualized TrendCare HPPD. The report focuses on the clinical variance for all wards over a month. During the nominated period the report identifies;

- the predicted patient throughput for each ward, for evening, night & day shift;
- hours required (predicted) for inpatient care for each ward, for all shifts;
- hours available (actualized) to provide inpatient care for all shifts;
- the variance between hours required and hours available for all shifts;
- the ratio of nurses to patients required for each ward, for all shifts;
- the ratio variance on each ward, for all shifts;
- the adjusted ward variance for night duty (Discussed later in this chapter and related to ward casemix) for each ward;
- the adjusted ward variance for night duty (Related to night duty shift length) for each ward; and
- bed utilization on each shift for all wards.

The report would be used daily by hospital managers for management of nursing resources prospectively before the shift begins for staffing adjustments, retrospectively after the shift has completed to review variance and required nursing hours based on acuity, or concurrently during the shift to identify the impact of unpredicted admissions, transfers, patients who fail to arrive, ward critical incidents. (TrendCare Report Definitions, 2003:9 & 10).

The Hospital PND/Ratio Variance Summary report was written after 2001 at the request of Directors of Nursing in Victorian Public Hospitals who were also TrendCare users. The Directors of Nursing wanted information on patient requirements and nursing resources which could be used to support decisions in their nurse patient ratio environments and provide evidence for decisions corresponding to the ratio flexibility elements. The report has undergone various modifications in that time and some of them specifically capture data for comparison in this thesis. Users can now use SQL to run their own queries.

#### **3.4.11 Software changes effecting the data**

As earlier discussed, the product has had 9 major upgrades since its first version in 1993, as listed below;

Trend-PNDS 1 1993

Trend-PNDS 1.2 1994

Trend-PNDS 1.3 1995

TrendCare Standard 1.0 1995

TrendCare Advanced 1.0 1996/7

TrendCare Advanced 2.0 1999

TrendCare v2.1 2001/2

TrendCare v3.1 2003

TrendCare 3.1.2 2004

Any version from 2.1 to 3.1.2 was valid for contribution of data for this thesis. Version 2.3 cannot be linked to versions prior to 2.1 and hospitals were required to have implemented the upgrades at the time of this thesis. The computerized system of TrendCare was introduced in 1995, just as Windows based environments were introduced. The program is written in Microsoft Visual Basic, and is a multi-user LAN enabled product which assumes ward level computerisation within the hospital.

Any of the mainstream LAN protocols and hardware protocols may be used, for example NOVEL, IBM LAN server, Microsoft Windows NT, on Ethernet or Token Ring hardware environments (TrendCare Training Booklet – Clinical, 2003:2).

Options for users now include common single routine interfaces which minimize programmatic errors, support HL7 sources (via the TrendCare HL7 Applet), or non-HL7 sources via simple download templates. HL7 or non HL7 interfacing is now common in most hospitals. In the ever-changing IT environment, the language has changed three times, and databases have changed twice in ten years of research and development of TrendCare systems. A hospital in Canberra is now working in an Oracle version and a web-based version of TrendCare is currently being developed on hand-held devices. This technology now facilitates growth using SQL compliant databases, such as Microsoft SQL Server (7.0 / 2000+) and Oracle (9i+), flexible scalable solutions such as minimized bandwidth usage, WAN compatible, Critix/Terminal servers and VB6/ASP NET Client Applications, with applet design to minimise Client Memory space usage and provide easy email patch, updates and corrections (Lowe and Dunigan, 2001).

Many users are now interfacing with the Patient Master Index (PMI), payroll, rosters, policy and procedure manuals, operating room bookings and allied health systems. There is a developing trend to link to prescribed reporting methods such as the Patient Reporting System for state health departments, for example PRS 2 (Patient Reporting System 2) by Victorian public hospitals to the Department of Human Services, Victoria. For these reports, the DRG which is allocated after patient separation for the purposes of casemix funding, is exported from reporting systems, for example Transition II, Combo PC or Power Generator, to the TrendCare system so that acuity reports by DRG become available; i.e. the DRG Specific Nursing Hours Report. See Figure 3.16

## DRG Specific Clinical Hours Report

DRG Code:

**1A 405 HIP REPLACEMENT W/O CC**

| Seq.            | Patient Number | Patient Name    | Length of Stay (days) | Inpatient Clinical Hours Worked (hh:mm) | Inpatient Clinical Variance (hh:mm) | Other Nursing Hours (hh:mm) | Total Hours Worked (hh:mm / HPPD) |
|-----------------|----------------|-----------------|-----------------------|-----------------------------------------|-------------------------------------|-----------------------------|-----------------------------------|
| 1               | 32731          | FARRELL, JOSEPH | 12                    | 53:05                                   | -3:45                               | 2:29                        | 55:34 4.63                        |
| 2               | 28249          | HART, THOMAS    | 9                     | 41:23                                   | -3:37                               | 2:40                        | 44:03 4.89                        |
| 3               | 532991         | BARTH, WILLIAM  | 8                     | 36:16                                   | -2:59                               | 2:26                        | 38:42 4.84                        |
| 4               | 139132         | SAILOR, KENNETH | 8                     | 37:27                                   | -2:19                               | 2:23                        | 39:50 4.89                        |
| 5               | 239149         | EATON, WALTER   | 20                    | 90:09                                   | -6:26                               | 6:58                        | 97:07 4.86                        |
| 6               | 437014         | WATERSON, WAYNE | 34                    | 143:09                                  | -1:46                               | 1:54                        | 145:02 4.18                       |
| 7               | 338984         | WILSON, FRANK   | 10                    | 45:38                                   | -3:22                               | 3:56                        | 49:34 4.96                        |
| 8               | 4082321        | HARRISON, JOHN  | 6                     | 23:26                                   | -1:29                               | 1:28                        | 24:53 4.15                        |
| 9               | 339062         | ROSE, DENNIS    | 12                    | 50:40                                   | -3:20                               | 5:36                        | 56:17 4.69                        |
| 10              | 428962         | BELLAY, SIMON   | 8                     | 34:26                                   | -2:14                               | 4:08                        | 38:34 4.82                        |
| <b>Total:</b>   |                |                 |                       | 555:38                                  | -31:17                              | 33:58                       | 589:36                            |
| <b>Average:</b> |                |                 | 12.7                  | 55:34                                   | -3:08                               | 3:24                        | 58:58 4.69                        |

**Figure 3.16 - DRG Specific Nursing Hours Report.**

Note: All names and data are fictitious.

TrendCare development projects included paediatric contact timings for Australia 2001, The National Nursing Workload Measurement report from New Zealand 2001,

the Victorian patient nurse dependency pilot project 2003, patient category validation study timing in New Zealand 2003, the benchmarking timings by hours per patient day for Australia, New Zealand and Thailand in 2003 and the national cost weight study group analysis of TrendCare HPPD by DRG.

TrendCare claims to provide nurse and hospital operational managers with data to develop realistic budgets, maintain quality patient care, distribute fair workloads for nursing staff, control staff costs and develop accurate nursing cost weights for specific DRGs or patient types (Lowe et al, 2001:4). User feedback on this product is encouraged by the vendors so that the product can be continuously enhanced and viability is maintained. Potential enhancements are identified through ongoing review and refinement of patient categories, timings, indicators and definitions. This process is designed to maintain currency and credibility with nurses and managers in ever-changing clinical and management settings. Some of those settings are in New Zealand and Thailand and their experiences of using TrendCare are now described.

#### **3.4.12 TrendCare in New Zealand**

The current nursing shortage is also evident in New Zealand where approximately 14 hospitals have implemented TrendCare over the past 4 years for the purposes of addressing optimum nursing resource management. Industrial action by nurses in the late 1990s prompted the New Zealand Ministry of Health to investigate nurses' concern about their workloads. In 2001 a collaborative approach to nursing workload measurement was undertaken at national level. The purpose was to explore the major influences on nursing workload and to evaluate the workload of the nursing management information produced by the TrendCare system. The national nursing workload measurement study produced a report for the Ministry of Health by District Health Boards New Zealand, Nurse Executives of New Zealand and Mid Central District Health Board August 2001. The report was prepared by Sue Wood, Project Manager, Director of Nursing, MidCentral Health and Marilyn Rimmer, Project

Coordinator and Consultant. Consortium members who also contributed to this study included 24 District Health Boards, including Taranaki District Health Board, Hawkes Bay District Health Board, West Coast District Health Board and Auckland District Health Board. This was the first time a national project was established to test whether TrendCare could be implemented for dependency measurement in New Zealand.

The project sought to establish the benefits of implementing a consistent approach to nursing workload measurement by exploring the major influences and the appropriateness of the TrendCare Acuity System used in the project. The benefits of a consistent approach to such measurement included the possibility of comparability and benchmarking information for the management of nursing resources within and between hospitals and a more cost effective service delivery which was sustainable in the longer term. It is noted that some of the pilot hospitals in the project were very new users of the product. The project demonstrated that measurement of nursing workload provided a '*substantive basis for managing of nursing workload*' (Wood, 2001:3). Further key findings in the report included comment on the complexity of the clinical environment and that '*nursing inherited many aspects of care that did not fit elsewhere*' (Wood, 2001:3). Wood identified a gap in current patient demand information regarding patient turnover and nurse staffing issues. Of particular interest were the findings in relation to skill mix by qualifications, experience and competencies and a relatively low allocation of nursing hours for quality improvement activities. The following advantages of TrendCare were identified in Wood's report:

- *The system used is nurse friendly and readily learnt by nursing staff. This results in a relatively short lead time to the production of useful and reliable nurse workload data, and the early beginnings of shared problem solving in the context of a joint approach to implementation.*

- *Access by pilot sites, by virtue of the Consortium, to a shared forum for problem solving, increased confidence in applying the systems, and enhanced reliability in data collection.*
- *The availability and applicability across patient specialties due to the availability of a range of care paths allowing easy applications of the system to different specialty areas (Wood, 2001:6).*

The following limitations were identified

- *The absence of specific indicators for complex admission and discharge processes*
- *Timings for afternoon shifts were believed to inadequately reflect work patterns in some very acute wards*
- *No allowance for intra ward transfers on the acuity system*
- *Improvement of system resource and training material, including improved on-line help for system users and guidance for interpretation of reports*
- *The absence of an allowance for weighting for skills mix in allocation of nursing hours and patient turnover information*
- *The requirement for more flexibility in reporting functionality was also identified. Some data entered onto the acuity system is not readily extractable in a form useful for analysis purposes (Wood, 2001:6).*

TrendCare was later implemented in 12 New Zealand hospitals; some participants in the workload measurement study did not continue using it and other new users were introduced to the system in 2001-2004.

During the workload measurement study, the ANF (Vic Branch) promoted the Victorian experience with ratios to their New Zealand counterparts, the New Zealand Nurses Organisation (NZNO). The NZNO subsequently also became interested in ratios saying that, *'Mandated nurse to patient ratios will bring our nurses back to nursing and make our hospitals safer for patients'* (O'Malley, J President New Zealand Nurses Organisation, 2003). In contrast to Victoria, where medical practitioners had little to say publicly about ratios or dependency systems, medical practitioners in New Zealand supported the nurses campaign to introduce ratios, saying that they had become impatient with restricted access to beds and surgery for their patients *'Nurses at the front line are much better placed and have much more expertise than managers and officials to understand what is necessary to address the serious problem of not enough nurses to meet patient needs'* (Powell I, Executive Director of the Association of Salaried Medical Specialists, 2004).

But the New Zealand Ministry of Health remained *'lukewarm on ratios'*, saying that workload problems will not be solved by numbers alone (Ministry of Health, Health News 2004). Government observers suggested that the nursing shortage was not about unfair workloads but rather poorer wages and conditions than those offered to nurses elsewhere. According to a New Zealand health spokesman, the reality is that the taxpayer trains nurses for export (Roy, 2004). Roy says these issues must be addressed to stem the flow of New Zealand nurses to Australia and other international destinations and he suggests that a solution is needed promptly to support an ailing healthcare system. Almost all New Zealand TrendCare users registered an interest in contributing data for this thesis.

### **3.4.13 TrendCare in Thailand**

In addition to Australian and New Zealand settings, TrendCare is also used in some Thai hospitals. A designed decision was taken to include data from Thailand. (See section 4.5.3). I begin with some background on nursing in this country. Thailand is

the only country in Southeast Asia that has never been colonized by a Western country. Thais have been influenced by the West, particularly the USA, through cultural, educational, and technological exchanges (Cummings and Martin, 2001). The development of nursing in Thailand reflects these Western influences (Cummings and Martin, 2001). The nursing profession in Thailand is relatively young, having existed for only 100 years. During this period, nursing in Thailand has evolved from a hospital-based, apprentice training model taught by male physicians, to the development of doctoral programs taught by Thai nurses who have been prepared at the doctoral level. This development was inspired and supported by the investments of two wealthy and influential groups, the monarchy and privately-based foundations located primarily in the USA (Heslop, 2003).

Though Thai nursing is based on many similarities in education and practice with the USA, there are many differences in nursing practice between Western economies and Thailand as nursing practice is shaped by the needs of Thai people and Thai culture. In Thailand traditional social relationships are complex and an understanding of 'Thai-ness' is outside the scope of the study. However, the researcher developed an awareness of the principles of a society governed by the concept of a senior (phuu yai) and junior (phuu nawy) person where the junior person by age, wealth, sex, status, ethnic group, education or power defers to the senior person. There is a social order of power relationships which is apparent in every social environment including hospitals. (Campbell and Morey, 1998). In the hospital setting this could be seen as a relationship where the nurse 'obeys' the patient and in some cases the favors provide additional money or other benefits for the nurse. Nurses wages in Thailand have low pay scales and it is custom and practice to accept personal payment for good service. In combination with the expectations of patients on VIP health insurance packages there would be an anticipated increase in acuity, since the patient may be disinclined to be actively involved in ADL's and rehabilitation exercises and other activities which would reduce the length of stay. The culture of merit is embedded in the

nursing models of care (Heslop, 2003). These differences in varying cultural perspectives are subject to current research by the International Council of Nurses (ICN).

Nurses are registered by the Thai Nursing Council which falls under the jurisdiction of the Ministry of Public Health which was established in 1942. Nursing resource management is the province of the Ministry of Public Health. The Ministry increased the supply of nurses by creating a new level of nurse in 1980 known as technical nurses. This level of preparation is similar to the Associate Degree programs in the USA.

Phya Thai Hospital Group has four hospitals in Thailand and three of these are private hospitals located in the capital city of Bangkok. They are some of the most technologically advanced hospitals in Thailand. The Bangkok based Phya Thai Hospitals 1, 2 and 3 contributed data to this thesis. The Phya Thai group provide mostly private hospital care to the Thai community and an increasing international patient demographic of expatriates and travellers attracted by competitive hospital charges. Phya Thai hospital 3 admits some public patients under agreement with the government. Unfortunately only 59% of all Thais have access to local health services (Cummings and Martin, 2001).

Phya Thai hospital 2 is the largest in the group and was established in 1987. The hospital has grown to provide for 1800 outpatients per day and 500 inpatients by 2003. The hospital provides comprehensive health care services which include a wide range of outpatient clinics, an acute emergency department, operating theatres, open heart surgery, haemodialysis, coronary care unit, intensive care unit, maternity and a wide range of medical and surgical wards. The Phya Thai hospital 2 also owns other supporting services such as rehabilitation, pathology, pharmaceuticals and radiology. The Phya Thai 2 Heart Centre is recognised worldwide and collaborates

with the Harvard Medical School, USA, encouraging international research in their clinical specialities.

Thailand experienced a severe economic crisis in 1997, which affected most Thai businesses including private hospitals. The Phya Thai Group of Hospitals was forced to restructure and downsize its workforce in order to remain viable. Hospital executives began looking at systems for optimum resource management and some visited Australia to identify strategies used in the Australian private and public hospitals to monitor and manage hospital effectiveness. Phya Thai nursing and medical staff visited 12 Queensland hospitals from public and private sectors to identify suitable methods. As with most other hospitals worldwide, wages were one of the hospitals' highest expenses and nursing wages were the first area targeted for cost savings in the restructuring process. (Siriprasert, Thongpuy, Chatrakul Na Ayuddhaya, 2003).

TrendCare was selected as a tool to assist with the re-engineering of the nursing services and was the first automated system to be introduced to the Phya Thai Group. To ensure that TrendCare was compatible, a work study was conducted across 3 of the Phya Thai group. The computer literacy skills of the nurses were evaluated and the following adaptations were recommended prior to implementation of the product:

- adaptation to Thai script and diagrammatic instruction manuals;
- adaptation to Thai cultural differences impacting on patient care; and
- adjustment for different nursing skill mix for Thailand.

Subsequently, TrendCare was implemented and DoN's fulfilled the role of interpreters for nursing staff unable to understand English. Training was hands on with computers and was scenario based. TrendCare booklets were translated into Thai and a senior nurse consultant from Australia was on site to mentor the Thai nurses.

This was their first experience of computerized systems in their culture. Six months later the data was being used to actively manage nursing workloads and meet financial targets. Initial inter-rater reliability testing was initially 70%, compared to the TrendCare recommended level of >90%, but is continuously improving. Inter-rater reliability testing is further discussed in Chapter 4. A benchmarking study is underway between Thailand and New Zealand and Australia, but is not part of this thesis.

The TrendCare implementation was a major commitment considering Phya Thai Group training budgets are around 3% of total hours, including occupational health and safety and new equipment training (Thongpuy, 2003). There is reluctance by nurses to undertake further studies without pay and the private sector is reluctant to pay for on-going education other than in-house modules and courses such as a Coronary Care Nursing Course (Thongpuy, 2003). There is little encouragement for on-going education where nurses will be rostered off the wards, in a climate of nursing shortage. Total workload allocation is by TrendCare and incentives apply for Nurse Unit Managers to reduce costs. Significantly, considering the focus on cost reduction, patients are still admitted for one day pre-operatively. Thai patients demand total care for ADLs, recovery and rehabilitation and these cultural expectations impact on indicators and timings in most patient types.

The Phya Thai Group shifted its focus to foreign patients and high end local clients in mid 2003 due to intensifying competition in health care and related pharmacy, medical supplies and insurance industries. The Group identified the growing tourist industry as a potential client base, opening an international ward at Phya Thai hospital 2 and commencing the Platinum Club which offers lifetime health care for one million baht (\$A33,500 approx), providing for free medical services and treatment for the patient's life and VIP hospital treatment. The aim for the hospital is to maintain good health for clients as long as possible. For nurses the challenge is to manage the

perceived requirement for greater assistance with ADL's when on VIP services. The hospital expects about 3,000 foreign patients per year, most of whom will be insured. The high number of VIP program patients will impact significantly on nursing workload statistics for the hospital if there is not a re-focus on the patient's role in their own care and rehabilitation. The TrendCare system, amongst other measures implemented by the Phya Thai Group have been highly successful in managing human resources and wages, resulting in a net profit in 2002 of 1.19 billion baht, compared to a net loss of 676 million in 2001. (Bangkok Post, June 28, 2003).

### **3.5 Conclusion**

TrendCare has been implemented in hospitals in three countries with a range of services, skill mix and case mix. Like ratios, TrendCare cannot determine which nurse is best to look after which patients and which nurses work best together in a team. However, TrendCare has the advantage of being able to record the individual requirements of patients and the individual skills and preferences of nurses to enhance the decision support. It also records the match between individual patients and nurses workloads the record is retrievable. Ratios simply involve a mathematical equation of numbers of nurses and numbers of patients. No paper or electronic record of the predicted or actual ratios is required. Neither TrendCare nor ratios can recruit nurses when the practices predict more nurses are needed than are rostered. Nurses and their managers must do that. However, in the event of an unavoidable staff shortage, TrendCare has the capacity to allocate every nurse an equal but higher workload. In contrast, ratio practices which would allocate some nurses extra numbers of patients or close beds.

Like ratios, TrendCare is based on a system of averages, but the difference is that thousands of users at over 100 TrendCare hospitals continually refine those averages for patient types, indicators and timings. Ratios are refined less often and usually once every three years prior to EBA negotiations. Over time, the 'exactness factor' has

crept in and hospital managers have increasingly developed an expectation that the TrendCare system will measure nursing resource requirements precisely for individual patients. To meet these expectations, mostly by non-nurse hospital managers, unproductive and unpredicted care allowances have been built in. Different models of care are accommodated by a range of options for indicators and direct care categories. By contrast, ratios are commonly fixed. A further illustration of the extension of the exactness factor is users' requests for the TrendCare system to undertake more functions and interface with more and more hospital systems. Recent TrendCare system upgrades have also accommodated requests for a report function in which hospitals in both ratio and non-ratio environments can compare data by two allocation practices simultaneously. The two practices are those of interest to this study; nurse patient ratios and nursing HPPD. Ratio practices remain isolated from the hospital information systems.

This analysis of ratio and dependency data available in TrendCare included some additional observations. The first is the capacity of the TrendCare system to interface with other hospital systems and the associated benefits of one database being used to verify the quality of another database. A second observation is the requirement for data to be sourced from hospitals without apparent industrial unrest on nursing workload issues in non-mandated ratio environments and by nurses who routinely use TrendCare. Therefore all data was sourced from TrendCare users outside Victoria and California (no current TrendCare users).

The Victorian public hospital nurses' ratios have been incorporated into the TrendCare system, but any alternative ratio formula could be used instead, for example the California ratios or another customized schedule, for example for a particular hospital group. Whether ratios or dependency systems prevail in the future, the establishment of data sets is dependent on recording data using computers. In addition, an unbiased presentation of alternative workload systems would be better

facilitated if trials and pilots are conducted outside the highly industrial climate of pre-EBA negotiations. In such a climate, the over-riding issue is that of change and control over working conditions and as such are likely to impact on both quantitative and qualitative research. The following chapter describes the research design and the efforts taken to ensure data quality and reliability for this analysis.

*‘Nursing is two things: care of the sick (or potentially sick) and the tending of the entire environment within which care happens. ‘Tending’ is a muscular commitment that extends us into politics and policy and management and operations and journalism and advocacy’ (Diers, 2004:338).*

## CHAPTER FOUR

### RESEARCH DESIGN

#### 4.1 Introduction

Nursing now has the technology to combine financial and clinical data to provide integrated information by shift, ward or hospital type or DRG. As outlined in the previous chapter, TrendCare is the most commonly used method of providing computerized patient dependency and nursing resource information in public and private hospitals in Australia and New Zealand and for major private hospitals in Thailand (TrendCare, 2004). Nurses at over 100 hospitals routinely collect this data which has not been analysed at an aggregate level for administrative applications to nursing resource management.

Some of the rich data available to users of TrendCare will be analyzed in this thesis to answer the question about which of the two practices, described in Chapter 3, better allocates nursing work. Variable nursing resource requirements by patient type have been the subject of several Australian studies, as described in Chapter 3 but until now there has never been an empirical study of patient dependency data across both public and private sectors and including international participants. This thesis aims to capture patient dependency and nursing workload information which would complement the major studies already undertaken.

One of these major studies was undertaken by the Nurse Policy Branch of DHS which conducted a pilot of the TrendCare PDS in 20 Victorian public hospitals in 2003 (Monash University, 2004b). Ten of the hospitals were experienced users of TrendCare and the remaining ten were new users who registered an interest in participating in the pilot. The pilot commenced in January 2003 and data was

collected from 21<sup>st</sup> April to 31<sup>st</sup> December of that year. It was evaluated using a triangulation research design over the period December 2003 to January 2004. The design included focus group discussions, key informant interviews and the administration of a questionnaire (a survey). Data was collected from direct care nurses, Nurse Unit Managers, senior hospital administrators, PDS pilot project officers, information systems managers and IT support personnel, representatives from hospital management, the DHS, Victorian Hospitals Industrial Association (VHIA) and the ANF.

Approximately 4,000 questionnaires were distributed to all nurses using the PDS at the pilot sites. The response rate was 36% and this was considered to be reasonable *'given the timing (Christmas/New Year) and relatively short time period specified for the evaluation'* (Monash University, 2004b:5). Nurses' commitment to data entry for the trial was difficult in a ratio environment, unless they had been expert users before the trial and had experience using TrendCare for workload allocation. New users had little, if any, incentive for ensuring quality data entry as they were not rostering by TrendCare and perceived themselves to be 'protected' by ratios, which many considered were 'here to stay' (Monash University, 2004a).

There were differences in the research design used by PDS evaluation and the research design in this thesis. In contrast to this study, the pilot evaluation was largely qualitative in nature. This thesis was designed for a quantitative analysis of two contemporary practices to shed light on a situation where policy had been established in the absence of quantitative data. Other differences in the research designs include the samples, the data collection periods and the methodology, which are summarized at the end of this chapter. This study commenced 2 years before the pilot and there was a 12 month overlap period.

As identified in the first chapter, the key questions for this thesis are;

- Is there a correlation between predicted TrendCare ‘HPPD’ and/or nurse patient ratios and the nursing care actually provided to patients?
- Which nursing workload allocation practice has the potential to better predict nursing resource requirements and as a result inform the clinical and financial futures of a health service organisation?

In this chapter, I describe how the research was designed and conducted to ensure optimum integrity and interpretability of the data collected for the best possible evidence. The research was conducted in 9 main steps and which are defined in the main steps of the study, see Figure 4.3 (Polit, Beck, Hungler, 2001).

## **4.2 Design decisions**

As already discussed, the TrendCare system was used as a basis for the research design because it was the only system which has the capacity to measure data recorded by nurses in two ways, at the same time. The following points summarize the key research design decisions. These research design decisions were the need to source data which:

- measured nursing work according to an industry accepted method;
- facilitated computerized entry and electronic transferability of data;
- could be verified for quality, reliability and comparability;
- enabled capture of both predicted and actualized care requirements for ratios and HPPD;
- recorded data by nurses not currently in negotiations for wages and conditions;

- had few privacy implications for both the patient and the nurse. The nurse records direct care, not an observer;
- recorded direct care by the nurse who provided the care. This provided the most accurate and timely data about direct care, including the cognitive aspects of nursing.
- the least costly option, with no additional costs associated with data entry. Lower cost enhances feasibility for repeated data capture at any other time in the future. For example, annual review of nursing dependency for high cost or high volume DRGs, or following policy or procedure change or environmental up-grades.
- conducted without a requirement for additional nursing resources, in consideration of the shortage of working nurses.

Further research design decisions are now discussed.

The method of recording ratios was by the application of the Victorian public hospital nurse patient ratios formula provided by TrendCare in system upgrades to all users including the hospitals in the sample. Further discussion on the system selection follows in the main steps of the study.

A quantitative approach was considered most appropriate to discover if a relationship existed between the dependent variable of interest; the care actually provided and various independent variables likely to influence that relationship. Examples of the independent variables include variations in care predicted for different shift, hospital or patient types. It was considered necessary to quantify nursing in a way that was useful for hospitals managers who are responsible for the funding and allocation of nursing resources. The results would need to be expressed in the 'same language' as budgets and enable extrapolation to an effect on costs and wages and subsequently to

policy development. In this way communication between nursing and finance departments would be credible, unambiguous and informing.

Since most health services consider themselves unique (Gillett, 2002), it was considered necessary to invite a wide range of health services to participate in the project. Inviting a large number of services, had implications for the management of a large amount of data and so computerized records were essential. Computerized records also facilitated timely data transfer and reduced data entry error. Data entry error is reduced when selections are option based, as they are in TrendCare and this also ensures all data is recorded by the same rules.

Data on predicted and actualized care on the same patient and staff cohort was essential to determine if trends were to be identified. Any trends were expected to identify relationships between how workloads are determined and how they are allocated. While the research was considered important for the purposes of informing future negotiations for wages and conditions, it became apparent that it was essential to capture data from settings not currently influenced by the negotiating process. In hospitals where nurses are involved with negotiations for enterprise bargaining agreements, the overwhelming concern of nurses is about change management and self governance of the work environment. The quality and quantity of data may be compromised where nurses suspect it may be used for purposes they do not support.

### **4.3 Introduction to the Method**

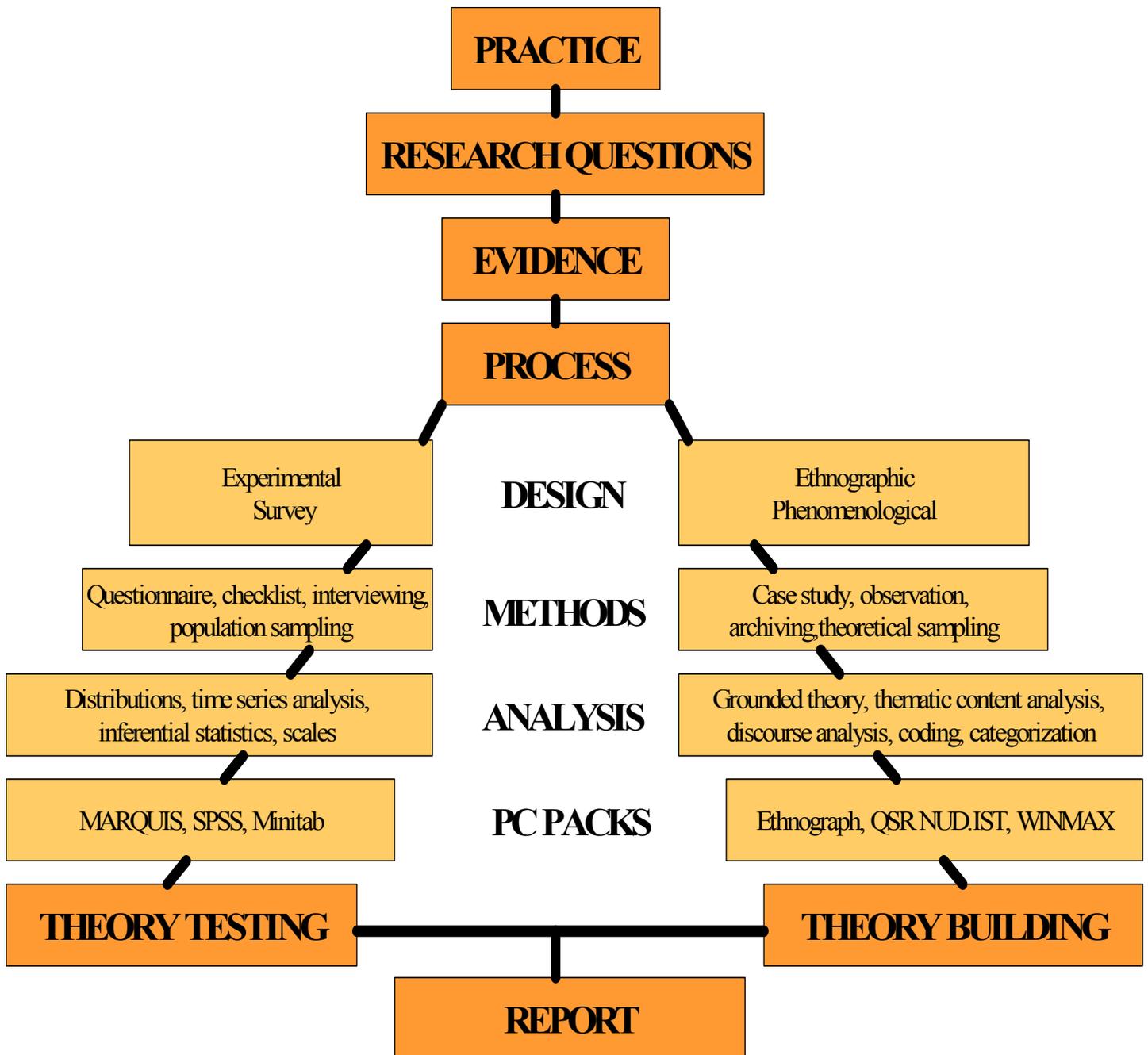
As introduced in Chapter 1, this research was conducted from the perspective of an observer, attempting to understand the political and clinical landscape of mandated nurse patient ratios. The use of numerically equivalent workloads was observed by the researcher to be philosophically and practically inequitable and public policy development in this environment became of intense interest. The perceived need for

research to match patient requirements with nursing resources was the catalyst for this study.

There was no intervention by the researcher who is neither employed by nor has any financial interest in any of the hospitals in the sample or any other stakeholders including TrendCare. The researcher was however a member of the Monash University School of Nursing working party which evaluated the Victorian PDS pilot under tender to the DHS. Other stakeholders in the pilot were ANF (Vic Branch) and VHIA. Therefore this is a non-experimental and correlational study of a retrospective cohort of nursing workload reports for the same patients and staff, during same cross-sectional period of time. It is a study that will inform policy decisions on mandated nurse patient ratios in Victorian public hospitals. Univariate, bivariate and multivariate statistics were used to analyse nursing dependency and ratio data. The study is now described.

#### **4.4 Testing or building theory**

A research design may build new theory or test existing theory as a general principle for explanation and as a catalyst for practice development. The theory underpinning both ratio and dependency practices is the same; that they are suitable for predicting and allocating fair and equitable workloads but a decision was required about whether this was new or emerging theory. The process described by Tarling and Crofts (2002) was adopted to make this decision and their algorithm has been reproduced in Fig 4.1.



| Figure 4.1 – Tarling and Crofts theory testing or theory building process (2002:69).

Using this process, I determined that the research was testing existing theory which had been adopted as practice and policy in various settings. A quantitative approach tests theory which is based on the assumptions that a single reality can be revealed through measurement (Tarling et al, 2002). The thesis adopted a quantitative design. The Tarling and Croft process was then adapted to fit this proposed research project, see Figure 4.2

|

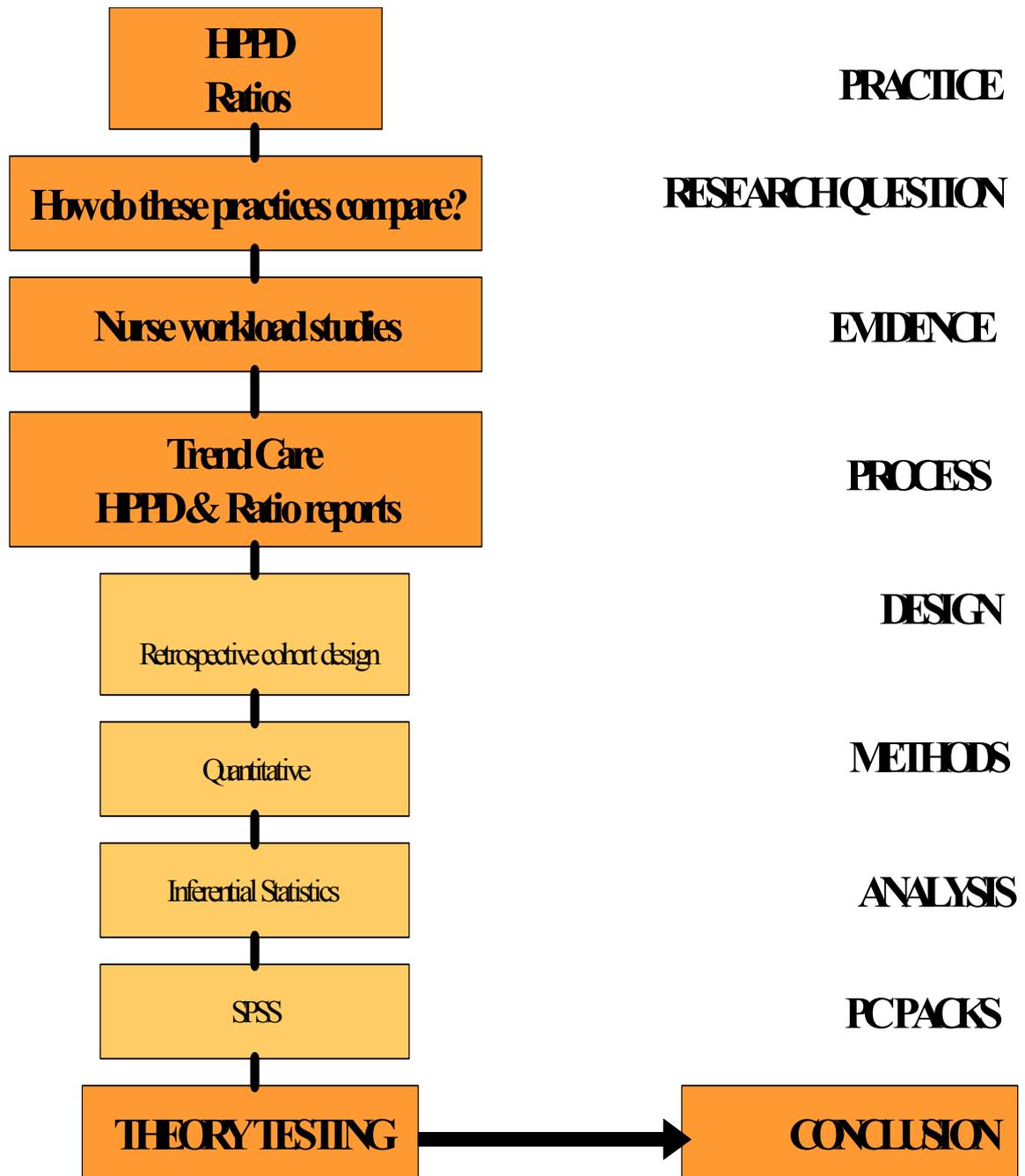


Figure 4.2 - Plummer's adaptation of Tarling et al, theory testing model (2002)

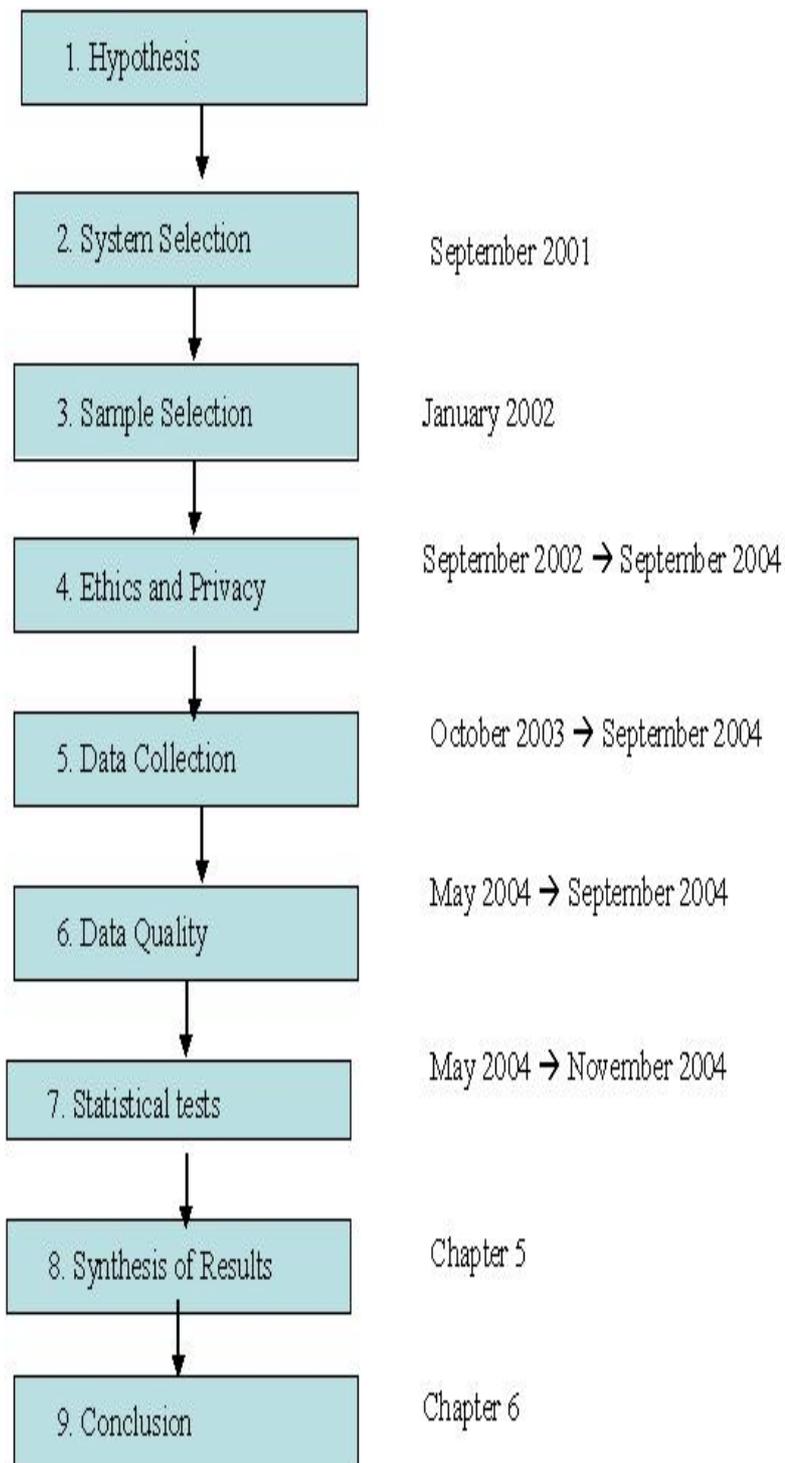
The research involved the empirical testing of two practices which underpinned workload policy for nurses in Victorian public hospitals by seeking to identify if a correlation existed between the following parameters:

- predicted hours per patient day and actualized hours per patient day; and
- actualized hours per patient day and mandated Victorian public hospital nurse patient ratios.

Correlation is the most common method of describing the relationship between 2 variables (Polit et al, 2001). The correlation question is to what extent are the two variables related to each other, measured quantitatively by calculating a correlation co-efficient which is the intensity of the relationship from -1.00 (negative or inverse relationship) to 1.00. There is no relationship where the correlation factor is zero. The higher the absolute value the stronger the relationship whether positive or negative. The strength or weakness of the relationship depends on the variable e.g. Pearson's (Polit et al, 2001). Aspects of the statistical procedures used in the research are detailed further in Chapter 5.

#### **4.5 The main steps in the study**

The research was designed to test existing theory about the prediction and allocation of fair and equitable nursing workloads. The steps and the timeline are depicted in Figure 4.3 along with a timeline and are now discussed. Steps 8-9 are described in later chapters.



**Figure 4.3 - The Main Steps**

See Sections 4.5.1 to 4.5.7 (Steps 1-7)

#### **4.5.1 Hypothesis**

The primary aim of this thesis as described in Chapter 1 was to analyze TrendCare data, examine the variance between predicted and actualized HPPD and ratios and determine if a correlation exists. The hypothesis is that both ratios and TrendCare can predict a fair allocation of nursing resources to patients, since they were both designed to do this, but that TrendCare predicts with greater accuracy as it has more detailed data inputs, for example, patient classification, pain management, dressings, support with ADLs and counselling requirements.

#### **4.5.2 System selection**

The research decision about the system for examining data associated with the policies for prescribing staffing levels was a simple one. The TrendCare system is the only available computerized system which simultaneously records data for patient dependency for HPPD and nurse patient ratios. No other computerized system has the capacity to record and calculate the required data on the same patient and staff cohort. Paper based manual methods were avoided due to the resources that would be required to manage the large amount of data expected, data quality and comparability.

In addition, there were sufficient potential hospital sites outside of Victoria to ensure a suitable sample size. In Victoria industrial action by nurses included an agreement to pilot TrendCare, although there was limited support for dependency systems by direct care nurses and the ANF. The Victorian public hospital nurses EBA was originally in place from 2000-2003 but had been extended by one year until April 2004 for a number of reasons including the need to accommodate part of the agreement where all parties agreed to conduct a pilot of a patient dependency system. The pilot and the subsequent evaluation were hastened to meet the extended deadline. The haste by DHS to meet the deadline and the lack of support by ANF were reflected in the results of the evaluation. The TrendCare system was unpopular in that state for a brief period, as it was seen by many direct care nurses to have been 'rushed in' for the dual

purposes of meeting the terms of the agreement in the timeframe and abolishing the popular ratios system. The industrial relations climate in Victoria resulted in the exclusion of Victorian public hospitals from the sample. See section on sample section 4.5.3 and other limitations in 4.5.6.

The selection of TrendCare facilitated the inclusion of some New Zealand hospitals in the research sample, as there are approximately 14 TrendCare user sites in that country. Belinda Morieson (former secretary, ANF Vic branch) was promoting ratios as 'the way to go' in New Zealand and as well as in other states of Australia. The NZNO had shown close interest in the success of ratios in Victoria. It was important for the research to capture data from New Zealand sites to contribute to future debate about the best method of predicting and allocating fair and equitable nursing workloads. The inclusion of private hospitals including Thai hospitals was designed to provide a range of comparisons across various settings and models of care. TrendCare was also selected since few other systems are supported by a system of inter-rater reliability testing and interfacing features to ensure data quality. In addition, there was no risk of researcher bias since the outcome was not proposed at the time of data collection (Wojner, 2001). Further advantages of using this system were that TrendCare had computerized databases and data collection was likely to be inexpensive, timely and efficient.

It should be clarified that while TrendCare is the system selected to measure allocation by both ratios and the TrendCare dependency system, other dependency systems could also have been studied. The study of other dependency systems is outside the scope of the study. Care has been taken to differentiate between TrendCare as an instrument for this study and TrendCare HPPD, as one of the practices under analysis i.e. the TrendCare dependency system.

### **4.5.3 Sample selection**

The next step in the study as described in figure 4.3 was the sample selection. Sampling was in three stages i) by hospital, ii) by period and iii) by unit of measurement. In principle, the sample should be representative of acute nursing care settings in Australia, New Zealand and private hospitals in Thailand. The sampling stages are now discussed, followed by a discussion about why data was collected from different settings.

#### **i) Hospital selection**

A purposive method of non-probability sampling was used to identify TrendCare users from the TrendCare web page [www.trendcare.com.au](http://www.trendcare.com.au). Then expert users of the TrendCare system were identified for the purposes of optimizing quality and access to data. The TrendCare Directors were contacted for assistance in identifying expert users. The inclusion of only champion sites may at first appear to make the sample less representative of all TrendCare users i.e. that the sample may be considered atypical of TrendCare users. This was in direct contrast to a random sample of TrendCare users of various skill levels which may be considered to be more representative of TrendCare skill levels. However, foreseeable technical difficulties with data transfer would have eliminated many non-expert users even if they otherwise agreed to participate. TrendCare data had never been transferred before, electronically (Dunigan, 2002) Appropriate purposive sampling of expert users for greater homogeneity in data quality was also considered necessary to avoid novice or unreliable data as a cause of sampling bias. There was a preponderance of Queensland hospitals in the sample because in that state most expert users reside. TrendCare was initially developed and tested in Queensland Also, the Queensland State Health Department have used TrendCare for business planning frameworks for nursing resources in public hospitals for several years. The following additional criteria were established as essential pre-requisites for the inclusion of hospitals in the sample sites:

- users of TrendCare versions 2.1 to 3.1.2 (previous versions cannot be mapped to version 2.1 or subsequent versions);
- greater than 3 months experience with the TrendCare system;
- executive commitment to assisting with data collection;
- expert nursing TrendCare system co-ordinator, on-site and
- expert Information Technology TrendCare system co-ordinator, on-site;
- regular users supported by a system of inter-rater reliability testing;
- the full range of countries currently using the product;
- the full range of hospital types: public, private; metropolitan, rural and various hospital sizes and services.

Approximately 50 sites in the 3 countries met the criteria and were invited to participate in the study. Directors of Nursing of the hospitals identified as potential participants by this method were then sent a letter of invitation to participate, a project outline (refer to Appendix C) and a registration of interest form. It was made clear that the letter of invitation sought only registrations of interest at that stage. No data was requested until project approval was granted from Monash University Standing Committee on Ethics in Research involving Humans (SCERH). Responses to calls for registration of interest provided the researcher with an estimate of the sample size, the mix of hospital types and the feasibility of the study.

The letters of invitation to the Directors of Nursing included full disclosure about the nature of the research and the benefits of participating in this international research study. The letter also sought comments about the research study whether they wished to participate or not. The letter also included a request for information about any

requirement for hospital ethics applications. The ethics application process is described in section 4.5.4.

There was considerable interest and a high number of responses to the invitation. The preparedness of the hospital staff to undertake to forward data without fee is acknowledged. The initial invitation was extended to Directors of Nursing, of all identified expert TrendCare users of hospitals, including Victorian Public Hospitals. Many Victorian hospitals registered an interest but within a month were required to withdraw due to a political directive by The Nurse Policy Branch of the Victorian DHS. This was at first a disappointing circumstance for both the researcher and the Directors of Nursing of these hospitals but ultimately contributed to the validity of the study, see section 4.5.7.

Given the tense industrial climate associated with mandated nurse patient ratios in Victoria and the nurses' apprehension about the purposes of research in this area, a further decision was made, not to include Victorian private hospitals who met the sample criteria. This decision was made in consideration of the possibility that the industrial unrest for Victorian Public hospitals had some collateral effect on working conditions and also the lack of preparedness to record TrendCare data in the Victorian private sector which was also negotiating for private sector ratios. For example, nurses working in private hospitals would be aware of lower ratios and higher rates of pay in Victorian public hospitals. The nurses may attribute these conditions to mandated nurse patient ratios and other elements of the public sector EBA. The private sector nurses expected a flow on effect for private hospitals and listed minimum nurse patient ratios in their log of claims for the forthcoming private sector EBA. There was a real risk to the stability of the Victorian health system if large numbers of private sector nurses returned to the public sector, as many had done in the previous campaign. It was reasonable to assume that nurses in Victorian private hospitals may have been just as apprehensive about research related to ratios as those

in the public sector and this may have contributed to difficulties with the data collection. In consideration of factors described above, no Victorian private or public hospitals were included in the sample.

The Directors of Nursing of most other invited hospitals agreed to participate after ethical approval was established. Each hospital had different ethical approval requirements and these are discussed in section 4. The sample of hospitals was selected and all subsequently reported on all wards, which was different from the Victorian PDS pilot, where only selected wards contributed data to DHS see Appendix D. The hours per patient day and ratio allocations were measured in the TrendCare Hospital PND/Ratio Variance Report. The reports were provided by the project manager at each hospital site. The project manager was the TrendCare coordinator in most hospitals, and for other sites it was the Director of Nursing or IT Manager. The original sample of 50 hospitals was eventually trimmed to 22 hospitals. Data was provided from 13 Australian Hospitals, 8 from New Zealand and 1 from Thailand. Of these, 12 were private hospitals and 10 were public hospitals and 16 were located in metropolitan areas and 6 in rural areas. Several hospitals withdrew over the three year period of the project ; 6 due to software difficulties in transferring data, 7 due to change of key personnel, 2 due to change of hospital ownership (Thailand) and 10 due to political directive by Victorian Department of Human Services. These withdrawals are discussed in limitations to the data collection in section 4.5.6.

A list of participants in the sample is listed in Table 4.1 Sample hospital profile. The list also includes other information about the hospitals, including the country of location. Data received from Australia and New Zealand was submitted in a similar electronic database. Data from Thailand was reported in an older version of TrendCare and in a different format. Results from Thailand are reported separately in Chapter 5.

Public or private hospital status is also recorded in the list of participants in Table 4.1. This classification by status has become less discrete over time in Australia and other countries. Public and private hospitals may be co-located. An example is the Mater group of hospitals in Queensland which submitted data for 5 sites, of which 3 are public and 2 are private some of which are co-located. Larger private hospitals have become more like public hospitals in their operations simply because of their size. The largest and most technologically advanced hospitals in Thailand are those in the private sector, (Cummings and Martin, 2001). This was discussed earlier in Chapter 3. In New Zealand there is public funding for midwives attending women in labour whether they deliver in public or private health care facilities and so there the delineation becomes unclear. However, as discussed earlier, there was a deliberate design decision to identify public and private status so that some statistical analyses could be undertaken for Australian public hospitals only. While comparisons across the range of hospital types was considered valuable, it was also considered necessary to have the ability to split the sample into subsets to match settings which were similar to the Victorian public hospitals and for whom mandated nurse patient ratios were designed.

Metropolitan or rural location was also recorded and this was a clear classification split. The location type was determined using the Rural, Remote and Metropolitan Areas (RRMA, 2004) classification for Australian hospitals and that classification was approximated for New Zealand hospitals. Phya Thai hospitals are located in Bangkok and were clearly metropolitan. The two classification systems were used to classify for Sunshine Coast Hospital Maroochydore. If the Accessibility/Remoteness Index of Australia (ARIA, 1997) system was used the definition of rural or metropolitan location would have been the same. Sunshine Coast hospital participated in the project until October 2004 when server difficulties prevented the email transmission of data and unfortunately it could not be included in the final sample.

The purpose of the metropolitan and rural split was a later design decision to test location as an independent variable which may be influential in the analysis. Rural Victorian public hospitals believed that they were disadvantaged by ratios and some sites were able to successfully negotiate not to have ratios in the 2000 and 2004 EBAs as discussed in the previous chapter.

Hospital level is the final information recorded in Table 4.1 and is purported to be a classification of hospital nursing care complexity or intensity under ratio practices in Victoria. Discussion on how the levels were determined follows the list of participant hospitals.

| <b>Hospital</b>             | <b>Country</b> | <b>Public/Private</b> | <b>Metro/Rural</b> | <b>Level</b>   |
|-----------------------------|----------------|-----------------------|--------------------|----------------|
| Calvary ACT                 | Australia      | Private               | Metro              | 2              |
| John James, ACT             | Australia      | Private               | Metro              | 3              |
| Westmead Private, NSW       | Australia      | Private               | Metro              | 3              |
| Sydney Adventist, NSW       | Australia      | Private               | Metro              | 1              |
| Greenslopes, QLD            | Australia      | Private               | Metro              | 1              |
| Bundaberg, QLD              | Australia      | Public                | Rural              | 2              |
| Mater Children's, QLD       | Australia      | Public                | Metro              | 1              |
| Mater Mothers, QLD          | Australia      | Public                | Metro              | 1              |
| Maters Mothers Private, QLD | Australia      | Private               | Metro              | 2              |
| Mater Private, QLD          | Australia      | Private               | Metro              | 2              |
| Mater Adults QLD            | Australia      | Public                | Metro              | 1              |
| Ipswich, QLD                | Australia      | Public                | Rural              | 2              |
| Hollywood, WA               | Australia      | Private               | Metro              | 2<br>Contd/... |

|             |             |         |       |   |
|-------------|-------------|---------|-------|---|
| Wakefield   | New Zealand | Private | Metro | 3 |
| Wanganui    | New Zealand | Public  | Rural | 2 |
| MidCentral  | New Zealand | Public  | Metro | 2 |
| Taranaki    | New Zealand | Public  | Rural | 2 |
| Ascot       | New Zealand | Private | Metro | 2 |
| Mercy       | New Zealand | Private | Metro | 2 |
| Hawkes Bay  | New Zealand | Public  | Rural | 2 |
| Greymouth   | New Zealand | Public  | Rural | 3 |
| Phya Thai 3 | Thailand    | Private | Metro | 2 |

**Table 4.1 - Sample hospital profile**

### **Hospital levels**

In Victoria, mandated nurse patient ratios were determined according to 3 ‘intensity’ criteria. The first criterion was shift type where for example ratios were lower on morning shifts and were increased for evening and night shifts in most wards. The second was by ward type, where, for example medical surgical wards had lower ratios than rehabilitation wards. The third was by hospital level. The levels are 1, 2, 3 and 3A. The method of allocating hospital level to Victorian hospitals was required for the purpose, of applying the method to this research design. The formula was not evident in Schedule C (Appendix A) where hospitals were listed by name in each level. There was however a formula to determine sub-levels for departments such as accident and emergency wards, but it was based on historical numbers of presentations. For example, Accident and Emergency Department level 3, or HDU level 1, or Delivery Suite level 2. Representatives from ANF and Nurse Policy Branch of DHS were consulted for clarification on the process of allocating hospital levels.

Neither the ANF nor DHS were able to provide a definitive formula or method, although the researcher enquired whether levels were based on Weighted Inlier Equivalent Separations (WIES), hospital size, number of separations, DHS Group (eg: A1, A2), Australian Industrial Relations Committee (AIRC) Group (eg: A, B, other), geographic location or possibly nurses payroll. After some months of enquiry the following response was received from the DHS Pilot PDS project officer, Mr Paul Adcock from DHS *'primarily the health services as described in the EBA for the allocation of nurse ratios followed the DHS classification of health services, although levels were meant to better represent a general 'type' of hospital than the very arbitrary A, B, C, D, that Cmr Blair identified in his decision'* (2003).

It is reasonable to assume that there were negotiations at some level between hospitals and either the ANF or DHS and hospitals were allocated their level according to a mix of expert opinion and negotiation.

Since there was no formula for classifying Victorian hospitals according to different levels, there was also no formula which would be applied to another set of hospitals. Victorian hospitals are simply named under each hospital level, for example; from highest to lowest in nursing intensity.

Hospital Level 1 = the Alfred Hospital, Frankston Hospital

Hospital Level 2 = Ballarat Hospital, Maroondah Hospital

Hospital Level 3 = Eye & Ear Hospital, Swan Hill Hospital

Hospital Level 3A = Portland Hospital

A map was developed by the researcher which proposed a level for hospitals in the sample See Table 4.2 Hospital level mapping. The map included all hospitals that were in the sample at the time, some of which were subsequently unable to provide data. The purpose of the mapping was to develop an equivalent level of 1, 2 or 3 to

which the hospital would have been assigned if they were located in Victoria. No level 3A hospital equivalence was allocated due to the small number allocated in Schedule C. Cherrie Lowe of TrendCare was then consulted for comment on the suggested level equivalence or match to Victorian levels. Ms. Lowe was considered the highest level expert for a ruling on an arbitrary assignment of levels of non-Victorian hospitals. The decision to consult Ms Lowe was based on her detailed knowledge of all the hospitals in the sample, and her role and experience as an ACHCS accreditation surveyor. She had a detailed knowledge of the Victorian hospitals with whom she had been working during the pilot. There was a deliberate design decision not to ask hospitals for their opinion about their own hospital level. Hospitals outside Victoria could be reasonably assumed to have little knowledge of the Schedule C hospital level classification, as it was unique to Victorian hospitals. A broader view of the comparability across Australia and other countries was required.

| Level 1          | Level 2               | Level 3              |
|------------------|-----------------------|----------------------|
| Sydney Adventist | Calvary ACT           | John James           |
| Mater Children's | Mater Mothers Private | Westmead Private     |
| Mater Mothers    | Mater Private         | Sunshine Coast*      |
| Mater Adult      | Ipswich               | St Andrews Brisbane* |
| Greenslopes      | Bundaberg             | Wakefield            |
| Phya Thai 1*     | Hollywood             | Greymouth            |
| Phya Thai 2*     | St Andrews Toowoomba* | Masterton*           |
| Wesley*          | MidCentral            |                      |
|                  | Taranaki              |                      |
|                  | Ascot, Auckland       |                      |
|                  | Mercy, Auckland       |                      |
|                  | Hawkes Bay            |                      |
|                  | Wanganui              |                      |
|                  | Phya Thai 3           |                      |

**Table 4.2 - Hospital level mapping**

**\* Hospitals which subsequently withdrew from the study.**

In Victoria, level 1 hospitals would be expected to be large public hospitals, but this is now not an exclusive category since some smaller public/private co-located hospitals share resources and care arrangements. The private sector now assumes some of the most complex cases with the exception, for the time being, of organ transplantation.

The largest hospital in Queensland for example is Greenslopes Private Hospital. Design decisions on hospital level for this thesis were made relevant to the state and country, for example; Phya Thai 2 was categorized as Level 1 because it offered the highest complexity of care in Thailand although in the private sector and Phya Thai 1 was also allocated this level because it admitted some public patients and had a complexity of care similar to the level 1 Victorian public hospitals. This decision was made in recognition of the fact that internationally, the best available care may not be equivalent between countries or regions.

TrendCare makes no adjustment for prediction of requirements according to hospital level. The system is designed with standard acuity measures and patient dependency measures. These measures do not change depending on where the care is being provided. An example of this approach is the view that the nursing care of a patient post prostatectomy would be the same if the patient was admitted to Hollywood Hospital, Western Australia or Greymouth Hospital in New Zealand. The care requirements would not be expected to vary by size or location of the hospital. Representatives of some level 2 and 3 Victorian public hospitals argue that the care requirements of patients are the same wherever they are cared for. This is a key point in their negotiations for assignment to higher hospital levels and therefore more realistic ratios. The advantage of the standard approach to measurement of patient requirements in the TrendCare system is the comparability across all hospitals.

**ii) Period sample – dates for data collection**

The research was designed to reveal correlation between variables and this required a retrospective approach using a cross-sectional design. There was no dedicated data collection specifically for this thesis, since data was drawn from existing nursing reports. However, there were dedicated dates for data collection. The dates were;

- 1<sup>st</sup> May to 31<sup>st</sup> August 2003, or any part thereof

- 1st May to 31<sup>st</sup> August 2004, or any part thereof.

This four months period was expected to provide enough data to estimate for other times of the year. A full year was considered ideal but the data sets were very large. Larger data sets may be considered in the future when a 12 month study of the seasonal independent variable may reveal further indicative trends. These date ranges were selected because in Australia and New Zealand;

- the period reflects the highest hospital activity; and
- the ideal data collection period is May, June, July and August, since these are busy months with few public holidays and not a common period for annual leave for surgeons, staff etc. It is also the most stable period for staffing and avoided popular seasonal breaks such as Easter and Christmas;
- it is also a more consistent period for staffing and the timeframes for data collection was a deliberate attempt to manage some of the extraneous variables associated with data recorded by casual staff, during lower occupancy and changing casemix where nursing expertise and efficiency could be a factor in data recorded;
- it is a stable work period for practicing surgeons and other medical practitioners who if absent from a hospital may change the casemix considerably;
- staff stability and staff knowledge of TrendCare would foreseeably be at a peak in these months. Associated inter-rater reliability testing would be expected to be higher in this stable period, refer section 4.5.6; and
- higher occupancy in the winter demand period.

Initially, the research was designed to include just 2003 data but two hospitals were unable to link the system to reports from year 2003 and were willing to provide data

from the 2004 winter demand. A third hospital provided 2003 data, which upon analysis revealed unexplained negative values for actualized care. After consultation with TrendCare technical advisors and site information technology managers, it was agreed to substitute the 2003 data with that of 2004.

It is acknowledged that it may not be easy to draw any conclusions over a longer time period. There may be alternative explanations where occupancy is lower and during periods of annual leave and public holidays.

### **iii) Unit of Measurement**

With the hospitals and the data collection period selected, a design decision was required about the unit of measurement. The following were considered:

- DRG/Episode and care
- Nursing Diagnosis
- LOS
- Per diem
- Shifts of Care

Although able to be recorded in TrendCare, DRG was excluded as the unit of measurement because it is a classification of medical resource homogeneity which, as the literature reveals, may be nursing heterogeneous and not a good measure of nursing requirements. The DRG is also allocated by Health Information Managers and not nurses, up to 7 weeks after discharge of the patient, by which time a nurse may have cared for many other patients and the medical record and indeed the relevance has long gone from the ward. The only way that could be overcome is by using a predicted or 'working' DRG but a reasonable knowledge of the DRG allocation process would be required at patient admission without even contemplating the

thought of provisional ICD codes and groupers and coding training for nurses. Nursing diagnosis was considered because it legitimately belongs to nursing, but the current shifts in boundaries, language and politics of the concept placed it clearly outside consideration for this project. Most importantly, it is not a feature of TrendCare.

Measurement of nursing by both LOS and per diem were considered, but were discounted due to the high degree of variability in nursing requirements across these parameters. Such variability was already identified in the literature. Finally, a decision was made to determine if a correlation existed between HPPD and ratios by the only measure common to both, i.e. shifts of care. This measure was entirely logical since it recorded both practices by shift in TrendCare. The concept of a shift as a unit was also one which nurses relate to most closely. The shifts of care have been effectively ‘weighted’ for resource intensity, according to a range of variables for the two practices. The practices were described in Chapter 3 and the criteria for the variables are now summarized;

### **Victorian public hospital mandated nurse patient ratios**

- Hospital Level - 3 levels from 1-3
- Ward Type – 16 types e.g. medical/surgical, special care nursery
- Specialty ward type level, for
  - Delivery Suite, 3 levels from NICU to level 2 the lowest,
  - Accident and Emergency department 3 levels from AE1 to AE3,
  - HDU, 4 levels from HDU1 to HDU 4 and
  - Rehabilitation category RHB1 (Spinal/amputees/ABI), RHB2 (other).

- Shift type – 3 types, morning, evening and night shift

### **TrendCare**

- Patient type – 41 types e.g. paediatric oncology to rehabilitation, fast stream
- Shift type – 3 types, morning, evening and night shift

Nursing resources are allocated in greater or lesser amounts according to these variables. For example Level 1 hospitals are allocated more resources than Level 3 hospitals. Under ratios, it can only be more or less nurses because the practice is only concerned about numbers. In TrendCare, the allocation may be more or less nursing time and/or a change of skill mix. The analysis considered these various methods of shift weightings and is discussed in Chapter 5. The hospitals and the data collection period sampled subsequently provided data on **103,384 shifts of care representing 1,998,902 nursing hours**. Of these 69 shifts of care were removed as ward type was not recorded, another 32 were removed due to unexplained negative hours of care, and a further 14 high outliers were removed. The outliers are explained in section 4.5.7 on statistical tests. This result was 103,269 valid shifts of care.

One area of variability both practices are in agreement about is the care requirements across the three shift types, morning, evening and night shift within the individual hospital types. Both ratio and TrendCare HPPD have allocated more resources for morning shifts, less for afternoon shifts and least for night shift. Shift types vary a little between some hospital types such as short shifts, 12 hour shifts in critical care units, 8, 9, 10 or 10.5 hour night shifts, but these variables were considered by the researcher to be unlikely to impact on the data collection.

### **The purpose of collecting data from different settings**

The research was designed to include a number of different hospital types in the sample. The types included rural and metropolitan, public and private, small and large

(by hospital level), local and international (see Table 4.1 – Sample Hospital Profile). Data collected from a broad range of different hospitals was considered likely to include a wide range of different patient types. This would then test the hypothesis over as many variables as possible in the parameters of relevance to each practice; i.e wards for ratios and patient types for TrendCare HPPD.

At the commencement of the study the researcher considered what was different across the different hospital types and what was the same. The following variables were identified as likely to impact on data recorded in TrendCare: location and labour force, casemix, nursing practice and models of care, patient throughput, nursing hours available, skill mix and for-profit status of the hospital. Quantifying these variables was outside the scope of the thesis. Despite this limitation, a range of hospital types was considered extremely important so that results could be projected for hospitals that had not provided data but for whom the sample or a sub sample was designed to be representative. It was especially important to be able to project the results for Victorian hospitals that were prohibited from providing data to this project by the Nurse Policy Branch of the Department of Human Services, Victoria.

Different hospital types (and therefore ward and patient types) may affect the correlations expected between predicted TrendCare and ratio requirements to actualized nursing care. As already discussed, TrendCare predictions are standard within the system. TrendCare makes no prediction adjustment to accommodate variability in nursing resource requirements for hospital level or location. TrendCare users consider that this variability in nursing practice or models of care is captured by the range of indicators and options available for their selection. An example is a comparison between the variability in nursing resource requirements for a post-caesarean section patient in Thailand and in Australia. In Thailand, the patient is cared for in bed for 7 days and in Australia the patient would be encouraged to ambulate almost immediately post operatively and this generally results in a reduced LOS. In

both these settings, the TrendCare indicators of mobility, activities of daily living and baby care will capture the differences. Some hospitals in New Zealand have requirements for specialising patients with dementia, and this would also be captured in the selection of indicators.

The hospital size is also important when considering workload data. For example, in a medium sized facility, nursing coordinators with midwifery experience can assume the role of staff midwives during peak workloads in labour wards. Another example is the deployment of the nurse educator from educational activities to the emergency department to assist with resuscitation. Where more nurses are working in a supernumerary, indirect care capacity they are more likely to be able to act as a buffer for clinical peaks. These additional resources are more likely to be recorded in actualized hours in TrendCare HPPD than in ratios environments where no record is generally kept of mid-shift deployments from indirect care resources. The availability of supernumerary, indirect care nurses is more likely in the medium to larger hospitals. Smaller hospitals may have more variance and less correlation for this reason.

As already discussed, neither ratios nor TrendCare are recruitment tools (although Victorian ANF might challenge that notion for ratios). A prediction for nursing requirements is not the same as those resources actually being available for rostering. The availability of nurses for work may be vastly different between hospital settings. For example, hospitals in far north Queensland may have no further available nursing resources due to their remote location, yet ratios or HPPD predict higher requirements than can be worked. In addition, some hospitals have high numbers of junior staff with limited skills, competencies and efficiencies but actively support these nurses with close clinical teacher supervision. The clinical teacher may be costed as an overhead to the general training budget and not recorded in direct nursing care. The range of hospital settings also had implications for research design with respect to the

next step in the project, which was essential before data collection commenced i.e. ethical approval to proceed.

#### **4.5.4 Ethics and privacy**

The thesis addressed the need for ethical conduct of the research since there was a clear involvement of '*human participation or definable human involvement .....and so subject to a review by a human ethics committee*' (NHMRC, National Statement on Ethical Conduct in Research Involving Humans, 2001:7). This thesis did not entail serious risks for the participants. Research risks were minimised by careful consideration of ethical matters pertaining to the conduct of the research. The thesis involved an analysis of data about shifts of care. The data was entered by nurses about care provided to patients and only deidentified data were analyzed.

#### **SCERH application**

The research process commenced with an application to the Standing Committee on Ethics involving Humans (SCERH) at Monash University in October 2001. There were no ethical dilemmas identified by SCERH since there was no risk of harm or exploitation of participants. The Committee scrutinized the process of protecting the privacy of participants. The Committee sought evidence of the nature of data required and whether applications had been made for ethical approval from hospitals or other relevant governing bodies in New Zealand and Thailand. The application detailed that the research was to be conducted on previously collected de-identified data about shifts of care and not individuals. This data is found in records of nurses' workloads not personal health information. No identifiable patient or staff data was required. The TrendCare report requested from hospitals was a monthly summary of shifts of care. The researcher had no role in the collection of data from any site and was unable to identify any patient or staff member even from small samples of one or two patients or staff.

The researcher agreed to meet all legal obligations in relation to secure storage, rights of access and the ultimate destruction of health information. The obligations are all set out in the Statutory Guidelines on Research, issued for the purposes of health privacy, Health Privacy Principles 1.1 (e) (iii) & 2.2 (g), Office of the Health Services Commissioner (Victoria), February 2002. In Victoria this relates to the Information Privacy Act 2000 (Vic) and the Health Records Act 2001 (Vic). In New Zealand this relates to New Zealand Privacy Act 1993, New Zealand Health Reforms 1993 and New Zealand Human Rights Act 1993. The Office of the Health Services Commissioner (Victoria) advised that the statutory guidelines apply to the public and private sectors and as such to research conducted in an Australian University, although some of the data may come from sites in other states of Australia or other countries such as Thailand or New Zealand. The Office advised that where the owner of the data in another state or country is willing to provide de-identified data for the purposes of research which has been approved by a Victorian university Human Research Ethics Committee, the issue of compliance with relevant privacy legislation has been thoroughly addressed.

The proposal was approved by the Monash University Standing Committee in Research Involving Humans (SCERH) in January 2002 and copies of the approval to proceed were forwarded to Directors of Nursing of hospitals who had registered an interest in participating in the research project. For approximately half of the hospitals the research could now proceed, but for the remainder further ethical approval procedures were required in addition to the approval to proceed by SCERH. The additional requirements varied both locally and internationally.

In Australia, 12 hospitals required additional and separate ethics applications after approval for the project was granted by SCERH. These were all submitted and approved. The requirements ranged from a telephone call from the chair of the ethics committee who gave telephone approval, to full written proposals to the relevant

hospital ethics committees. For three hospitals, this ethical clearance process was followed and approval given in 2002 and full repeat applications were required by those same hospitals in 2004. Two hospitals required repeat applications at the request of new Directors of Nursing and one at the request of new regional ethics committee formed after the approving ethics committee disbanded.

The ethics application process for multi centre studies in New Zealand involved a National Application for Ethical Approval and the nomination of a lead hospital ethics committee which co-ordinated the application and consulted other New Zealand hospitals in the sample. The lead committee was Hawkes Bay Ethics Committee who agreed to undertake this role and their support and assistance in co-ordinating the responses of 6 hospitals is acknowledged. Two New Zealand hospitals, one private and one public, did not require inclusion in the national application procedure, nor any other additional process other than SCERH approval and that was communicated in writing.

The Operational Standard for Ethics Committees for the Ministry of Health in New Zealand required respect for the three principles of the Treaty of Waitangi “*partnerships, participation and protection should inform the interface between Maori and research*” (2002:82). The New Zealand Public Health and Disability Act 2000 (the Act) provides guidelines for consultation with Maori (Consultation Guidelines, Ministry of Health, 2002). The format included reference to two organisations, the Ngati Kahungunu Iwi Inc. Hauora Board and the Maori Health Unit of Hawkes Bay District Health Board (HBDHB). This was followed by notification to the Taiwhenua located within the area of research and other Maori health providers who may have an interest in the research.

The Hawkes Bay Ethics Committee has two Maori members in addition to the Chair who is also Maori and all are of Ngati Kahungunu descent. These committee members represented the Ngati Kahungunu Iwi Inc. Hauora Board. The Maori Health

Unit of Hawkes Bay was consulted and provided a letter of support for the project. In addition the following Maori providers were consulted in the local areas of research;

- Te Ra O Te Whanau Wairoa Taiwhenua
- Tematea Taiwhenua
- Te Taiwhenua O Heretaunga
- Te Whanganui A Orotu Taiwhenua Napier
- Ngai Tahu Maori Health Research Unit, University of Otago
- Maori Research Review Committee for Auckland District Health Board (DHB)

Correspondence and information on the project was sent to the Nursing Council of New Zealand.

The TrendCare Co-ordinator for Thailand advised that there was no government regulatory body to which nurses report in that country. However the Medical Director at the Phya Thai Group of hospitals advised that there were no further specific ethics approval processes after approval was provided by the Monash University SCERH. Correspondence and information on the research project was forwarded to the Commission for Control of the Arts in Healing, Ministry of Public Health in Bangkok which the Nurses Board of Victoria advised is the only body responsible for the registration of nurses practising in Thailand.

### **Consent**

The consent of participating hospitals was obtained in three ways. First, by returning registration of interest forms. Secondly, by approval by the Director of Nursing or the hospital ethics committee, and thirdly by forwarding the data. Informed consent by patients and staff was not required, since all data was de-identified in the standard TrendCare report requested. Patients sign consent of a general nature for the purposes

of research on their admission form. It was recommended in the introductory letter to hospitals that they actively inform patients, staff and visitors about their participation in the research via newsletters, staff meetings, displays and research forums.

Since nurses already record the data, the research did not impose an additional burden on nurses during the research project. A specific request for consent or assistance by nurses on this project was not required. The TrendCare Coordinator required some additional time for data transfer however there remained a fair distribution of the benefits and burdens of participation and research. For some sites this time was as little as 10 minutes on one occasion only.

The data was emailed directly to the researcher and was not sighted by representatives of TrendCare, ANF, DHS or VHIA or any other hospital.

A Confidentiality Agreement was signed between Monash University and TrendCare Pty Ltd in February 2003.

#### **4.5.5 Data collection**

The next step was to gather the information to address the hypothesis. An early decision was about whether to generate new data or use existing data. The existing data was most suitable for the purpose since the critical operational variables could be captured in standard TrendCare reports. The decision to use existing reports also meant a potentially large sample of up to 100 hospitals. The project was designed to take advantage of the existence of the information in databases which nurses routinely collected as a record of patient care and also as a record of their workload.

The use of standard reports minimized the use of additional nursing resources for data collection for research purposes. Standardized reports may also have contributed to the development of a culture of establishing databases of routinely collected nursing information. Also contributing to this culture may have been the subsequent or

concurrent use of those databases for research in improving patient care and working conditions of nurses.

An example of the risk of bias when generating new data for research purposes was the Victorian PDS pilot. In that pilot, data collection took place for research only; since workloads were allocated by another method i.e. mandated nurse patient ratios. Nurses were concerned about the use of the data and it was reasonable to assume that they may have not entered data accurately or missing data was completed by the Nurse Unit Manager for the purposes of the DHS trial. The Victorian public hospital trial hospital database may not have been an accurate record of the patient requirements at that time. To avoid the use of scarce nursing resources, promote nursing research as a routine part of our work and avoid bias in data collected for another purpose, no new data were generated.

### **Data format**

The use of existing data was embedded in the research design from its inception but the suitability of standard reports within TrendCare required more critical analysis. The advice of one of the Directors of TrendCare was to decide what was needed and then source the data within TrendCare rather than use the TrendCare reports. The use of raw data was suggested to avoid the errors which may arise from averaging 'averages' which are elements of many summary reports. This advice was considered along with issues of transfer of the data in a non-report format and the skill levels required of nursing TrendCare coordinators at hospitals. A complicated request by the researcher, for data rather than a standard report, had the potential to reduce the sample. In order to maintain the sample size and reduce the risk of errors in transferring raw data, a decision was made to consider the data in several standard reports. The researcher remained very mindful of the use of averages in those reports.

At the commencement of the project it was planned that several reports would be requested from hospitals, to capture the required data. It was also planned to request a report amendment through the user feedback mechanism which TrendCare supports in its process of system up-grades. The aim was to be able to request a single report from hospitals to simplify the process.

Initially 6 standard reports were considered. They were;

1. Hospital PND/Ratio Variance Summary Report
2. Hospital Monthly Category Profile Report
3. Ward Shift Summary Report
4. Ward Daily Category Profile Report
5. Ward Clinical hours Variance Report
6. DRG specific Nursing Hours report

The first 4 reports had de-identified data but the 5<sup>th</sup> report included staff names and the 6<sup>th</sup> report included patient names. If these two reports were to be used then the TrendCare coordinator at the hospitals would need to remove those fields before forwarding the data for analysis. Since all the reports were in PDF format and not easily manipulated at that time, a decision was made not to use those reports to maintain the anonymity of the participants and the simplicity of the data collection for the hospital TrendCare coordinators. It was foreseeable that future versions of TrendCare would enable sites to delete or hide identifying information in the PDF files to enable multi-site research in the future.

Reports 2, 3 and 4 were not used in this thesis. The reports had been identified as possible sources of information on the TrendCare acuity classifications or categories. For example, categories 1-5 for medical surgical patients as discussed in Chapter 3.

The reports included predicted and actualized hours by category and summaries of the number of patients in each category. An analysis of categories was potentially a second large study and it was decided in consideration of the focus on shifts of care to concentrate on the raw data for ratios and HPPD. Although not clear early in the research, it has since become evident that these reports may be significant for dependency based ratios in the future and is discussed further in chapter 6.

This left the first report for consideration in this thesis. The report was in an early stage of development. See Figure 4.4 – Hospital PND/Ratio Variance Summary Report. It was created in 2002, for Directors of Nursing of Victorian public hospitals who were TrendCare users and who were concerned about the introduction of mandated nurse patient ratios. In 2002 however, there was no SQL (Structured Query Language) data retrieval available in the TrendCare system. The patient nurse dependency variance reports had no capacity for direct comparison with ratios which were in the first year of implementation in Victoria. Discussion with the Directors of TrendCare at that time revealed that TrendCare Systems Pty Ltd were successful in tendering for the system to be used for the proposed trial of a dependency system in Victorian public hospitals. The trial was a condition of the Heads of Agreement to introduce nurse patient ratios in 2001. Because of this impending trial, the report was upgraded for a wider group of users. There were several report modification requirements which the researcher discussed with the TrendCare Directors for the purposes of obtaining data for this thesis. These requirements could also be useful in the future for Victorian public hospital Directors of Nursing for their information and management of nursing resources. The requirements were;

- capacity to customize the date range e.g. 4 months or part thereof;
- changing the sequence of the columns and locating all the required or predicted hours' columns next to each other on the left side of the report. This placed all the actualized hours on the right hand side of the report next to the variance;

- inclusion of TrendCare clinical HPPD variance and ratio variance and a TrendCare/ratio variance;
- changing the order of specialist department options from highest to lowest, rather than a different sequence for each department;
- addition of the ability to report with or without the rounding rule (discussed further in this section and in Chapter 5);
- email-able report. TrendCare directors suggested reports were prepared as an export file loaded onto diskettes for email or post, or print and post hard copy. This was not acceptable due to high volume of data. This was also considered to be more time consuming and may inadvertently reduce the size of the sample; and
- able to be transcribed for use in Statistical Package for Social Sciences (SPSS). The PDF format was a deliberate design decision for TrendCare, to prevent unauthorized manipulation of the reports. This presented a difficulty when authorized manipulation was required.

As a result of these discussions, modifications were made to the report on patient nurse dependency variance and it evolved to become the Hospital PND/Ratio Variance Report (2003). See Figure 4.5. This report included the Victorian public hospital ratios formula as agreed in 2001-2004 EBA; the calculations were held within the system and could not be manipulated or adjusted by users. It was made available in the next TrendCare system up-grade in March 2003, which was distributed to all users.

This report was not used by Victorian hospitals for reporting to DHS. They were required to forward monthly export files to DHS including costs information based on

TrendCare data. There was no direct comparison of the two practices by workload, since nurses workloads in Victoria were governed by mandated nurse patient ratios. TrendCare could not be used to allocate workloads in these hospitals with the exception of a few regional hospitals that had earlier negotiated for inclusion in their EBA.

# Hospital PND/Ratio Variance Summary Report

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Period: **November, 2001** ANE Classification: **Level 1**

| Calendar Date              | Shift       | Ward Name                  | Patient Type               | No. of Patient Shifts      | TC PND Required (hh:mm) | Ratio Required (hh:mm) | Actual (hh:mm) | TC PND Admin (hh:mm) | TC PND Variance (hh:mm) | Ratio Variance (hh:mm) |       |
|----------------------------|-------------|----------------------------|----------------------------|----------------------------|-------------------------|------------------------|----------------|----------------------|-------------------------|------------------------|-------|
| 18/11/2001                 | Evening     | Ward 3 East                | Surgical                   | 15                         | 28:45                   | 30:00                  | 28:28          |                      | -0:19                   | -1:34                  |       |
|                            |             |                            | Medical                    | 11                         | 14:55                   | 22:00                  | 14:47          |                      | -0:08                   | -7:13                  |       |
|                            |             |                            | Palliative Care            | 1                          | 2:05                    | 2:00                   | 2:04           |                      | -0:01                   | 0:04                   |       |
|                            | Night       | Ward 3 East                | Surgical                   | 16                         | 23:20                   | 32:00                  | 23:09          |                      | -0:11                   | -8:51                  |       |
|                            |             |                            | Medical                    | 11                         | 8:30                    | 13:04                  | 7:17           |                      | 0:47                    | -5:47                  |       |
|                            |             |                            | Palliative Care            | 1                          | 1:30                    | 1:11                   | 1:34           |                      | 0:04                    | 0:23                   |       |
|                            | 19/11/2001  | Day                        | Ward 3 East                | High Dependency - Surgical | 1                       | 4:50                   | 2:00           | 4:49                 | 0:15                    | -0:01                  | 2:49  |
|                            |             |                            |                            | Medical                    | 10                      | 15:40                  | 20:00          | 15:29                | 2:30                    | -0:11                  | -4:31 |
|                            |             |                            |                            | Palliative Care            | 2                       | 5:10                   | 4:00           | 5:08                 | 0:30                    | -0:02                  | 1:08  |
|                            |             | Evening                    | Ward 3 East                | Surgical                   | 19                      | 38:55                  | 38:00          | 38:34                | 4:45                    | -0:21                  | 0:34  |
| High Dependency - Surgical |             |                            |                            | 1                          | 3:35                    | 2:00                   | 3:34           |                      | -0:01                   | 1:34                   |       |
| Medical                    |             |                            |                            | 8                          | 9:20                    | 16:00                  | 9:09           |                      | -0:11                   | -6:51                  |       |
| Night                      |             | Ward 3 East                | Palliative Care            | 2                          | 4:10                    | 4:00                   | 4:07           |                      | -0:03                   | 0:07                   |       |
|                            |             |                            | Short Stay - Surgical      | 1                          | 2:05                    | 2:00                   | 2:04           |                      | -0:01                   | 0:04                   |       |
|                            |             |                            | Surgical                   | 18                         | 29:30                   | 36:00                  | 29:06          |                      | -0:24                   | -6:54                  |       |
|                            |             |                            | High Dependency - Surgical | 1                          | 3:35                    | 1:11                   | 3:36           |                      | 0:01                    | 2:24                   |       |
| 20/11/2001                 | Day         | Surgical Ward              | Medical                    | 8                          | 4:00                    | 9:30                   | 4:04           |                      | 0:04                    | -5:26                  |       |
|                            |             |                            | Palliative Care            | 2                          | 3:00                    | 2:23                   | 3:01           |                      | 0:01                    | 0:39                   |       |
|                            |             |                            | Short Stay - Surgical      | 1                          | 0:40                    | 1:11                   | 0:41           |                      | 0:01                    | -0:31                  |       |
|                            | Evening     | Intensive Care Unit        | Surgical                   | 18                         | 17:30                   | 21:23                  | 17:39          |                      | 0:09                    | -3:43                  |       |
|                            |             |                            | High Dependency - Surgical | 1                          | 4:50                    | 2:00                   | 4:49           | 0:16                 | -0:01                   | -7:60                  |       |
|                            |             |                            | Medical                    | 8                          | 14:50                   | 16:00                  | 14:43          | 2:08                 | -0:07                   | -1:17                  |       |
|                            |             |                            | Palliative Care            | 2                          | 4:50                    | 4:00                   | 4:48           | 0:32                 | -0:02                   | 0:48                   |       |
| Surgical Ward              | Ward 3 East | Short Stay - Surgical      | 1                          | 0:55                       | 2:00                    | 0:54                   | 0:16           | -0:01                | -1:06                   |                        |       |
|                            |             | Surgical                   | 18                         | 36:00                      | 36:00                   | 35:45                  | 4:48           | -0:15                | -0:15                   |                        |       |
|                            |             | Intensive Care             | 2                          | 4:50                       | 16:00                   | 8:00                   |                | 3:10                 | -7:60                   |                        |       |
| Ward 3 East                | Ward 3 East | Surgical                   | 4                          | 8:30                       | 8:00                    |                        |                | -8:30                | -7:60                   |                        |       |
|                            |             | High Dependency - Surgical | 1                          | 3:35                       | 2:00                    | 3:30                   |                | -0:05                | 1:30                    |                        |       |
|                            |             |                            | Medical                    | 6                          | 6:30                    | 12:00                  | 5:58           |                      | -0:32                   | -6:02                  |       |

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Figure 4.4 - Hospital PND/ratio variance summary report (2002) (Fictitious data)

## Hospital PND/Ratio Variance Summary Report

17/14/02

Date Range: 1/05/2003 to 31/08/2003  
 Hospital Classification: Level 2  
 Hospital: DEFAULT

| Calendar Date | Shift            | Ward Name                  | Patient Type               | No. Of Patient Shifts      | TG PND Required (hh:mm) | Ratio Required (hh:mm) | Actual Inpat. Clinical (hh:mm) | TC PND Admin (hh:mm) | TC PND Variance (hh:mm) | Ratio Variance (hh:mm) |       |
|---------------|------------------|----------------------------|----------------------------|----------------------------|-------------------------|------------------------|--------------------------------|----------------------|-------------------------|------------------------|-------|
| 1/05/2003     | Day              | AAU - 4th Floor            | Medical                    | 28                         | 50:15                   | 52:00                  | 57:00                          | 3:00                 | 6:45                    | 5:00                   |       |
|               |                  | Intensive Care Unit        | High Dependency - Medical  | 3                          | 13:40                   | 8:00                   | 14:46                          | 0:45                 | 1:06                    | 8:46                   |       |
|               |                  |                            | High Dependency - Surgical | 2                          | 9:40                    | 4:00                   | 10:24                          | 0:30                 | 0:44                    | 6:24                   |       |
|               |                  |                            | Intensive Care             | 3                          | 27:15                   | 24:00                  | 28:21                          | 0:45                 | 1:08                    | 4:21                   |       |
|               |                  | Med Resp & Renal           | Medical                    | 24                         | 50:10                   | 48:00                  | 50:00                          | 11:00                | -0:10                   | 2:00                   |       |
|               |                  | Medical Coronary           | Coronary Care              | 5                          | 19:10                   | 20:00                  | 24:00                          | 1:00                 | 4:50                    | 4:00                   |       |
|               |                  | Medical B1                 | Medical                    | 18                         | 28:00                   | 35:00                  | 34:15                          | 3:00                 | 6:15                    | -1:45                  |       |
|               |                  | Medical B2                 | Medical                    | 21                         | 46:19                   | 42:00                  | 50:00                          | 3:00                 | 3:41                    | 8:00                   |       |
|               |                  | Paediatrics                | Paediatric ***             | 31                         | 50:55                   | 62:00                  | 62:00                          |                      | 11:05                   |                        |       |
|               |                  | Surgical A2                | Surgical                   | 26                         | 46:50                   | 52:00                  | 49:30                          | 3:00                 | 2:40                    | -2:30                  |       |
|               |                  | Surgical A3                | Surgical                   | 21                         | 34:45                   | 42:00                  | 46:30                          | 3:00                 | 11:45                   | 4:30                   |       |
|               |                  | Surgical B3                | Surgical                   | 28                         | 62:20                   | 58:00                  | 52:30                          | 3:00                 | -8:50                   | -3:30                  |       |
|               |                  | Evening                    | AAU - 4th Floor            | Medical                    | 27                      | 36:00                  | 43:00                          | 43:00                | 1:00                    | 7:00                   |       |
|               |                  |                            | Intensive Care Unit        | High Dependency - Medical  | 3                       | 10:21                  | 5:00                           | 10:47                | 0:36                    | 0:26                   | 5:47  |
|               |                  |                            |                            | High Dependency - Surgical | 4                       | 14:21                  | 6:00                           | 14:55                | 0:48                    | 0:34                   | 8:55  |
|               | Intensive Care   |                            |                            | 3                          | 26:53                   | 24:00                  | 27:18                          | 0:36                 | 0:26                    | 3:18                   |       |
|               | Med Resp & Renal |                            | Medical                    | 28                         | 47:20                   | 45:00                  | 47:00                          | 1:00                 | -0:20                   | 2:00                   |       |
|               | Medical Coronary |                            | Coronary Care              | 5                          | 13:15                   | 20:00                  | 13:00                          |                      | -0:15                   | -7:00                  |       |
|               | Medical B1       |                            | Medical                    | 19                         | 20:55                   | 30:00                  | 26:00                          |                      | 5:05                    | -4:00                  |       |
|               | Medical B2       |                            | Medical                    | 24                         | 42:30                   | 38:00                  | 45:00                          | 1:00                 | 2:30                    | 7:00                   |       |
|               | Paediatrics      |                            | Paediatric ***             | 23                         | 32:00                   | 37:00                  | 37:30                          |                      | 5:30                    | 0:30                   |       |
|               | Surgical A2      |                            | Medical                    | 2                          | 1:30                    | 3:00                   | 2:04                           | 0:05                 | 0:34                    | -0:56                  |       |
|               |                  |                            | Surgical                   | 23                         | 32:20                   | 37:00                  | 38:56                          | 0:56                 | 0:36                    | 1:56                   |       |
|               | Surgical A3      |                            | Surgical                   | 18                         | 27:15                   | 29:00                  | 33:00                          |                      | 6:45                    | 4:00                   |       |
|               | Surgical B3      |                            | Surgical                   | 26                         | 48:45                   | 42:00                  | 44:15                          |                      | -4:30                   | 2:15                   |       |
|               | Night            |                            | AAU - 4th Floor            | Medical                    | 25                      | 16:50                  | 30:00                          | 27:00                |                         | 10:10                  | -3:00 |
|               |                  |                            | Intensive Care Unit        | High Dependency - Medical  | 3                       | 7:40                   | 4:00                           | 10:51                | 0:36                    | 3:01                   | 6:51  |
|               |                  | High Dependency - Surgical |                            | 5                          | 15:05                   | 8:00                   | 20:08                          | 1:00                 | 5:02                    | 14:08                  |       |
|               |                  | Intensive Care             |                            | 2                          | 20:00                   | 19:00                  | 22:01                          | 0:21                 | 2:01                    | 3:01                   |       |
|               |                  | Med Resp & Renal           | Medical                    | 27                         | 20:55                   | 32:00                  | 23:30                          |                      | 2:35                    | -8:30                  |       |

NOTES: This report identifies the variances between the TrendCare acuity required hours, the actual clinical hours worked and the equivalent ratio required hours.

NB: The ratio required is calculated by applying the set ratio across all patients (e.g. 1:4 or 1:5) and does not apply the 50% rule.

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Figure 4.5 - Hospital PND/ratio variance summary report (2003) (fictitious data)

The 2002 report, as available in TrendCare version 2.1, is by patient type with no rounding. This means that if the 50% rounding rule was applied, the appropriate ratios would not be captured. The rounding rule is described in the next section. This 2002 report is fixed on 9.5 hour night shifts and is not adjustable in that version. The 2003 report as in version 2.3 includes the ability to report by patient type with no rounding and also by ward type with rounding included. This report also includes 10 hour night duty shifts or flexible shift length. HPPD was also calculated slightly differently between these two versions and this is discussed in section 5.4 of this chapter. In addition SQL support was included in the upgrade to version 3.1 so that hospitals and researchers could analyse according to their research questions and outside the 40 standard TrendCare reports available.

To summarise this section, only one report was requested from the hospitals in the sample. The report is a monthly summary of the hospital activity reporting by ward, shift, patient type and the variables of interest, predicted and actualized hours per patient day and ratio variance between the Victorian public hospital ratios and the ratio hours for nurses actually providing for patients. The information in the 2003 report was most suitable to address the research questions. The details of the data reported in the Hospital PND/Ratio variance Summary Report as in Figure 4.5 are described as follows in Table 4.3 - Report descriptors;

| Column/data label          | Description                                                        |
|----------------------------|--------------------------------------------------------------------|
| Date range                 | Manually defined date range in month/day/year order                |
| Hospital Classification    | Equivalence to Victorian Public Hospital ANF levels                |
| Hospital                   | May have name or default hospital                                  |
| 1. Calendar date           | Date of shift, in month/day/year order, system selects             |
| 2. Shift                   | Day evening or night shift, system selects                         |
| 3. Ward name               | Label only, system selects                                         |
| 4. Patient type            | TrendCare patient type (41 options), nurse selects                 |
| 5. No of patient shifts    | No of shifts of care, or patients cared for                        |
| 6. TC PND required         | Predicted requirements by TrendCare system                         |
| 7. Ratio required          | Predicted requirements, Victorian nurse patient ratios applied     |
| 8. Actual In-pat clinical  | Actualized requirements by TrendCare system                        |
| 9. Clinical/TC variance    | The variance between columns 6. And 8.                             |
| 10 Clinical ratio variance | The variance between columns 7. And 8.                             |
| 11.TC/Ratio variance       | The variance between columns 9. And 10.                            |
| Notes at foot of table     | Defines ratio model and if the 50% rounding rule has been applied. |

**Table 4.3 TrendCare Hospital PND/Ratio Variance Summary Report descriptors**

The columns in the report of interest in this thesis are 6, 7 and 8. The variance columns 9, 10, and 11 were considered as a measure of comparability of the two practices. A decision was made to export the data from the predicted (columns 6 and 7) and actualized hours (column 8) and analyze the variance statistically within and between patient types and ward types.

Hospital TrendCare coordinators/Project officers were requested to execute the Hospital PND /Ratio Variance Summary report according to agreed selections from the following parameters;

- Hospital level
- Specialist Department level (delivery suite, A and E, HDU, Rehabilitation)
- Inclusion of report with the Victorian rounding rule applied and also without the rule applied.

Selection of these parameters will now be discussed

### **Processes**

The processes of allocating staff, categorizing patients and allocating workloads have been described in detail in Chapter 3. Data collection for this thesis was in two parts, i) by direct care nurses and ii) by TrendCare coordinators. The first part was routine data collected by direct care nurses as a regular component of their work for shifts of care commencing after 0700 hours on 1<sup>st</sup> May and ending at 0700 hours 1<sup>st</sup> September in either 2003 or 2004. The last shift of care in either period commenced before midnight on 31<sup>st</sup> August and that night shift was included in the data set.

The second part of the data collection was by the TrendCare co-ordinators who were contacted by email with permission of the Directors of Nursing. Contact was by email for the purpose of establishing email communications and preparing for the first email transmission of reports using the TrendCare System. The upgraded Hospital PND/Ratio Variance Summary report availability was initially delayed by 12 months and then by a further 6 months as an email-able version. The delays were due to technical demands at TrendCare who were required to meet the requirements of the PDS pilot for DHS. Several attempts to commence data collection were postponed until 6<sup>th</sup> October 2003 when the first data was emailed from John James and

Westmead Private hospitals. Some of the larger hospitals and one hospital with an Oracle database were technically unable to send data until September 2004 while awaiting 'patches' or 'fixes'. Some hospitals who had participated in the project since 2001 were finally excluded from the sample while still awaiting patches. Data collection was required to close to commence data analysis.

When the Hospital PND/Ratio variance summary report finally became available for individual hospital users to study ratio and HPPD variance, Victorian hospitals simply selected their name from the options of Victorian hospitals listed in the TrendCare system and their profile was effective for executing the report. However, the non-Victorian hospitals were not listed by name in the options for the report (as in practice, the ratios only applied in Victoria). The TrendCare Co-ordinators of non-Victorian hospitals were required to manually define the report using the following selection options; See Figure 4.6 Manually Defined Settings.

- select date range
- select default hospital
- select manually defined settings
- hospital level – As described in section 4.5.3
- delivery Suite level – defined by level of neonatal care which would determine the complexity of care for mother and baby. The range was NICU to Level 2.
- accident and Emergency Group – was determined by selecting from the range AE1 to AE3.
- HDU level – was determined by selecting from the range HDU1 to HDU4.

- rehabilitation Category – was determined as either RHB1 for the care of patients with acquired brain injury, spinal injury or amputation, or RHB2 for other rehabilitation categories.
- select type of report, with or without 50% rounding rule applied

Unlike the selection of hospital level 1-3, about which hospitals in the sample were advised, the selection of the appropriate level for Delivery suite, A and E, HDU and rehabilitation was determined after a discussion between the researcher and the TrendCare Co-ordinator of each individual hospital. Hospitals were then requested to run the report and provided with written instructions, for example as follows for a level 1 hospital.

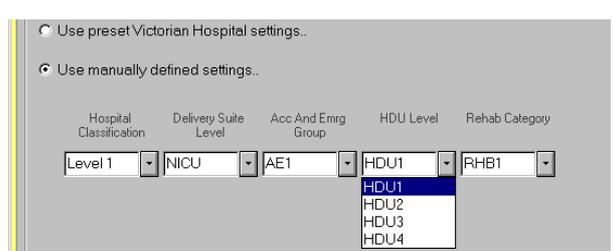
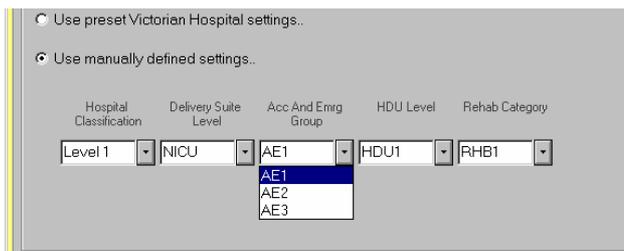
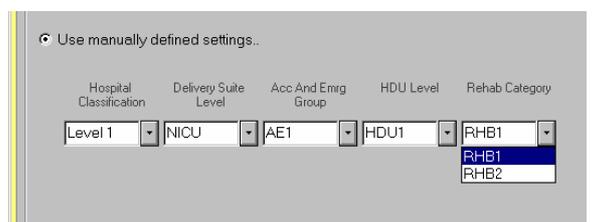
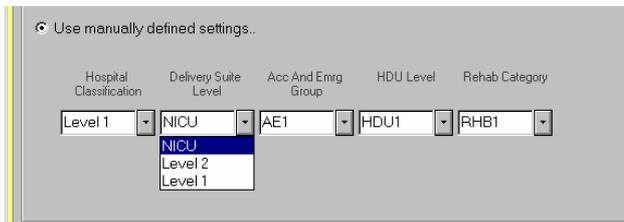
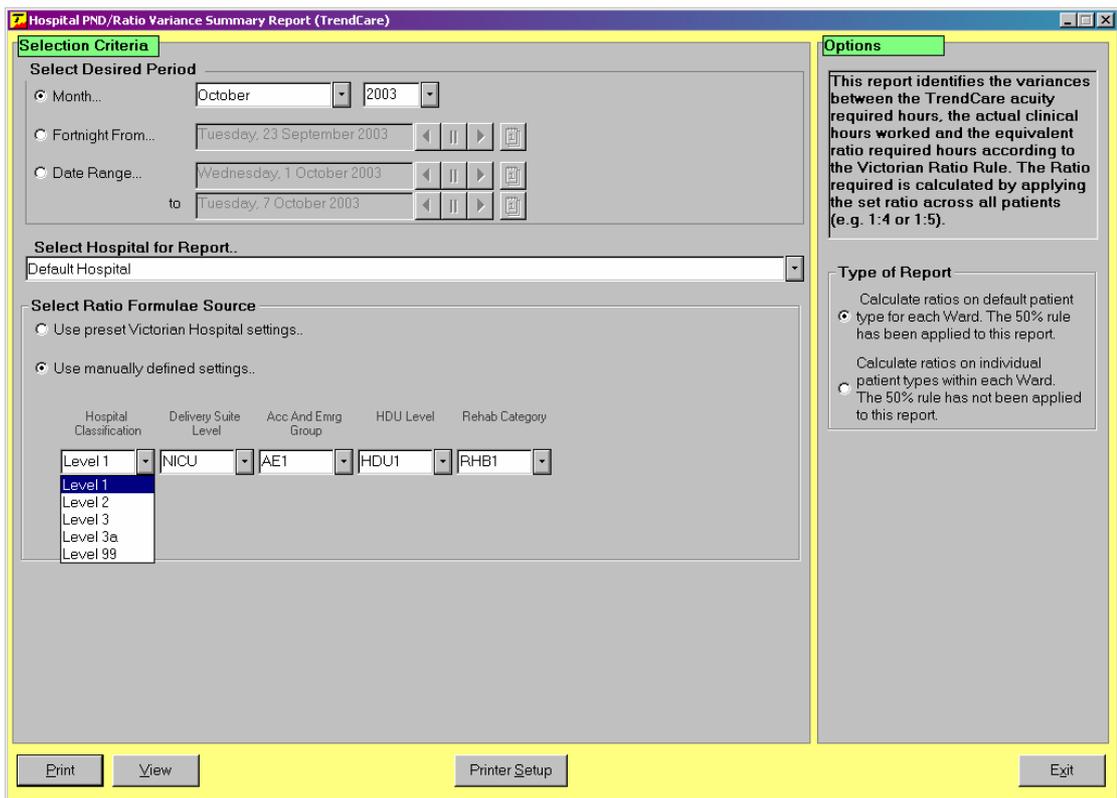


Figure 4.6 - Manually defined settings

Hospitals were instructed to

1. Click on Reports in TrendCare menu
2. Click on miscellaneous
3. Click on Hospital PND/Ratio variance summary Report
4. 'Then select the following':
  - Date range 1<sup>st</sup> May – 31<sup>st</sup> August 2003/04

For most sites these dates are retrospective to implementation of TrendCare version 3.1-3.3 but the report will run satisfactorily for the back dated period.

  - Select Hospital for report Default Hospital
  - Select Ratio Formula Source Use Manually Defined settings
  - Hospital Level Select Level 1
  - Delivery Suite level Level 1
  - Accident and Emergency Group AE1
  - HDU Level HDU1
  - Rehab Cat RHB1

Make no selection if there is no such department at the hospital.

- Type of report

Run report twice, once on each option: once with and once without the 50% rounding role option

5. Save as PDF file and email to researcher

TrendCare coordinators in all except two sites sent two reports for this thesis, one with the rounding rule applied and one without. Wakefield Hospital sent one report with no rounding and Ascot Hospital sent one report with rounding.

Hospital TrendCare co-coordinators at most sites were able to spend just 10 minutes executing the report and emailing it to the researcher. For some of the larger sites, the report was too large even with one month of data and it could not be executed before timing out. TrendCare addressed the problem by preparing a fix which was sent to the affected hospitals in the 3.1.2 upgrade. For other sites the report needed to be split as files were too large to email. These technical difficulties and repeated attempts to execute the report resulted in the withdrawal of 3 hospitals from the sample on the final day of the data collection period. All sites that required assistance approached TrendCare for technical support and this was provided. This effort by the sites and the TrendCare staff is gratefully acknowledged since the sole purpose of the report was for this research project. All hospitals were outside Victoria and did not use the ratio system.

Apart from understanding the technical difficulties of the data collection, there were two concepts which also required a sound understanding to facilitate the collection of the correct data. These concepts were the rounding rule for ratios and the HPPD formula for TrendCare

### **Rounding rule - Ratios**

Rounding occurs in ratio practices where the number of patients is not equally divisible by the ratio. Rounding up occurs when the requirement for an extra nurse exceeds 50% of another nurse. Rounding down occurs when the requirement for an extra nurse is 50% or less. The rounding rule was considered closely in data analysis. It can only apply to ward type. In some settings one nurse could look after two or three more patients than another, depending on rounding up or rounding down. The

upgraded TrendCare versions (from 2.3 onwards) included provision for the 50% rule. The ratio required column (column 7, figure 4.8) currently reflects the calculations without the 50% allowance for rounding. Therefore, if rounding occurs the predicted ratios are not captured accurately, and the ratio variance is also not accurate.

One of the key issues of comparison between ratios and TrendCare HPPD is that the Victorian public hospital nurses EBA applies to ward type not patient type. Therefore, ratios may not exactly apply to the patient casemix considering variations in patient types within and between wards of the same type. For example medical/surgical wards may have more surgical patients on two days of the week, more medical patients on another, more aged care patients over holiday periods and more paediatric patients when an ENT surgeon consults in the local area. If the rounding rule was applied for all the various patient types within a ward (instead of simply for ward types as it was designed); the most resource intensive scenario is if each type requires a rounding up. This would have the effect of lightening the workload significantly beyond what was required for the overall ward. Equally, rounding down could occur for each patient type, resulting in very heavy nursing workloads. In this way, with a nurse caring for two or three more patients than another nurse, depending on rounding up or rounding down, unfair and inequitable workloads would prevail once again. Hamilton hospital, in regional Victoria, requested to have workload by patient type in their EBA for this reason, in consideration of the significantly diverse casemix within wards.

### **HPPD Calculations - TrendCare**

Users of the HPPD data in TrendCare need to be certain whether they are using converted decimal values or times as seen in reports and graphs and windows of TrendCare. The measurement of HPPD is recorded as hours and minutes in the format hh:mm. For example, 8.50 is 8 hours and 50 minutes, not 8 ½ hours. It is however **calculated as a decimal** where 8.50 would in fact = 8 ½ hours. It was essential that

there was appropriate caution using final report HPPD figures without being certain of the formula behind them. The TrendCare Directors warned that calculations on hours as decimals instead of hours and minutes would lead to wrong data and 0.1 HPPD difference can make the difference of \$100, 000 to some hospitals (Lowe, 2003). The following is an extract from TrendCare Advanced technical – notes TA2 20-Technical.doc (2001:20-2).

*The HPPD (Hours per Patient Day) values shown on the reports, windows, and graphs within TrendCare are calculated using a weighted average formula.*

*This formula is HPPD (for period) =*

*Sum of Hours (for period in decimal)/ Sum of Average Daily No. of Patients*

*Or*

*Sum of Hours (for period in decimal)/Sum, for each ward/date, of (No. of patients in day / No. of shifts in day)*

*This formula allows for multiple date periods and wards. As the smallest unit of measure for HPPD is, by definition, the day, each day is treated as a separate element within the formula divisor. In essence, the number of patients for any given period relates to the sum of the average number of patients for each day in the sample. It is also noted that there is no significance to the number of wards or number of days in the formula. This allows the formula to be utilized across a broad range of criteria. The summation of hours over the period allows the trapping of wards where staff are assigned but no patients are present. If the formula averaged the daily HPPD values only then the hours assigned to these ‘empty’ wards would not be included in the total results.*

*The following examples consist of arbitrary values used for example purposes only;*

*Example A: Typical daily Ward Report (1 day, 1 ward, 3 shifts used):*

| <b>Shift</b>      | <b>No. of Patients</b> | <b>Required Hours</b> | <b>Clinical Hours</b> |
|-------------------|------------------------|-----------------------|-----------------------|
| <b>Day</b>        | 22                     | 33:45                 | 32:00                 |
| <b>Evening</b>    | 21                     | 27:00                 | 28:00                 |
| <b>Night</b>      | 24                     | 49:25                 | 48:00                 |
| <b>24hr Total</b> | 67                     | 110:10                | 108:00                |
| <b>HPPD</b>       |                        | 4.93                  | 4.84                  |

TrendCare adds morning, evening and night shift patient numbers and divides them by 3 rather than the previously used midnight census which was popular before the rise in same day cases.

$$\begin{aligned}
 \text{Required Hours HPPD} &= \frac{(33:45 + 27:00 + 49:25)}{(22 + 21 + 24) / 3} \\
 &= \frac{(33.75 + 27.00 + 49.41666')}{67 / 3} \text{ (hours decimal)} \\
 &= 4.93 \text{ HPPD.} \\
 \text{Clinical Hours HPPD} &= \frac{(32 + 28 + 48)}{(67 / 3)} \\
 &= 4.84
 \end{aligned}$$

If the ward was not open for night shift, the number of shifts would be 2 rather than 3 as in the denominator formula in the above example.

2 HPPD is a 1:4 medical/surgical ratio for category 3 TrendCare patients for nurses working an 8.5 hour shift taking a 0.5 hour meal break i.e. 8 hours. Therefore Category 3 patients are a fair match for number of nurses by ratios. This means that both practices agree on the workload allocation for this category of patients. There is not the same agreement for other categories of patients or different shift lengths and this had not been tested empirically before this study.

### **Preparing the data for analysis**

After collecting the data and with a clear understanding of the effect of rounding and the HPPD formula, the next step was to prepare the data for analysis. As with many quantitative studies the data was not ready for immediate analysis. TrendCare data was designed for in-house use and had never been analysed statistically in aggregate form. Data in pre-PDF format (editable) such as database file, .doc or .txt. would have been ideal. However, the TrendCare report comes in non-editable PDF format and changes made to make it importable to a statistical analysis package such as SPSS were likely to risk potential errors. The TrendCare Directors first provided the researcher with an example of an export file, using HL7 pipes as delimiters. They then sent a generic template file of TrendCare report in order to see if it was compatible in SPSS (V II.5).

After consideration by the statistical team it was decided that a good software package, even commercial, could translate the .pdf files into a form that was directly usable. The statistical team consisted of Dr Catherine Forbes, Dr Lee Gordon-Brown, both from Faculty of Business and Economics, and Dr Lee Seldon, from Faculty of Information Technology, Monash University. They identified a way to convert the text from the .PDF into a Word (.doc) file. Unfortunately, the text was not formatted and it took a lot of time and effort to format manually. Dr Gordon-Brown offered to write a Visual Basic (VB) macro to format the text and put it into an Excel spreadsheet sheet. From Excel the conversion to SPSS was relatively easy. Some

rearranging was then still required, programming the VB macro to transfer the information to the spreadsheets and then manipulation provided confidence in complete data transferability. The process is summarised;

**PDF → Word → Visual Basic macro → Excel → SPSS**

For Wakefield hospital the process was very different from that described above for the rest of the sample. The hospital's IT department could not foresee when it would be able to install the TrendCare up-grade which facilitated email transmission of data. Although the up-grade was available to them, resources for installation were not available at that time due to an urgent IT up-grade for another department. By June 2004, the TrendCare co-ordinator decided to execute the report and print and post hard copy of the Hospital PND/Ratio Variance Summary report in version 2.1 so that they could participate in the study. This version had no rounding capacity and in hospital level it recorded level 99. Level 99 was communicated to the statistical team as hospital level 3 equivalence, in consideration of the levels of the departments selected.

The Wakefield report had 65 pages which were scanned one page at a time to get 65 files small enough to be processed. They were made by scanning into PDF format, then running the PDF-RTF conversion, opening the file in Microsoft Word and saving it again as plain text. Considerable editing was then required on the plain text file to get it back into a recognizable table for ease of conversion to SPSS. The files were able to be converted using Optical Character Recognition (OCR) software. Unfortunately timings over 24 hours, including those over 48 and 72 hours were truncated and required manual adjustment, for example 37:00 hours converted to 13:00 hours. The final file was cross checked with the printed version 3 times by data entry person, researcher and prior to input by statistician. The process is summarised;

**Scan → PDF → RTF → Word → Visual Basic macro → Excel → SPSS**

There were two additional problems to be clarified in the process of transmitting and preparing the data for analysis. For several hospitals, including Hollywood, St Andrews Brisbane, Wesley and Greenslopes the report timed out before execution. TrendCare addressed this in the up-grade version 3.1 so that Microsoft then timed out after 1 minute instead of 30 seconds. This was suitable for Hollywood and Greenslopes to participate in the sample but the up-grade was not installed at the remaining hospitals at the time of the close of the data collection. The second problem was that for some hospitals the date format in the report was month/day/ year as for USA style and for others it was day/month/year, as for Australian style. The dates in both formats were accommodated once the problem was identified.

Data cleaning involved correcting the truncated values in the Wakefield data set, excluding 69 shifts of care where the ward type was not recorded and 32 shifts of care with unexplained negative values. A further 14 high outliers which had the potential to skew the results were considered with respect to their validity and reliability and the decision to exclude them from the sample is discussed in detail in chapter 5. The care requirements of high outliers may be the subject of future studies.

#### **4.5.6 Facilitating the statistical tests**

This thesis examines the patients' relative requirements for nursing care for groups of patients known by ward type (ratios) and patient type (TrendCare). Data in the Hospital PND/Ratio variance summary report was provided by hospitals which allocated workload according to patient type. Following the mapping of hospitals to a level 1, 2 or 3, there were two further mapping processes. The first was undertaken to facilitate statistical tests by the measures used by each practice i.e. to include ward type. The second was to have a manageable number of patient types for analysis. These were;

1. Mapping wards as described in the reports to an equivalent ward type as in Schedule C
2. Mapping the 41 TrendCare patient types to a smaller number of patient type categories.

The first type of mapping was completed by examining the reports sent by hospitals and mapping the ward type however named e.g. St Cecilia's, Curtin ward or surgical ward 2 to a ward type, such as would be listed in Schedule C. The ward type was determined by analysis of the report to determine which was the predominant patient type, for example at Grey Base hospital, Morice Ward was determined to be medical/surgical and Hannan Ward was determined to be Rehabilitation category 2. The ward types were given a descriptor and a code. The descriptor was derived from Schedule C. See Table 4.4 - Schedule C-ANF ward types.

| <b>Code</b> | <b>ANF Ward Type</b>   | <b>Code</b> | <b>ANF Ward Type</b> |
|-------------|------------------------|-------------|----------------------|
| <b>1</b>    | Medical/Surgical       | <b>9</b>    | HDU                  |
| <b>2</b>    | Ante/Postnatal         | <b>10</b>   | Palliative Care      |
| <b>3</b>    | Aged Care Acute        | <b>11</b>   | Rehab Category 1     |
| <b>4</b>    | Aged Care Aged         | <b>12</b>   | Rehab Category 2     |
| <b>5</b>    | Delivery Suite         | <b>13</b>   | GEM                  |
| <b>6</b>    | Special Care Nursery   | <b>14</b>   | Operating Room       |
| <b>7</b>    | Accident and Emergency | <b>15</b>   | PACU                 |
| <b>8</b>    | Coronary Care Unit     | <b>16</b>   | ICU                  |

**Table 4.4 - Schedule C– ANF Ward Types and codes**

Each ward in each hospital in the sample was then analyzed for its predominant patient type and this was mapped to an ANF ward type and coded. An example is

shown in Table 4.5 Ward mapping and the full table is appended (Appendix E). Ward types 14 and 15 were Operating Room and Post Anaesthetic Care Unit/Recovery room and were not being used in TrendCare in 2003, but were used after the 3.1 upgrade in 2004. GEM is an abbreviation for geriatric evaluation and management.

| <b>Hospital</b>    | <b>Ward Name</b>                 | <b>ANF Ward Type</b>        | <b>ANF Ward Code</b>         |   |
|--------------------|----------------------------------|-----------------------------|------------------------------|---|
| <b>Australia</b>   | 2N Public Mentan                 | Medical/Surgical            | 1                            |   |
|                    | 3N Private Mate                  | Ante/Postnatal              | 2                            |   |
|                    | 3S Public Mater                  | Ante/Postnatal              | 2                            |   |
|                    | 4E Public Surgi                  | Medical/Surgical            | 1                            |   |
|                    | 4W Public Orth                   | Medical/Surgical            | 1                            |   |
|                    | 5W Public Medic                  | Medical/Surgical            | 1                            |   |
|                    | 6E Private Medic                 | Medical/Surgical            | 1                            |   |
|                    | 6W Private Surg                  | Medical/Surgical            | 1                            |   |
|                    | BS Birthing Suite                | Delivery Suite              | 5                            |   |
|                    | CDU Clinical De                  | Medical/Surgical            | 1                            |   |
|                    | CVL the Act Con                  | Aged Care Aged              | 4                            |   |
|                    | HG Hyson Gree                    | Medical/Surgical            | 1                            |   |
|                    | Hosp Clare Hol                   | Palliative Care             | 10                           |   |
|                    | 24 HOUR WARD                     | Medical/Surgical            | 1                            |   |
|                    |                                  | SCN Special Care            | Special Care Nursery Level 2 | 6 |
|                    | ICU                              | ICU                         | 16                           |   |
|                    |                                  |                             |                              |   |
| <b>Grey Base</b>   | Barclay Ward                     | Medical/Surgical            | 1                            |   |
| <b>New Zealand</b> | Brian Waterson Unit              | Medical/Surgical            | 1                            |   |
|                    | Critical Care Unit               | Coronary Care Unit          | 8                            |   |
|                    | Hannan Ward                      | Rehabilitation - category 2 | 12                           |   |
|                    | McBrearty                        | Ante/Postnatal              | 2                            |   |
|                    | Morice Ward                      | Medical/Surgical            | 1                            |   |
|                    | Pafitt Ward                      | Medical/Surgical            | 1                            |   |
|                    |                                  |                             |                              |   |
| <b>Phya Thai 3</b> | Coronary Care                    | Coronary Care Unit          | 8                            |   |
| <b>Thailand</b>    | Emergency                        | Accident and Emergency      | 7                            |   |
|                    | High Dependency - Medical        | High Dependency             | 9                            |   |
|                    | High Dependency - Surgical       | High Dependency             | 9                            |   |
|                    | Intensive Care Special           | ICU                         | 16                           |   |
|                    | Intensive Care                   | ICU                         | 16                           |   |
|                    | Labour                           | Delivery Suite              | 5                            |   |
|                    | Maternity (Antenatal/Postnatal)  | Ante/Postnatal              | 2                            |   |
|                    | Medical                          | Medical/Surgical            | 1                            |   |
|                    | Maternity (Mothers with Babies)  | Ante/Postnatal              | 2                            |   |
|                    | Paediatric                       | Medical/Surgical            | 1                            |   |
|                    | Paediatric - Babies to 12 months | Medical/Surgical            | 1                            |   |
|                    | Paediatric - Intensive Care      | ICU                         | 16                           |   |
|                    | Psychiatric                      | Medical/Surgical            | 1                            |   |
|                    | Renal Dialysis                   | High Dependency             | 9                            |   |
|                    | Short Stay - Medical             | Medical/Surgical            | 1                            |   |
|                    | Short Stay - Surgical            | Medical/Surgical            | 1                            |   |
|                    | Special Care Nursery             | Special Care Nursery        | 6                            |   |
|                    |                                  | Surgical                    | Medical/Surgical             | 1 |

**Table 4.5 - Ward Mapping Schedule C equivalence for Non Victorian Hospitals  
(extract, full mapping Appendix E)**

During the mapping process a number of design decisions were made.

1. For mixed ward types where the patient types occurred with about the same frequency, the type for which the lower ratio applied i.e. less patients per nurse, was mapped. This was in view of the likelihood that rounding up would occur more often than rounding down, resulting in lower ratios more often.
2. Oncology wards had predominantly medical/surgical patient types with a small number of patients requiring palliative care and these wards were mapped to medical/surgical.
3. Delivery Suite often had higher numbers of patients classified post natal than those in labour but they were all classified as Delivery Suite, once again it was a lower ratio and a fairer reflection of the purpose of the unit.
4. Paediatric wards and the Paediatric Hospital 'Mater Children's' have been mapped to medical/surgical and ICU where appropriate as there is no provision for a specific paediatric ward type in the ANF Schedule C. However, the Schedule listed the Royal Children's Hospital as a Level 1 Hospital and a design decision was made that if the same level was assigned to paediatric wards for the non Victorian Paediatric Hospitals, then the appropriate ratios will be mapped.
5. Psychiatry wards are also not provided for in Schedule C and therefore the mapping for these wards was also to medical/surgical ward type.

The second mapping process involved mapping the 41 TrendCare patient types into a more manageable number of patient type categories and coding them. These categories were derived for manageability of the data and are to be clearly differentiated from patient categories e.g. 1-5 that TrendCare system uses to

categorize patient acuity classification. See Table 4.6 TrendCare patient type – mapping.

| Type Code | Type label                          | Category code | Category Label |
|-----------|-------------------------------------|---------------|----------------|
| 1         | Medical                             | 1             | Medical        |
| 2         | High Dependency Medical             |               |                |
| 3         | Short Stay Medical                  |               |                |
| 4         | Oncology / Haematology              |               |                |
| 5         | Day Oncology                        |               |                |
| 6         | Palliative Care                     |               |                |
| 7         | Surgical                            | 2             | Surgical       |
| 8         | High Dependency Surgical            |               |                |
| 9         | Short Stay Surgical                 |               |                |
| 10        | Paediatric Babies Under 12 Months   | 3             | Paediatric     |
| 11        | Paediatric Medical                  |               |                |
| 12        | Paediatric High Dependency Medical  |               |                |
| 13        | Paediatric Short Stay Medical       |               |                |
| 14        | Paediatric Oncology / Haematology   |               |                |
| 15        | Paediatric Day Oncology             |               |                |
| 16        | Paediatric Palliative Care          |               |                |
| 17        | Paediatric Surgical                 |               |                |
| 18        | Paediatric High Dependency Surgical |               |                |
| 19        | Paediatric Short Stay Surgical      |               |                |
| 20        | Paediatric Psychiatric              | 4             | Maternity      |
| 21        | Maternity Antenatal / Postnatal     |               |                |
| 22        | Maternity Mother with Baby          |               |                |
| 23        | Labour and Post Natal               |               |                |
| 24        | Labour Ward                         |               |                |

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|    |                                          |   |                              |
|----|------------------------------------------|---|------------------------------|
| 25 | Labour Assistance to Independent Midwife |   |                              |
| 26 | Baby Post Natal                          |   |                              |
| 27 | Adolescent Psychiatric                   | 5 | Psychiatric                  |
| 28 | Psychiatric                              |   |                              |
| 29 | Psychiatric Geriatric                    |   |                              |
| 30 | Rehabilitation – Fast Stream             | 6 | Sub Acute /<br>Extended Care |
| 31 | Rehabilitation – Slow Stream             |   |                              |
| 32 | Geriatric                                |   |                              |
| 33 | Nursing Home                             |   |                              |
| 34 | Emergency                                | 7 | Critical Care                |
| 35 | Intensive Care                           |   |                              |
| 36 | Coronary Care                            |   |                              |
| 37 | Paediatric Intensive Care                |   |                              |
| 38 | Neonatal Intensive Care                  |   |                              |
| 39 | Special Care Nursery                     |   |                              |
| 40 | Renal Dialysis                           | 8 | Acute Special                |
| 41 | Boarder                                  | 9 | Other                        |

**Table 4.6 - TrendCare Patient Type Mapping**

Further design decisions were made after this mapping;

1. Medical/surgical category label, category codes 1 and 2 would be considered one patient type category as this is reflective of ward mix in most hospitals.
2. Maternity category label, category code 4 was expanded to include special care nursery, patient type code 39. Labour ward, type codes 24 and 25, does not have a current shift prediction for care. Care in Labour ward, as for emergency departments can only be recorded as actualized care and was

excluded. There is no predicted care requirement for either of these ward types in TrendCare.

3. Psychiatric, sub-acute/extended care and acute special areas/renal dialysis, and boarder category codes 5,6,8 and 9 had very small numbers of shifts of care compared to the rest of the sample, at 8% of the total, and were bundled together for the regression analysis.
4. Emergency type label patients, type code 34, were removed from Critical Care category label, category code 7 because only 2 hospitals submitted data and emergency departments do not have a current shift prediction for care, only actualized care.
5. Critical care category label, type code 7 was split into adult and non-adult critical care. The new adult critical care category label included intensive care, type code 35 and coronary care, type code 36. The new non-adult critical care category label included paediatric intensive care, type code 37 and neonatal intensive care, type code 38. Type codes 39 and 34 were removed from this category as previously discussed.

The new patient type categories derived for regression analysis are described in Table 4.7 TrendCare Patient type Category Mapping.

| New patient type Category code | New patient type category label | Old patient type codes                        | Old patient type labels        |
|--------------------------------|---------------------------------|-----------------------------------------------|--------------------------------|
| 1.                             | Medical/surgical                | 1-9                                           | Medical/Surgical               |
| 2.                             | Paediatric                      | 10-20                                         | Paediatric                     |
| 3.                             | Post/antenatal                  | 21-23, 39                                     | Maternity, SCN                 |
| 4.                             | Adult critical care             | 35-36                                         | Intensive Care & Coronary Care |
| 5.                             | Non-adult critical care         | 37-38                                         | Paediatric ICU & neonatal ICU  |
| 6.                             | other                           | 27-33, 40-41                                  | All others                     |
| *                              | Excluded                        | 24-25, 34 (Labour ward, Emergency department) |                                |

**Table 4.7 – TrendCare patient type mapping**

### Instruments

The instrument used to collect the data was the TrendCare system. TrendCare requires Microsoft Windows 32-bit client workstations, connection to the RDBS to be compatible with Microsoft ActiveX Data Objects (ADO) version 2.6. Initial release requires a Microsoft SQL Server database environment, Oracle or an IBM DB2 database environment. The system now has

- SQL compliant databases
  - Microsoft SQL Server (7.0 / 2000+)
  - Oracle (9i+)
- Flexible Scalable Solution
  - Minimised Bandwidth Usage
  - WAN Compatible
  - Citrix / Terminal Servers

- VB6/ASP NET Client Applications
  - Applet design to minimise Client Memory space usage and provide easy e-mail patch, updates and corrections
- Common Single Routine Interfaces
  - Minimises programmatic errors
  - Supports HL7 Sources (via TrendCare HL7 Applet)
  - Supports Non-HL7 Sources (via simple download templates)
- Print Preview Option with Support for Saving Reports
  - Save reports as PDF / HTML files
  - Can be transmitted electronically in complete format e.g. by email

The reliability of the instrument was a major factor in determining the quality of the data and the subsequent interpretations.

#### **4.5.7 Data quality**

Ensuring the quality of data from various sites is an essential element of the research design and a determinant of meaningful results. Enthusiasm and co-operation from the sites did not necessarily correlate with quality data. The Ministry of Health New Zealand has begun the development of a data quality framework and strategy. That strategy is being shaped by the views of Redman based on Joseph Juran. *'Data are of high quality if they are fit for their intended uses in operations, decision-making and planning. Data are fit for use if they are free of defects and possess desired features'*. (Kerr 2004:23). The following guidelines were adopted to enable a critique of the data quality or in other words, to ensure that the data were suitable. (Polit, Beck and Hungler, 2001:317);

1. Congruence between conceptual and operational variables
2. Appropriate measurement of the variables
3. Reliability of the data
4. Reliability of the method
5. Validity of the measures
6. Validity of the method

These guidelines were then addressed by the researcher to ensure a valid research design and form the structure of this section.

### **Congruence**

Congruence between the conceptual and operational variables was considered to be satisfactory.

The conceptual variables are;

- mandated nurse patient ratios, and
- dependency systems

These variables are in agreement with the operational variables of Victorian public hospital nurse patient ratios under schedule C 2001/2004 and TrendCare system HPPD. The operational dependent variable is the actual care provided in hours and minutes. The independent variables are the predicted care requirements by both Victorian mandated nurse patient ratio formula and TrendCare HPPD by various hospital and shift types for various patient and ward types. The independent variables are common, long standing industry measures and can therefore be considered valid.

### **Data variables**

The extraneous variables of different patient and staff cohorts were controlled for but there were some variables which could not be controlled and which required awareness for interpretation of results. The number of patients admitted after a shift begins effects the prediction of workloads and the ability to deploy or recruit staff mid shift has varying degrees of success. For example, hospitals with labour wards and 24-hour Emergency Departments can experience sudden and significant impacts on the nursing supply and demand dynamics, and therefore nursing workload. These departments are highly influential on the unpredicted peaks and troughs of nursing requirements. This effect may be more widespread than those individual departments.

Patient data may be different in other ways. For example, larger metropolitan hospitals may have wards where the nursing case mix is defined well by specialty, such as a 'urology' ward or a 'gynaecology' ward, compared to a rural or suburban hospital where the nursing case mix is more 'mixed'. In the first scenario, nursing specialization (nursing expertise in a particular field of nursing) develops more quickly, due to greater exposure to a smaller range of patient types. In the latter scenario, specialization is usually less prompt, due to exposure to a lower number of patients in a higher range of patient types. This may result in the need for closer supervision, more regular checks of policy, more regular contact with the senior clinician and more clinical pathway variances. The acuity and dependency of the patient is not different but the nurse skill mix is, simply by default, since a skill mix must match the patient requirements. Smaller hospitals and those with emergency departments and labour wards were expected to have a greater variance between what was predicted and what was actualized under both practices. This may be the subject of future studies.

As earlier discussed, larger hospitals have more supernumerary indirect care nurses who are able to fill short term peaks in workload requirements, for example, the night

nursing supervisor may be able to attend labour ward to assist with a delivery or a nurse educator may be able to assist in resuscitation in the emergency department or ICU or a lactation consultant may be able to assist with specialising a mother breast feeding pre-term twins. These additional resources cannot be counted twice and often remain in indirect nursing hours, although some direct care hours should be allocated pro-rata to the ward. This is to try and get some standardization and for accuracy of variance between what was predicted and what was actualized. Smaller hospitals do not have the same benefit of deploying supernumerary staff as they are either not available or not available over 24 hours per day, 7 days per week. These hospitals tend to have greater variance between what was predicted and what was actualized under both practices because they cannot deploy or recruit staff as easily as larger hospitals.

Private hospitals depend on throughput by those insured through private health funds. Health funds membership is restricted to some degree by exclusion by the funds of some high risk and therefore high cost users. There is also occult restriction of those who cannot afford the out of pocket expense of membership premiums, usually those with chronic and debilitating conditions. The patient profile for private hospitals tends to be younger, electively admitted patients who have less co-morbidity than those without insurance in the researcher's experience on the Australian Private Hospital Board. This has an impact on the acuity and therefore dependency of the patients in those hospitals. For example, a 40-year-old sportsperson will usually require less nursing resource requirements for an elective total knee replacement than an aged pensioner, with diabetes, early signs of dementia, another painful knee, no home help and admitted through the emergency department. Extraordinarily, under the ratio practices, these two patients would be considered to have the same requirements. Private hospitals were expected to have less variance between what was predicted and what was actualized under both practices.

Nurses want to have post death care acknowledged (Lowe, 2003). They are required to care for the deceased and the relatives, often without acknowledgement of their workload, because the time of death was recorded as the time of separation in the same way as if the patient was discharged. The resources required for post death care are especially important when caring for deceased children because this care can continue for up to three shifts post death. Care of patients post death is included in TrendCare but is a discharge or separation under traditional PMI and ratio rules.

### **Reliability of the data**

Data reliability in TrendCare is maintained and evaluated through several processes; (TrendCare User Handbook, 2004);

- comprehensive staff training
- regular inter - rater reliability testing, a measure of the reliability of the raters in the selection of patient indicators
- regular review and validation of categories and indicators
- prompt review of outliers, specialized units are more likely to have outliers.
- review of patient outcomes
- review of user satisfaction

Two of these processes require further discussion; the reliability of the patient categories and timings and the reliability of the rater. In 1993/4 the reliability of the clinical indicators and the validity of the nursing hours allocated to each patient class were tested by 2500 nurses in Queensland who rated 806,250 patient categories (TrendCare, 2004). The main purpose of the Queensland state wide trial was the validation of category timings. The result of this trial generated clearer definitions for some clinical indicators and additional category timings were developed for high

dependency patients. Nurses participating in this trial considered it to be very user-friendly and 80% estimated that TrendCare allocated a fair workload. This study was repeated in 1999 and again in 2002/3. Most specialties are re-validated every three years in terms of timings, indicators and definitions. The timings are continually updated by TrendCare on advice from users on an ad hoc basis in addition to communications through TrendCare user group meetings and direct communications with the vendor. Some formal timing and reliability studies according to TrendCare (2005) include;

- Paediatric Contact Timing Study 2001 AUST
- National Workload Review 2002 NZ
- An Analysis of Patient Acuity Data 2001 – 2004 International Study – Monash University
- Victorian PND Pilot Project 2003 AUST
- Patient Category Validation Study – contact timing 2003 NZ
- Benchmarking Clinical Required HPPD 2003 AUST, NZ, Thailand
- New Zealand hospitals 2003-2004 (at same time as my collection and confused some NZ Co-ordinators)
- Australian midwifery sites, QLD 2004

The purpose of inter-rater reliability (IRR) testing is to ensure accuracy of individual raters, identify staff knowledge deficits in the use of TrendCare and ensure reliable data for decision making and costing of acuity. This is conducted at least annually and the reliability of nurse raters must be at least 90% for the unit (Lowe, 2003). Where a nurse's reliability falls below 90%, remedial education may be given, followed by three monthly testing until the reliability is above 90%.

Inter-rater reliability can be done by one of two methods.

- a) Interactive validation. This is most useful for testing in the early stages, up to three months after implementation where the tester sits with the rater and selects patient variables.
- b) Retrospective validation. The unit rater selects patient variables independently for all patients allocated and must be within a two hour time limit from the time the inter-rater reliability tester conducts testing. See Figure 4.7 Inter-rater reliability comparison form and figure 4.8 Inter-rater reliability record sheet.

It is essential that rating is done by an outside ward member with expertise and appropriate time available. This provides an alternative view for each indicator, thus avoiding a culture of wrong indicator determination. For example, taking toiletries to the shower is not 'partial assist' with hygiene. There is a general view that nurses under-rate at higher rate than over categorizing (Lowe, 2004). After time, the aim is to raise the benchmark from 90% to 94% to 96%. All hospitals in the sample had IRR testing over 90%, most close to 97%. IRR was lower in ICU's at 94%, and in Thailand 70% but improving. After the commencement of data analysis any report with suspect data for which there was no explanation, was removed from the sample.

Several processes established in the TrendCare system further ensure reliability of patient acuity data. These processes are:

- recording by the direct care nurse, rather than an observer or supervisor and which includes all actual nursing and intuitive aspects of care
- the actualization of hours worked reflecting an update from the predicted to the actual

Reliability in the data is enhanced by cross reference or interfacing of the TrendCare system with another, for example payroll, importable rosters or PMI. Data are recorded by option based click and go methods with no keying in required to avoid data entry error. The definitions of the options are available by holding the mouse over the indicator for definitions including definition of administration. Further associated reliability measures include the capacity to hyperlink from a procedure in clinical pathway e.g. insertion of naso-gastric tube, to internet policy and procedure manual for individual hospitals.

Inter Rater Reliability ComparisonIRR 01

Categorising Nurse **Jill SMITH**  
Date **01/02/03**

| Medical / Surgical      |                           | <i>Bed 1</i> |          |          | <i>Bed 2</i> |          |          | <i>Bed 3</i> |          |          | <i>Bed 4</i> |          |          | <i>Bed 5</i> |          |          |
|-------------------------|---------------------------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|
| Patient Type:           |                           | <i>M</i>     | <i>M</i> | <i>M</i> | <i>M</i>     | <i>M</i> | <i>M</i> | <i>S</i>     | <i>S</i> | <i>S</i> | <i>M</i>     | <i>M</i> | <i>M</i> | <i>S</i>     | <i>S</i> | <i>S</i> |
| Indicator               |                           | <i>E</i>     | <i>N</i> | <i>D</i> |
| <i>Specialising</i>     | <i>2hr</i>                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>3hr</i>                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>4hr</i>                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>8hr</i>                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>9hr</i>                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>10hr</i>               |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Mobility</i>         | <i>Self</i>               |              |          |          |              |          |          | ✓            | ✓        | ✓        |              |          |          |              |          |          |
|                         | <i>Part</i>               | ✓            | ✓        | ✓        | ✓            |          | ✓        |              |          |          | ✓            | ✓        |          |              |          | ✓        |
|                         | <i>Total</i>              |              |          |          |              |          |          |              |          |          | ✓            |          |          | ✓            | ✓        |          |
|                         | <i>Heavy</i>              |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Hygiene</i>          | <i>Self or N/A</i>        |              | ✓        |          |              | ✓        |          | x            | ✓        |          |              | ✓        |          |              |          |          |
|                         | <i>Part</i>               | ✓            |          |          | ✓            |          | ✓        |              |          | ✓        |              |          | ✓        |              | ✓        | x        |
|                         | <i>Total</i>              |              |          | ✓        |              |          |          |              |          |          | ✓            |          |          | ✓            |          | ✓        |
| <i>Nutrition</i>        | <i>Self or N/A</i>        |              | ✓        |          | ✓            | ✓        | ✓        | ✓            | ✓        | ✓        | ✓            | ✓        | x        | ✓            | ✓        | ✓        |
|                         | <i>Part</i>               | x            |          | ✓        |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>Total</i>              | ✓            |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Thought Process</i>  | <i>Minor</i>              |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>Mod.</i>               |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>Severe</i>             |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Continence State</i> | <i>Freq 2-4</i>           |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                         | <i>Freq 5 or more</i>     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Communication</i>    |                           |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <i>Observations</i>     |                           | ✓            | ✓        | ✓        |              |          | ✓        |              |          |          |              |          | ✓        | ✓            | ✓        | ✓        |
| <i>Meds</i>             | <i>1<sup>st</sup> Inv</i> | ✓            | ✓        | ✓        |              |          | ✓        |              |          |          | ✓            | ✓        | ✓        | ✓            | ✓        | ✓        |

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|                                                        |                     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|--------------------------------------------------------|---------------------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|--------------|----------|----------|
|                                                        | 2 <sup>nd</sup> Inv |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                                                        | 3 <sup>rd</sup> Inv |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| CV Line / Portacath                                    |                     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| Treatments                                             | 30mins              | ✓            |          | x        |              |          |          |              |          | x        |              |          | ✓        |              |          |          |
|                                                        | 60mins              |              |          | ✓        |              |          |          |              |          | ✓        |              |          |          |              |          |          |
|                                                        | 2hrs                |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| Teaching /<br>Counselling<br>/<br>Emotional<br>Support | Routine             | ✓            | ✓        | ✓        | ✓            | ✓        | ✓        | ✓            | ✓        | ✓        | ✓            | ✓        | x        | ✓            | ✓        |          |
|                                                        | 30mins              |              |          |          |              |          |          |              |          |          |              | ✓        |          |              |          |          |
|                                                        | 60mins              |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| <b>Medical / Surgical</b>                              |                     | <b>Bed 1</b> |          |          | <b>Bed 2</b> |          |          | <b>Bed 3</b> |          |          | <b>Bed 4</b> |          |          | <b>Bed 5</b> |          |          |
| <b>Patient Type:</b>                                   |                     | <i>M</i>     | <i>M</i> | <i>M</i> | <i>M</i>     | <i>M</i> | <i>M</i> | <i>S</i>     | <i>S</i> | <i>S</i> | <i>M</i>     | <i>M</i> | <i>M</i> | <i>S</i>     | <i>S</i> | <i>S</i> |
| <b>Indicator</b>                                       |                     | <i>E</i>     | <i>N</i> | <i>D</i> |
| Isolation                                              |                     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| Discharge<br>Planning                                  | Routine             |              |          | ✓        |              |          |          |              |          |          |              |          |          |              |          |          |
|                                                        | Extensive           |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
|                                                        | Complex             |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| Transfer                                               |                     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |
| Boarder Baby                                           |                     |              |          |          |              |          |          |              |          |          |              |          |          |              |          |          |

**Figure 4.7 – Inter-rater reliability comparison form**

Reproduced from the TrendCare User Handbook 2004



### **Reliability of the method**

The reliability of the method is a major element of assessing the data quality. The research design aimed to assure that reliability by the use of routinely recorded databases from a range of hospitals, categorized by level by expert nurse opinion and the data was statistically tested by the statistical consultant team of the Business and Economics Faculty of Monash University.

The risk of ‘gaming’ by nurses had been removed since patient categories do not appear on the TrendCare screens from version 2.1 onwards. In versions 2.0 and earlier, the user could view the category and click on higher indicator levels to increase the category. The researcher sought peer review on the method throughout the research project.

### **Validity of the measures**

For the purposes of this study, TrendCare will be understood to be a valid system for measuring nursing resources. TrendCare is considered to be valid because it has been constructed by its designers on categories of nursing work which are built on an understanding of what direct care constitutes nursing work, 20 years research, 2<sup>nd</sup> yearly reviews and validation of patient categories and variables contact timings and outlier reviews.

Dependency is a valid measure, often delineated in structured care methodologies, such as clinical pathways, protocols, standing orders or algorithms (Wojner, 2001). It is fixed, patient specific and not able to be manipulated. It is not related to occupancy, size of ward, demands of other patients or staff availability. A structured clinical pathway is another module of TrendCare that is not being evaluated in this study; there are also many non-TrendCare versions.

The workload for the oncoming shift depends on the acuity information within the system. A further measure of validity is the satisfaction of the oncoming shift with a fair distribution of nursing resources for the patient requirements. Peer review is an effective indicator of validity for any system, although highly subjective and barely quantifiable.

Data security is a more quantifiable element of data validity and is ensured by limiting access. What users can't see, they are less likely to attempt to hack. Hospitals must regularly review access levels and organisation rules and definitions, for example no uploading to PMI from TrendCare. Maintaining data integrity means that HPPD cannot be skewed by others for example accountants. An example of access levels is shown in Table 4.8 TrendCare Security Level Schedule.

During this study data security was maintained by ensuring that data was accessible only to the researcher, her supervisors and the statistical consultant team of the Business and Econometrics unit of Monash University. All electronic and print data and materials were, and continue to be, stored securely according to Monash University regulations and for 5 years from completion of the study. No data was or will be accessed by hospital or TrendCare staff or consultants.

## Security Level Details

| <b>Security</b>        | <b>Process</b> | <b>Enquiries</b> | <b>Reports</b> | <b>Graphs</b> | <b>Maintain</b> | <b>HRM</b> | <b>HRM Reports</b> | <b>Diets</b> | <b>Bed Mngt</b> | <b>Infection Control</b> | <b>Lists</b> |
|------------------------|----------------|------------------|----------------|---------------|-----------------|------------|--------------------|--------------|-----------------|--------------------------|--------------|
| <b>Security Off</b>    | X              | X                | X              | X             | X               | X          | X                  | X            | X               | X                        | X            |
| <b>Operations</b>      | X              | X                | X              | X             | X               | X          | X                  | X            | X               | X                        | X            |
| <b>Hospital Coord.</b> | X              | X                | X              | X             |                 | X          | X                  | X            | X               | X                        | X            |
| <b>Campus Coord.</b>   | X              | X                | X              | X             | X               | X          | X                  | X            | X               | X                        | X            |
| <b>HRM Campus</b>      |                |                  |                |               |                 | X          | X                  |              |                 |                          | X            |
| <b>Hospital Coord.</b> | X              | X                | X              | X             |                 |            | X                  | X            | X               | X                        | X            |
| <b>Ward Manager</b>    | X              | X                | X              | X             |                 | X          | X                  | X            | X               |                          | X            |
| <b>Bed Manager</b>     |                |                  |                |               |                 |            |                    |              | X               |                          |              |
| <b>HRM Manager</b>     |                |                  |                |               |                 | X          | X                  |              |                 |                          | X            |
| <b>Educator</b>        |                |                  |                |               |                 | X          | X                  |              |                 |                          | X            |
| <b>Nurse User</b>      | X              |                  |                |               |                 |            |                    | X            |                 |                          |              |
| <b>Nurse User</b>      | X              |                  |                |               |                 |            |                    | X            |                 |                          |              |
| <b>Enquiries</b>       |                | X                | X              | X             |                 |            |                    |              |                 |                          | X            |
| <b>Patient Lists</b>   |                |                  |                |               |                 |            |                    |              |                 |                          | X            |
| <b>Ward Clerk</b>      | X              |                  |                |               |                 |            |                    | X            |                 |                          |              |
| <b>Dietician</b>       | X              |                  |                |               |                 |            |                    | X            |                 |                          |              |
| <b>Kitchen</b>         |                |                  |                |               |                 |            |                    | X            |                 |                          |              |
| <b>Infection</b>       |                |                  |                |               |                 |            |                    |              |                 | X                        |              |

Table 4.8 – TrendCare Security Level Schedule

### **Validity of the method**

The validity of the method was maximized through constancy in communications with participants, research rules and protocols for example written instructions for hospitals preparing to manually define the settings for the Hospital PND/ratio variance summary report. Ongoing and regular communications with the TrendCare Directors, representatives from ANF, DHS, hospital users both in Victoria and in the sample and the statistical consultants ensured the method was refined to validly source results which supported or refuted the hypothesis.

Internal validity is the degree to which the independent variables affect the correlation rather than the extraneous variables (Polit, Beck and Hungler, 2001). Independent variables could not be manipulated. Threats include a selection threat due to lack of randomization in participant selection, a maturation threat where change occurs as a function of time and a mortality threat where attrition occurs for various reasons (Polit, Beck and Hungler, 2001). The threats were avoided by a combination of careful research design and regular and frequent personal communication with participants and other stakeholders.

External validity is the generalisability of the research to other settings or samples so that others can benefit. The adequacy of the research design and representativeness of the sample was intended to yield results which would enable extrapolation to other settings especially for Victorian and New Zealand public hospitals

### **Limitations of the instruments**

Despite the best efforts of the researcher to maximise the validity and reliability of the instruments and the method, there were several limitations to the research design, which potentially decrease the validity. These were taken into account when interpreting the findings. Limitations of ratios include:

- No application of the rounding rule in predicted ratios. Rounding is only applied to actualised ratios which may effect ratio variance;
- Minimum ratios are applied to the total of both direct and some indirect nursing care requirements, such as training, handover time, escorts out of the ward and meal breaks, quality improvement activities, orientation, meetings etc. TrendCare clinical nursing hours are all direct care;
- In this research design the ratios were calculated on open beds. In Victoria nurses are permitted to close beds when minimum ratios cannot be met. This may effect the actualized hours and therefore also the ratio variance;
- Post death care is included in TrendCare but is not under traditional ratio rules.
- There is no provision for psychiatric wards in Schedule C, Calvary hospital has 2 wards which were grouped with medical /surgical rather than psychiatric;
- There is no provision for paediatric wards in Schedule C, they were grouped with adult medical/surgical wards; and
- Ratios formula as recorded in TrendCare includes the In-Charge Nurse where it is stipulated in Schedule C and not where it is not included in Schedule C. Where not included in the Schedule an additional nurse is In-Charge and may be allocated to administrative hours. In TrendCare the hours worked by the In-Charge Nurse are always recorded in administration hours.

Limitations related to the use of TrendCare include;

- Analysis of a system which was also the subject of a state health department pilot and evaluation and during the same period. The Victorian DHS pilot understandably diverted TrendCare resources away from this project, resulting in delay in data collection for technical reasons;
- There have been 4 upgrades to the TrendCare software during the periods of the study. This meant that various hospitals were using a range of different versions of TrendCare at the same time. There were delays in calling for data until the version with emailable reports was introduced at each site; version 3.1. The 3.1 patch of small fix-ups was rolled out in November 2003 but was not available to most users until October 2004. Calvary hospital in Canberra, uses an Oracle database and was delayed in submitting data from November 2003 until July 2004. TrendCare version 3.2 is the multi-campus version as required by Mater Group, Wesley, Calvary and others. All hospitals including the Oracle user hospital in Canberra will receive the same version from 3.2 onwards.
- The labels in the reports from each hospital had various permutations and data analysis initially reported the same file types as different labels, for example files called surg, surgic, and surgical were run as three different files when they all should have been read as surgical. Reports from all hospitals were checked and verbal mapping was undertaken for the statistical consultants. Considering the simplicity of the conversion no written mapping was required for labels for wards.
- TrendCare HPPD required is calculated slightly differently in 2.1 to 3.1 as reported from TrendCare systems but this only affected Wakefield and Phya

Thai hospital 3 and on the advice of TreadCare Technical support staff is unlikely to have had any impact on the results; and

- Unusual wards may skew summary results such as 5 day wards with 2 shifts, rather than 3, i.e. no night shift, no weekend days. Versions 3.1 onwards provides the option to delete unusual wards from data sets for research purposes.

A further limitation in this design is that the researcher had no control over the quality of data completed by an indirect care nurse such as the Associate Nurse Unit Manager (ANUM), on behalf of staff who were perceived by them to be too busy or inexperienced to complete TrendCare reports. Some ANUM's complete reports for patients cared for by staff from nursing agencies or from the hospital nurse bank, rather than show these staff how to complete the reports. The reports take 5-10 minutes to complete for all patients in an entire nurse workload and the system is set up for quick 'click and go' options, with facility for text, but this is rarely used. Staff report that in many cases the ANUM does not consult the staff member or the patient and makes an estimate of the care requirements.

### **Other Limitations**

The researcher concluded that DHS prefer nursing resources in Victoria to be allocated on a dependency system such as, but not exclusively limited to the TrendCare system, rather than by fixed nurse patient ratios. Despite this apparent preference, the DHS was unwilling to allow external research, such as this study, to be undertaken on the system or ratios, using data from the 20 Victorian public hospitals participating in the pilot. Belinda Moyes (former, Director of the Nurse Policy Branch, DHS) interfered in the conduct of this independent research by advising Directors of Nursing of Victorian public hospitals not to participate in this study, for non-scientific reasons, in an email to all public hospitals on 3<sup>rd</sup> March 2003.

The researcher received communication from some of the hospitals about the email. The Victorian public hospitals then withdrew their registrations of interest and the research proceeded without the Victorian data. Senior researchers at Monash University protested about the political interference but the decision was not reversed. This initial limitation on the sample was eventually viewed as a beneficial exclusion for the purposes of obtaining un-biased data.

For the hospitals in Thailand there were several limitations. The first was that there was some anti-Australian feeling in Thailand at that time. Some nurses at first refused to use the Australian TrendCare product considering the system was a threat to their culture. However, the Directors of Nursing were fully supportive and compliance increased over the next two years. This compliance is illustrated by the fact that IRR was 70% initially and then improved to match Australian and New Zealand IRR. after that. Workplace efficiencies improved with associated savings as described in Chapter 3. The product was introduced in Thai script and staff training and lecture notes were in Thai from the beginning of implementation. Also during the research project the Director of Nursing of Phya Thai Hospital 3 was deceased in February 2004 and the Directors of Nursing of Phya Thai Hospitals 1 and 2 lost their positions when the company was sold in January 2004. These events severely limited on-going contact with the hospitals.

The researcher conducted a field visit in June 2003. This was followed by a period when all contact was lost with the Phya Thai Directors of Nursing. A search was commenced for Thai contacts at Monash University and an associate nurse researcher was contacted who made contact in Thailand by writing directly to the newly appointed Vice Manager in Thai language. The associate also visited the sites in August 2004 on behalf of the researcher. Fortunately, the Vice Manager permitted the former Director of Nursing of Phya Thai hospital 1 to release some data by fax, before her resignation from the hospital just two weeks later in August 2004. The data

arrived in two reports. The first was for the period July-August 2003 and was submitted as Ward Period Comparison report and is appended (Appendix F). The second report was for the period May – July 2003 and was submitted as Ward Acuity HPPD per patient type report and is appended (Appendix G). The Hospital PND/Ratio Variance Summary report was not submitted and although providing some useful data for benchmarking of average HPPD and HPPD by occupancy, the data could not be merged with the data from Australian and New Zealand hospitals and is reported separately in the next chapter.

Finally, the study had a ‘positive’ limitation, arising from the high volume of reportable results. As described in section 4.5.5 patient type data was mapped from TrendCare types to 6 patient type categories which removed some of the precision for reporting. In future studies it is recommended that medical and surgical patient types are split as is more common for level 1 hospital wards. It is also recommended that antenatal, post-natal and special care nursery patient types are split further, into 3 patient type groups for analysis.

There was also a high volume of reportable results by hospital type and for the regression and cost analysis, the most common types were selected. It is recommended that the metropolitan and rural split is analysed further in future studies.

#### **4.5.8 Statistical tests**

The organisation of the statistical tests to reveal trends or relationships between the variables was conducted in four analytical stages. These were;

- Descriptive statistics – an analysis of the characteristics of the sample using tables and histograms

- Correlations and cross tabulations – an analysis of the relationship between pairs of variables using scatter plots, box and whisker plots.
- Regression – an analysis fo the relationship between the dependent variable and other variables of interest to determine the significance of the differences using tables and scatter plots.
- Costing analysis – an analysis of the costs for the sample for a range of variables, by both practices.

There was some design decisions associated with these tests. There was large volume of data, > 206,000 shifts of care, i.e. two reports on each of the 103,000 actual shifts of care. There were also a large number of variables. Initial frequency tests were run to decide which variables to concentrate on and which were less significant.

In order to reduce the dataset to a manageable number of shifts of care, there was discussion with the statistical consultants about the difference in the information between the two reports and it was decided to analyze only the no 50% rounding report. The reasons were firstly that the report with rounding had a format which included empty cells, see Figure 4.9 extract of Hospital PND/Ratio Variance Summary Report, with rounding. This could be managed, but it required more formatting taking approximately 4 weeks. Secondly and most importantly, the difference the rounding made to the actualized hours was highly variable between hospitals ranging from no difference to high positive and high negative variances. The results of this analysis are discussed in the following chapter.

### Hospital PND/Ratio Variance Summary Report

Printed: 16/01/2004  
3:15:09 PM

Date Range: 01/05/2003 to 31/08/2003  
Hospital Classification: Level 3  
Hospital: DEFAULT

| Calendar Date | Shift | Ward Name            | Patient Type                 | No. Of Patient Shifts | TC PND Required (hh:mm) | Ratio Required (hh:mm) | Actual Inpat. Clinical (hh:mm) | Clinical/TC Variance (hh:mm) | Clinical/Ratio Variance (hh:mm) | TC/Ratio Variance (hh:mm) |
|---------------|-------|----------------------|------------------------------|-----------------------|-------------------------|------------------------|--------------------------------|------------------------------|---------------------------------|---------------------------|
| 01/05/2003    | Day   | Aubrey Tow           | High Dependency - Surgical   | 1                     | 2:25                    | 1:31                   | 2:31                           |                              |                                 |                           |
|               |       |                      | Medical                      | 17                    | 31:35                   | 25:54                  | 33:24                          |                              |                                 |                           |
|               |       |                      | Palliative Care              | 3                     | 6:45                    | 4:34                   | 7:04                           |                              |                                 |                           |
|               |       |                      |                              | 21                    | 40:45                   | 32:00                  | 43:00                          | 2:15                         | 11:01                           | 8:46                      |
|               |       | Canberra Cancer C    | Medical                      | 7                     | 16:55                   | 24:30                  | 20:08                          |                              |                                 |                           |
|               |       |                      | Paediatric ***               | 1                     | 2:25                    | 3:30                   | 2:53                           |                              |                                 |                           |
|               |       |                      |                              | 8                     | 19:20                   | 28:00                  | 23:00                          | 3:40                         | -5:00                           | -8:40                     |
|               |       | Curtin Ward          | Surgical                     | 22                    | 36:10                   | 32:00                  | 34:30                          |                              |                                 |                           |
|               |       |                      |                              | 22                    | 36:10                   | 32:00                  | 34:30                          | -1:40                        | 2:30                            | 4:10                      |
|               |       | Day Surgery Unit / R | Paediatric ***               | 4                     | 4:20                    | 10:14                  | 4:16                           |                              |                                 |                           |
|               |       |                      | Short Stay - Surgical        | 13                    | 11:55                   | 33:16                  | 11:44                          |                              |                                 |                           |
|               |       |                      |                              | 17                    | 16:15                   | 43:30                  | 16:00                          | -0:15                        | -27:30                          | -27:15                    |
|               |       | Deakin Ward          | Surgical                     | 13                    | 21:25                   | 24:00                  | 18:30                          |                              |                                 |                           |
|               |       |                      |                              | 13                    | 21:25                   | 24:00                  | 18:30                          | -2:55                        | -5:30                           | -2:35                     |
|               |       | Delivery Suite       | Labour                       | 3                     | 15:40                   | 8:00                   | 15:00                          |                              |                                 |                           |
|               |       |                      |                              | 3                     | 15:40                   | 8:00                   | 15:00                          | -0:40                        | 7:00                            | 7:40                      |
|               |       | Garraan Ward         | Surgical                     | 20                    | 34:50                   | 32:00                  | 33:30                          |                              |                                 |                           |
|               |       |                      |                              | 20                    | 34:50                   | 32:00                  | 33:30                          | -1:20                        | 1:30                            | 2:50                      |
|               |       | Intensive Care Unit  | High Dependency - Medical    | 2                     | 4:20                    | 16:00                  | 17:50                          |                              |                                 |                           |
|               |       |                      | High Dependency - Surgical   | 1                     | 2:25                    | 8:00                   | 9:10                           |                              |                                 |                           |
|               |       |                      |                              | 3                     | 6:45                    | 24:00                  | 27:00                          | 20:15                        | 3:00                            | -17:15                    |
|               |       | Maternity Unit       | Maternity (Antenatal/Postnat | 4                     | 8:00                    | 6:24                   | 6:54                           |                              |                                 |                           |
|               |       |                      | Maternity (Mothers With Bab  | 15                    | 28:05                   | 24:00                  | 23:58                          |                              |                                 |                           |
|               |       |                      | Surgical                     | 1                     | 2:25                    | 1:36                   | 2:09                           |                              |                                 |                           |
|               |       | Nursery Unit         | Baby - Post Natal            | 20                    | 38:30                   | 32:00                  | 33:00                          | -5:30                        | 1:00                            | 6:30                      |
|               |       |                      |                              | 4                     | 4:55                    | 8:00                   | 4:00                           |                              |                                 |                           |
|               |       |                      |                              | 4                     | 4:55                    | 8:00                   | 4:00                           | -0:55                        | -4:00                           | -3:05                     |

NOTES: This report identifies the variances between the TrendCare acuity required hours, the actual clinical hours worked and the equivalent ratio required hours according to the Victorian Ratio rule.  
NB: The ratio required is calculated by applying the set ratio across all patients (e.g. 1:4 or 1:5). The 50% rule has been applied.

Figure 4.9 - Hospital PND/Ratio Variance Summary Report – Rounding rule applied (Sample Only)

The management of outliers was considered at length including with reference to Victoria - public hospitals and mental health services Policy and Funding Guidelines (2004-2005), for methodological guidance. Clearly a policy on this exact type of analysis would not be in the Guidelines but there was consideration of the use of 3 standard deviations in calculations for H3L3 rules on the management of in-patient outliers and the statistically common practice of also using 3 standard deviations. Outliers were considered in light of three standard deviations and the most reasonable highest dependency, such as a patient in ICU requiring two nurses for care over a full shift. The range of hours predicted and actualized for one patient care shift was limited to 0-20 which eliminated patients with very high care needs and who were likely to skew the results. Patients requiring more than 20 hours of care per shift would be requiring more than the full care of 2 nurses for say a 10 hour night shift. Outliers were then trimmed from the dataset. There were 14 shifts of care trimmed and these are described in chapter 5 in descriptive statistics.

As already discussed, some negative values, 32 in total, were found in the reports. Clearly no actualized care can be a negative value. Some of the reports were then suspected of having invalid data and were not used. There were 10 negative values that could be explained where a nurse caring for a patient predicts the care for the next shift and then continues to care for the patient until discharge or transfer without another nurse being rostered on the on-coming shift, the actualised hours will appear as negative. This is because the same nurse hours cannot be recorded twice. For example, a nurse caring for a woman in labour on a morning shift will predict requirements for the evening shift. If the woman delivers and is transferred to the postnatal ward by say 4pm, leaving the labour ward unoccupied, an evening nurse may not be rostered. The hours when the shift overlaps and are part of the predicted work load for both shifts, then become negative actualized hours when no evening staff are rostered. This was determined following a query to TrendCare, where one of

the technical support staff contacted the relevant hospitals and asked them to look at other reports of the dates in question, not available to the researcher, and determine if staff were rostered for the on-coming shift and if the department was then closed. It was revealed that there was indeed no staff rostered for the on-coming shifts in departments such as labour ward, day surgery and ICU. In such cases, although the negative values were a valid record of nursing HPPD, the entire 24 hours was removed from the dataset. The query did not reveal any staff names to the researcher and anonymity was maintained.

The design decisions and trimming associated with the data collection reduced the number of shifts of care from approximately 206,000 to 103,269 valid and reliable shifts of care for analysis.

#### 4.6 Design comparison – a similar study

The research design differed from the DHS pilot in several ways, although comparisons will be made since both research projects were designed to compare the two practices of mandated nurse patient ratios and TrendCare dependency HPPD. A comparison is summarised as follows;

##### **DHS Pilot Evaluation**

- Qualitative, concurrent
- Research based data collection
- Selected wards
- 20 sites
- Public hospitals, Victoria
- 9 months data analyzed
- Evaluated over Christmas holiday period
- Data collected during EBA negotiations
- Half novice users
- Analysis by ward type
- Occupancy based analysis
- Various commitments to IRR testing

##### **Plummer Analysis**

- Quantitative, retrospective
- Routinely collected databases
- Whole of hospital
- 22 sites
- Public and Private Hospitals, non-Victorian
- 4 months data analyzed
- Evaluated mid-year
- Data collected in stable industrial period
- All expert users
- Analysis by ward and patient types
- Occupancy and dependency based analysis
- Commitment to IRR testing

An alternative executive summary to the DHS pilot evaluation conducted by Monash University was circulated by the ANF (Vic branch) in April 2004. The summary recommended a direct empirical comparison between ratios and TrendCare. Under current agreements this cannot be conducted in Victoria at the present time. This research project was designed to address this comparison.

#### **4.7 Conclusion**

The research was designed to provide the most accurate unbiased and interpretable data to answer the research questions and to provide a medium to support or refute the hypothesis. The relative strength of the design depended on the extent to which the chosen sample represents the population that is being studied (Tarling et al, 2001:74) and this is discussed in Chapters 5 and 6. The strengths include the sample size, range of sites, a single electronically transferable file (for all but two sites), for non-Victorian hospitals, measuring both ratio and dependency practices on the same patient and staff cohort. The validity and reliability of the data and the method is supported by various processes including IRR and the use of expert opinion. This research design has sought to demonstrate the project validity and significance.

*In all human affairs there are efforts, and there are results, and the strength of effort is the measure of the results”*

James Allen (1864-1912)

## CHAPTER FIVE

### RESEARCH RESULTS

#### 5.1 Introduction

A systematic analysis of reliable and relevant ratio and TrendCare HPPD data assisted in determining which method better predicts nursing resource requirements in a range of settings and for a range of patient types. In the previous chapter, I described how the research design was developed and how reliable and comparable data was collected to match the aims of the research. In this chapter, I report the results of the analysis of TrendCare data and I focus on predicted ratios and HPPD and actualised hours of care. The information derived from the analysis of the data enabled the testing of the hypothesis.

The selected results are presented in this chapter, and they are supported by tables, histograms, box and whisker plots and scatterplots. Overall results are reported first, followed by two important subsets of hospitals which underwent special analysis. The first of these subsets is a sample from Australian public hospitals known as the ‘most common shift profile subset’, described in section 5.2.3. The second subset is a sample of 7 hospitals known as the ‘Thailand subset’ and is described in section 5.3.

Many of the results are informative in their aggregate form and others are more informative when explained in detail. Some detailed results for individual hospitals are reported in coded format (Appendix F). The process for the analysis and reporting of aggregate data is grouping results for patient types. The 41 TrendCare patient types were aggregated into sets of 6 patient type categories, as described in the previous chapter. The purpose of the aggregation was to simplify reporting. In addition, the patient type categories also represent the 6 major categories of patient types of interest to most hospital managers.

While the TrendCare software has been used to facilitate the analysis for all results, readers will be able to distinguish the results which arise specifically from the TrendCare dependency system. The graphs reported throughout this chapter are in a set sequence. 'Ratio' results are always reported in the first graph. 'TrendCare' results are reported in the second graph - from the top of page to the foot, or from the left to the right of the page. In some reports there are three comparisons. 'Actualized' results are reported first, followed by 'ratio' and then 'TrendCare' results as for the set sequence. Readers are cautioned to note the scales on the vertical axes, which are sometimes slightly different in some variable groups to better illustrate the results. The groups of variables are hospital type, shift type and patient or ward type. The major findings of the data analysis are now presented. a discussion and synthesis of the outcomes follow in Chapter 6. The results are reported in five main sections in this chapter. These sections are:

1. Descriptive statistics
2. Inferential statistics
3. Thailand, New Zealand and Australian subset analysis
4. The effect of the rounding rule
5. Cost analysis

## **5.2 Descriptive statistics**

The descriptive statistics summarize several different elements of the data set. The first element is the frequency distribution. The second element is the measurement of the central tendency of the distribution; that is the average or typical value. In this thesis this is reported as the mean. The third element is the measurement of variance or the spread of data. In this thesis, this is reported as the standard deviation.

The data considered in this section are from 21 hospitals and exclude Phya Thai hospital 3 in Thailand. The Phya Thai hospital 3 data is not directly comparable for several reasons and is reported separately in section 5.3. Australia and New Zealand have essentially the same nursing practice, casemix, resources, models of care and length of stay by patient type. It was considered suitable to analyze and report the data from these two countries together.

There was one exception to the commonalities of practice between the two countries. That exception was delivery suite. The New Zealand government funds independent midwives to attend women in labour in both public and private hospitals. New Zealand hospital midwives are funded for just 40 minutes of care for delivery. This is in contrast to Australia, where it is more common for hospital midwives to provide the care for women in labour and throughout delivery. A relatively smaller number of independent midwives provide services to private patients in Australia. The care provided by independent midwives is not reported in TrendCare in either country. The New Zealand mean clinical hours for delivery suite will be less than the Australian mean clinical hours for this reason.

### **5.2.1 Sample statistics for Australia, New Zealand and Thailand**

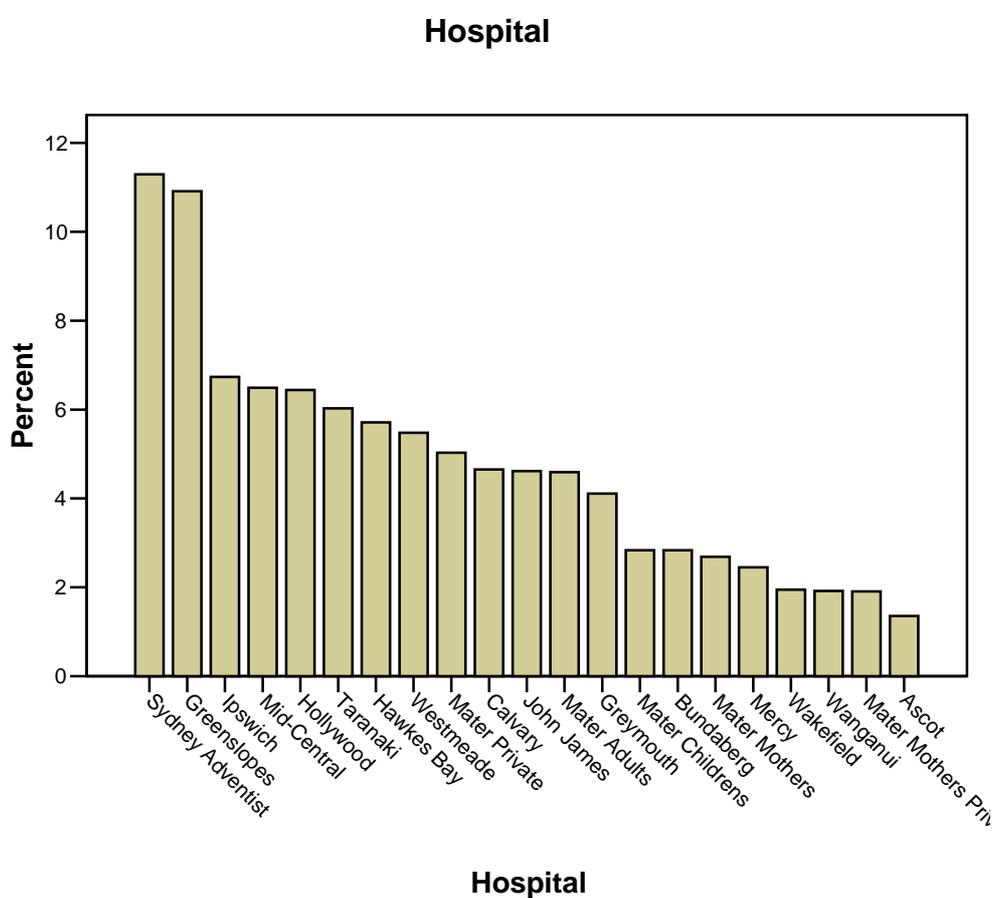
For Australian and New Zealand sites there were several variables to summarise. I begin by presenting the frequency distribution of some of the independent variables in frequency tables. The frequency tables show the number of shifts of care in the data set in three groups. The first group is hospital variables and I report on country, region, status and hospital level. See Table 5.1. The second group are shift variables and I report by morning/day, evening and night shift and also by month. The final group are patient variables and I report by ward type, patient type and patient type category.

The hospital variables are detailed in Table 5.1. The sample size was 103,269 shifts of nursing care in 2003 and 2004. Just over 70% of shifts of care in the sample were provided by Australian hospitals. In addition, over 70% were from both Australian and New Zealand hospitals combined in metropolitan regions. A little less than half of the shifts were provided by public hospitals and the balance from private hospitals. Level 2 or medium sized hospitals provided 60% of the shifts of care.

|                | <b>Variable</b> | <b>Frequency</b> | <b>Percentage</b> |
|----------------|-----------------|------------------|-------------------|
| <b>Country</b> | Australia       | 74299            | 71.9              |
|                | New Zealand     | 28970            | 28.1              |
|                | <b>Total</b>    | <b>103269</b>    | <b>100.0</b>      |
| <b>Region</b>  | Metropolitan    | 75047            | 72.7              |
|                | Rural           | 28222            | 27.3              |
|                | <b>Total</b>    | <b>103269</b>    | <b>100.0</b>      |
| <b>Status</b>  | Public          | 45363            | 43.9              |
|                | Private         | 57906            | 56.1              |
|                | <b>Total</b>    | <b>103269</b>    | <b>100.0</b>      |
| <b>Level</b>   | 1               | 22555            | 21.8              |
|                | 2               | 62060            | 60.1              |
|                | 3               | 18654            | 18.1              |
|                | <b>Total</b>    | <b>103269</b>    | <b>100.0</b>      |

**Table 5.1 – Frequency of shifts by hospital variables**

The frequency distribution of the number of shifts by hospital is illustrated graphically in Figure 5.1. Sydney Adventist Hospital and Greenslopes Private Hospital were two of the largest hospitals in the dataset and contributed the greatest number of shifts of care by hospital to the data set. Greenslopes is the largest hospital in Queensland and contributed 10.9 % of the shifts of care. Sydney Adventist hospital, one of the largest hospitals in New South Wales, contributed the highest number of shifts of care at 11.3%. These latter two hospitals represented just over 22% of the total sample.



**Figure 5.1 - Frequency of shifts by hospital**

The range of frequency for hospitals to the data set, by percentage of the total shifts of care is 1.4% for Ascot hospital New Zealand - 11.3% for Sydney Adventist hospital NSW. The majority of other hospitals each contributed 2.8 - 6% of shifts and have more similar contributions to the sample by frequency. Bundaberg hospital is a level 2 equivalent Australian rural hospital which provided data on shifts for 2.8 % of the data set, which relates to data for just 6 weeks. Technical problems arose for the off-site server for Bundaberg Hospital while waiting for the balance of the data. Unfortunately, the data collection period closed before the server problems were resolved.

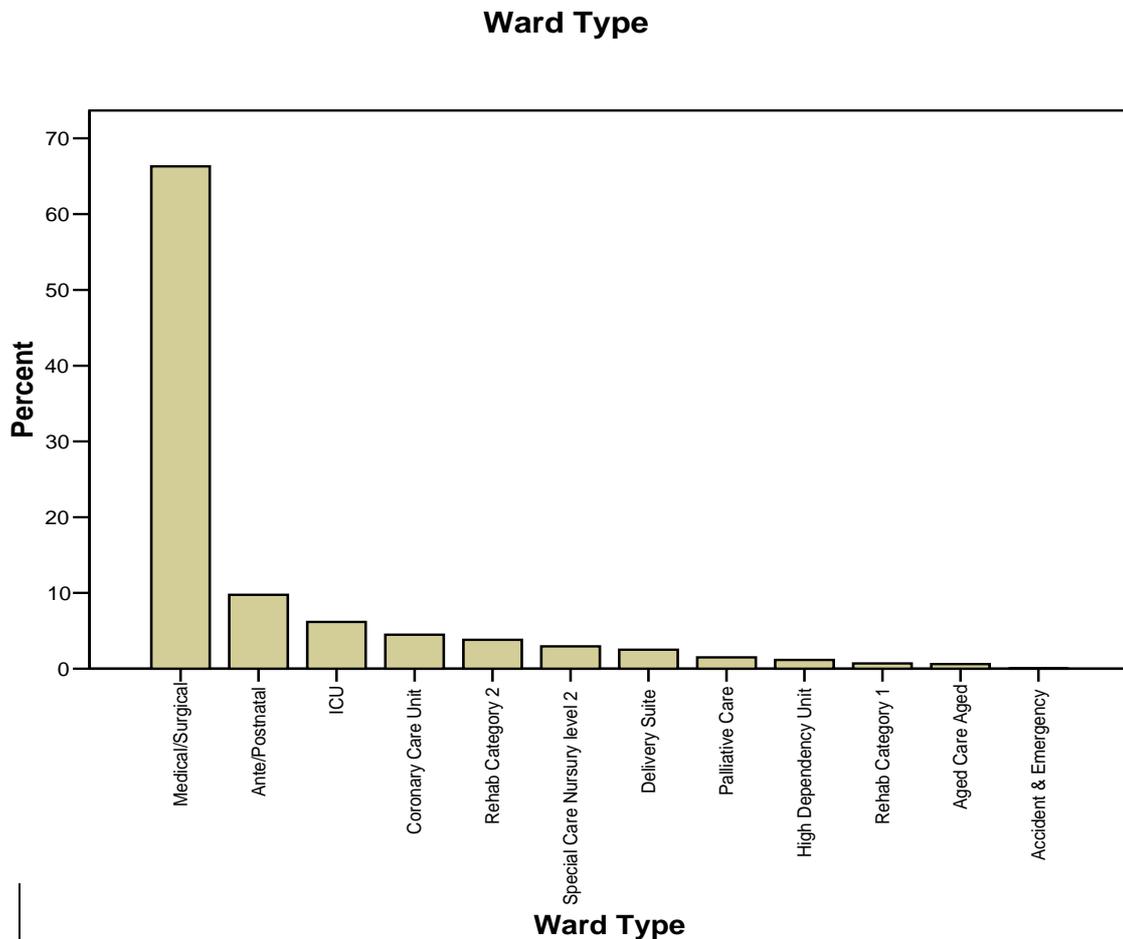
The second group of descriptive statistics is for shift variables including frequency of shifts by month and by shift type. The results are as shown in Table 5.2;

| <b>Month %</b> |      | <b>Shift %</b>     |      |
|----------------|------|--------------------|------|
| <b>May</b>     | 24.9 | <b>Morning/day</b> | 35.0 |
| <b>June</b>    | 24.8 | <b>Evening</b>     | 32.7 |
| <b>July</b>    | 25.1 | <b>Night</b>       | 32.3 |
| <b>August</b>  | 25.2 |                    |      |

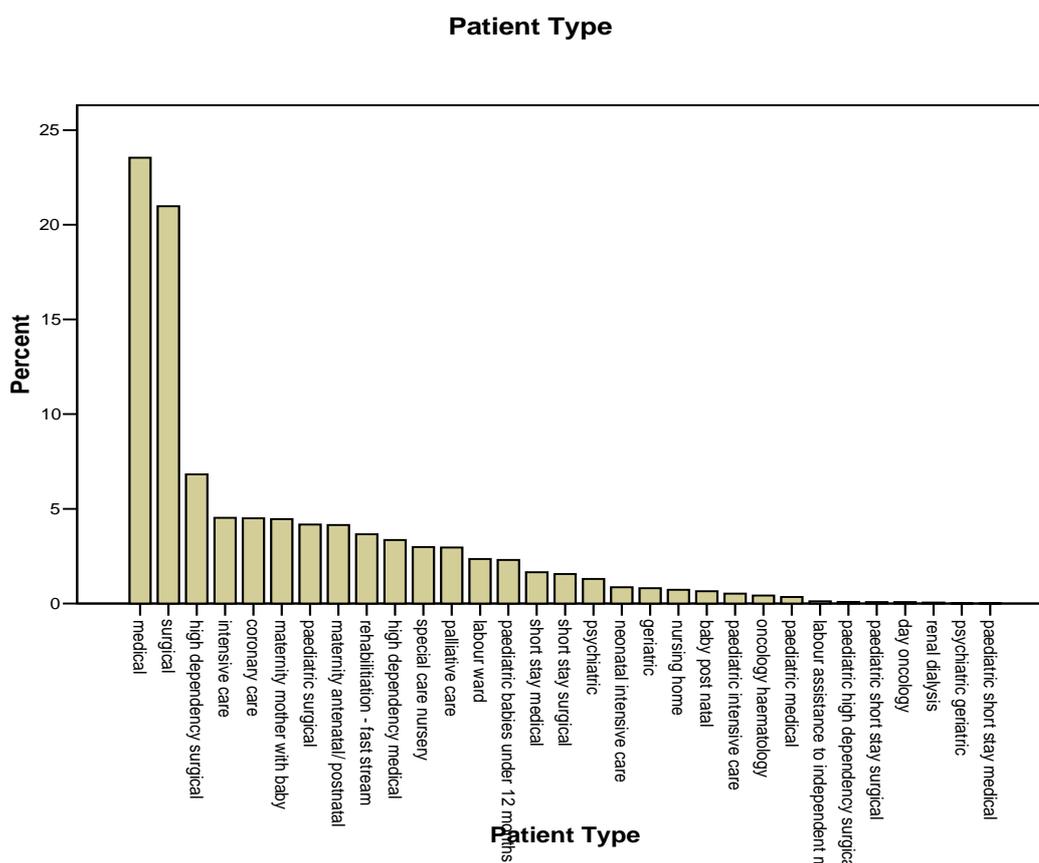
**Table 5.2 – Frequency by time data**

Both 2003 and 2004 data are included for each month and there is very little difference in frequency between the months. This indicates that the sample period was a stable occupancy period, thus fulfilling one of the key aims of the research design. As expected the frequency on morning shifts is the highest. It would be reasonable to assume that day cases account for the higher frequency of morning shift hours. The frequency for evening and night shift were almost the same. This indicated that for hospitals in the sample, occupancy did not change very much between these shifts.

The third group of frequency reports are those for patient and ward type. Ward types are used for classification of patient requirements for ratio practices. Figure 5.2, shows that medical/surgical wards are predominant, as would be expected. Patient types are used for classification of patient requirements for TrendCare. See Figure 5.3. This histogram also shows that medical and surgical patient types have the highest frequency in the data set, but in addition the histogram shows that high dependency medical, high dependency surgical and paediatric surgical patient types are frequently occurring patient type groups. It is interesting to note that in Figure 5.2 High Dependency Unit is an infrequently occurring ward type, despite being a high frequency patient type. Indeed there are not a lot of HDUs in the data set..



**Figure 5.2 - Frequency by ward type - Ratios**



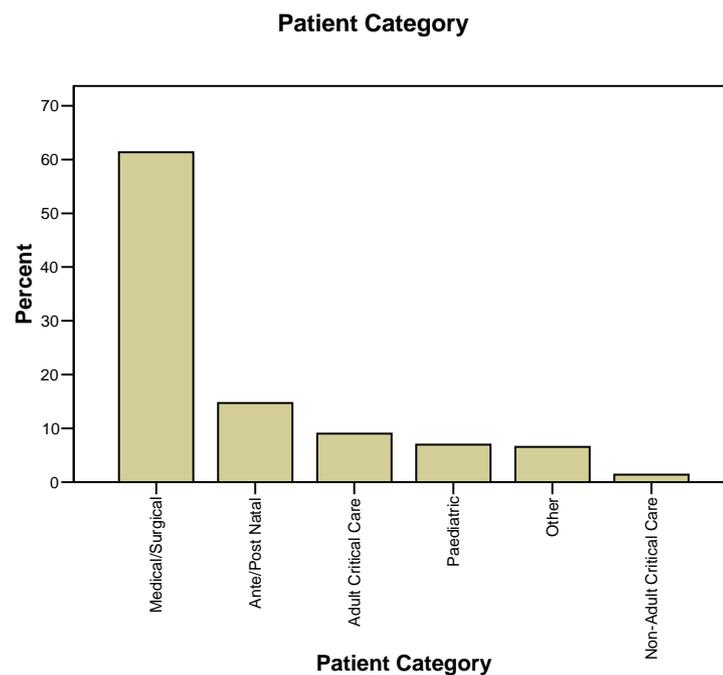
**Figure 5.3 - Frequency by patient type -TrendCare**

A study of these two histograms suggests that high dependency type patients are cared for in the wards in greater numbers than those numbers cared for in dedicated high dependency units. Under ratio practices, the admission of high dependency patients to general medical surgical wards would not usually result in an increase in the regular mandated ratio allocation for that ward. High dependency patient types will foreseeably increase in frequency with the increasing age and presence of co-morbidities in the in-patient population. The implications of this are discussed further in Chapter 6.

The two histograms also reveal that paediatric surgical patients are a significantly frequently occurring patient type, which has not been addressed under ratio allocation. There is no paediatric ward ratio allocation. The Royal Children's Hospital in Melbourne has a unique ratio formula under their EBA but this does not apply to

paediatric wards in other Victorian public hospitals. In this analysis, the only design decision possible was to map paediatric patient types to adult ward types for ratio equivalence or to remove the paediatric data. This limitation to the interpretation of the research findings is further discussed in Chapter 6.

Frequency by patient type category as aggregated by TrendCare patient category is shown in Figure 5.4. The frequency of medical/surgical category is 61.4%, paediatric 7%, ante/post natal 14.7%, adult critical care 9%, non-adult critical care 1.4% and other patient types category is 6.5%. Many of the inferential statistics are reported on these categories and it is important to note that non adult critical care has a relatively low frequency and represents just 1431 shifts of care.



**Figure 5.4 - Frequency by patient type category – results reporting category**

There was a greater than expected difference between the frequencies of ward type and patient type categories. This demonstrated that the label associated with ward type under ratio practices may not accurately reflect the range of nursing care needs of the range of patient types admitted to those wards, even when aggregated into reasonable and useful categories. This was not surprising since frequency by ward type reveals that 83% of the sample was medical surgical wards. This leaves only 17% of ward types which have an alternative ratio formula. By contrast medical surgical patient types account for just 63% of the shifts. That means that 20% of patients in medical surgical wards by ratio rules have another patient type classification in TrendCare. Further discussion of these findings is outlined in Chapter 6.

### 5.2.2 Central tendency and variation for actual hours

In Table 5.3, statistics for the reference or dependent variable, the actual in-patient hours and for the independent variables of ratio predicted hours and TrendCare predicted hours are summarised. The mean is a simple average of all actual or predicted in-patient hours. The standard deviation is the measure of the spread of the values observed across all hospitals in the sample (Forbes, 2005). Both the mean number of hours per shift and the spread or standard deviation is higher for ratio predicted hours than for either TrendCare predicted hours or actualized hours.

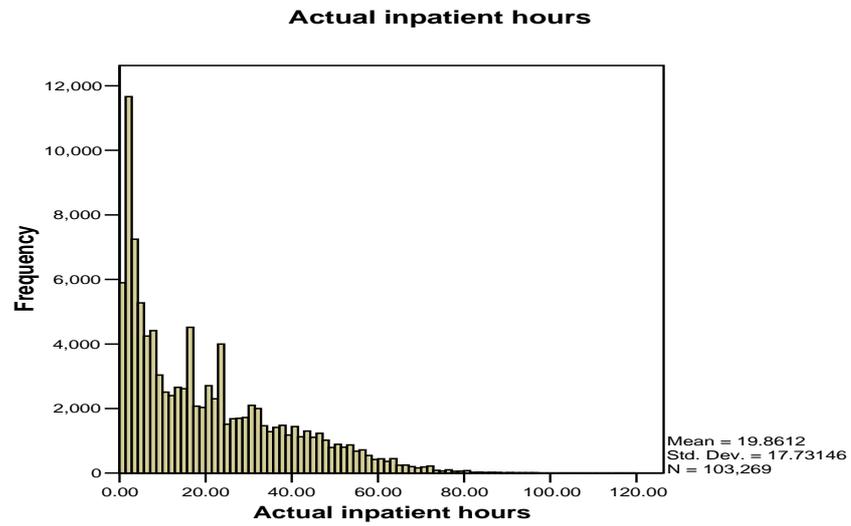
|                |       | Actual inpatient hours | Ratio predicted hours | TrendCare predicted hours |
|----------------|-------|------------------------|-----------------------|---------------------------|
| N              | Valid | 103269                 | 103269                | 103269                    |
| Mean           |       | 19.8612                | 20.2199               | 19.5528                   |
| Median         |       | 15.5000                | 13.0000               | 12.6667                   |
| Std. Deviation |       | 17.73146               | 19.86600              | 19.12870                  |
| Minimum        |       | .02                    | .18                   | .25                       |
| Maximum        |       | 120.00                 | 152.00                | 116.42                    |

**Table 5.3 – Overall mean & standard deviation for hours of care per patient shift**

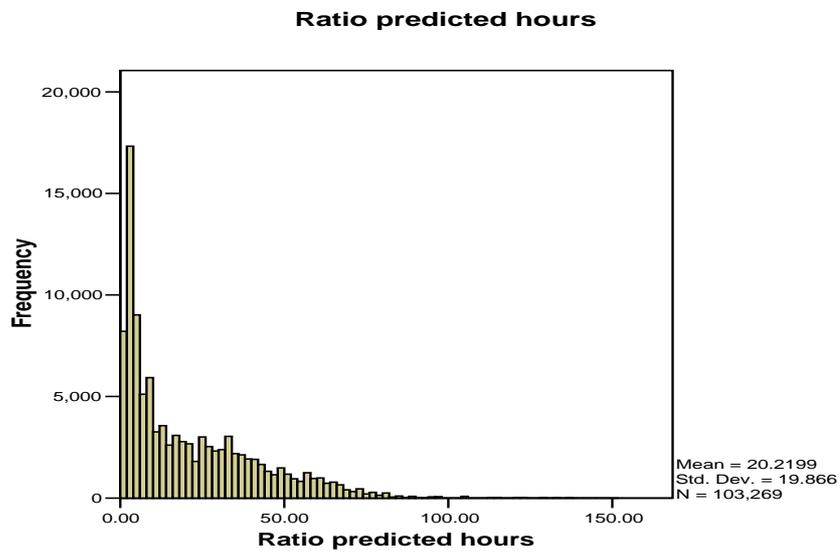
Statistical distribution is difficult to interpret but there is a lot of variation. Notice that ratio predicted hours are not as close to the actual hours as TrendCare predicted hours.

The mean and standard deviation of actual and predicted hours are shown in Figures 5.5 - 5.7 Actual hours, Ratio predicted hours and TrendCare predicted hours per shift. A positively skewed distribution of actual and predicted hours, rather than a normal distribution, has been the result in all the frequency histograms. In statistical terms, this means that there are a disproportionately high number of observations which have low values or low numbers of hours of care. In reality, this is not surprising because the distribution represents the expected high number of shifts of care for day case patients. This asymmetric distribution was expected given the trend to short stay nursing practices within Australia and New Zealand. There may be a different distribution pattern with other models of care in other countries, for example in Thailand, which is discussed in section 5.3.

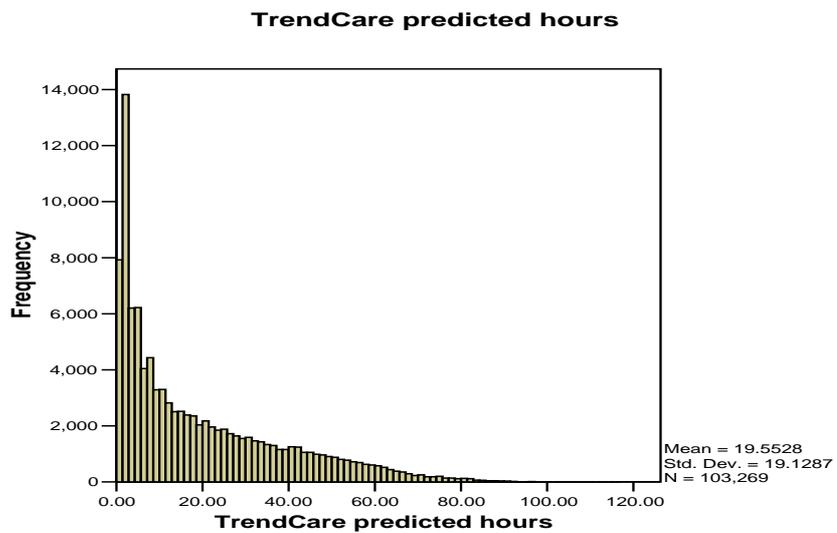
In the following histograms, the mean represents the average hours of care per shift for all hospitals, all wards and on all shift types for actualized, ratio predicted and TrendCare predicted hours. The mean was between 19.55 and 20.21 hours. The analysis revealed that ratios had the highest mean followed by actualized hours and TrendCare predicted hours. As expected the standard deviation is highest for ratios practices because the practice uses whole nurses and not hours of care. The rounding rule would effect this also, since rounding up occurs twice as often as rounding down, as discussed in the previous chapter.



**Figure 5.5 - Actual hours per shift**



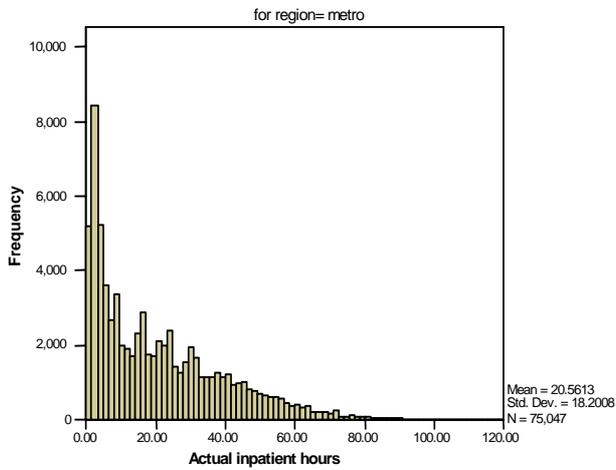
**Figure 5.6 - Ratio Predicted Hours per shift**



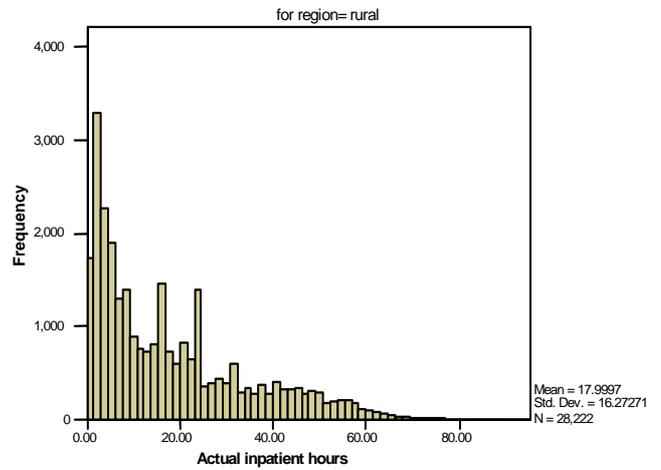
**Figure 5.7 – TrendCare Predicted Hours per shift**

Note: Vertical and horizontal axes are not always identical.

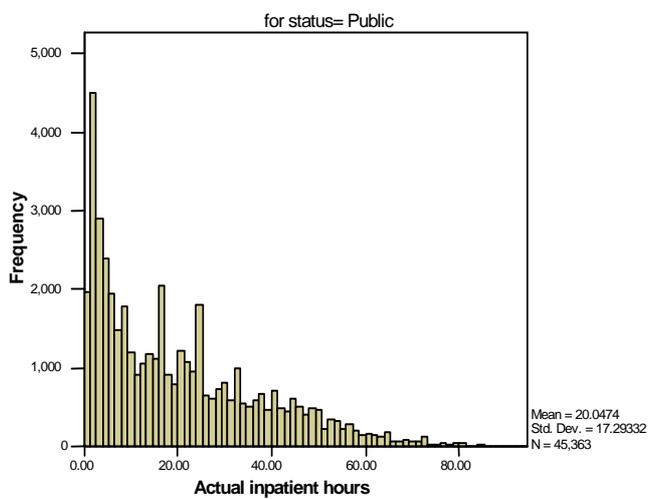
After determining the overall distribution, mean and standard deviation of the actualized and predicted hours by ratio and TrendCare, it was then considered useful to further split the data to describe the actualized hours of important subsets within the sample. This would help to understand if differences existed between the care actually provided according to groups of hospital, shift or patient variables. Figures 5.8 and 5.9 describe the differences in actualized hours of care between metropolitan and rural hospitals per shift. See also Figures 5.10 and 5.11 which describe the differences in actualized hours of care between public and private hospitals per shift.



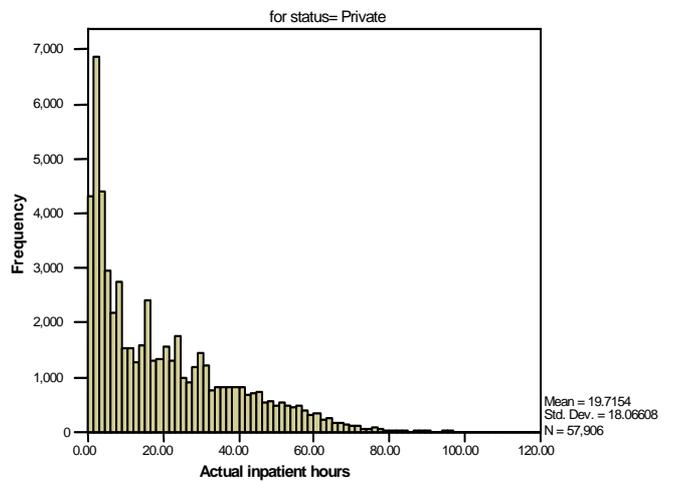
**Figure 5.8 – Actual hours per shift, metropolitan**



**Figure 5.9 – Actual hours per shift rural**



**Figure 5.10 – Actual hours per shift, public hospitals**



**Figure 5.11 – Actual hours per shift, private hospitals**

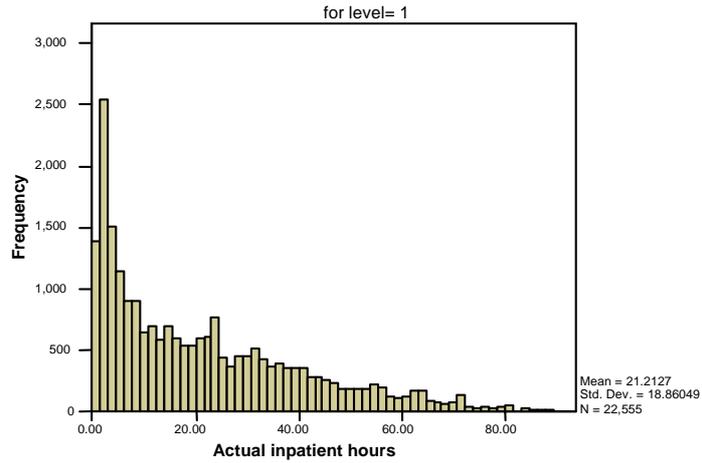
Note: Axes are not always identical.

In these results, the mean and standard deviation of metropolitan hospitals is higher than for rural hospitals. In public hospitals the mean is higher but the standard deviation is lower than for private hospitals. The result was initially surprising as I had anticipated more variability in public hospitals because the casemix is driven by the full range of public health requirements. In contrast, private hospitals can manipulate the casemix in two ways; by the providers and by default to those patients with private health insurance or the financial resources to self fund the episode of care. On reflection it is entirely logical that private hospitals will have more variable occupancy levels and more variable casemix because they essentially care for elective admissions although this pattern is changing with private Accident and Emergency and Critical Care Departments. The variability in casemix can be explained by higher numbers of day cases or low acuity patients, increasingly higher numbers of complex or high acuity patients and fewer patients of medium level acuity in convalescent care or waiting for transfer to other care facilities such as residential aged care, than public hospitals. Convalescent days require less actual hours of care and are likely to be more stable, i.e. less variable.

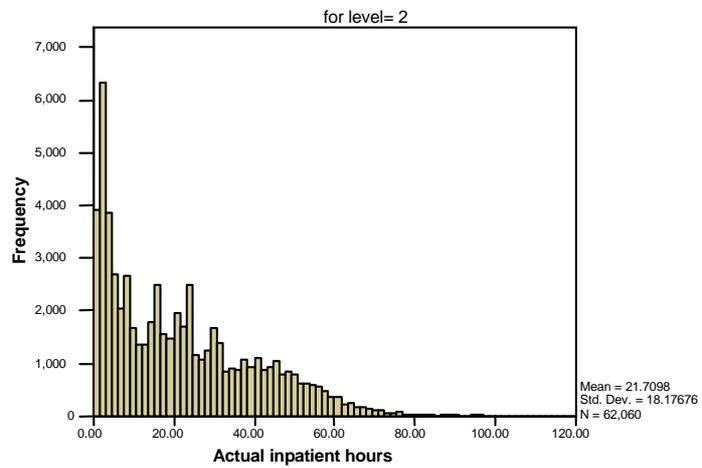
Actualized hours per shift according to hospital level are shown in Figures 5.12 - 5.14. The mean for level 2 hospitals was 21.71 slightly higher than for level 1 hospitals at 21.21 hours. Level 3 hospitals had a much lower mean at 12.08 hours. This result for the mean or average measure of acuity has significance when considering the Victorian public hospital ratio formula applied to level 1 and 2 hospitals. The formula allocates lower nurse patient ratios for level 1 hospitals than for level 2 hospitals, yet the results of this analysis indicate that the reverse is more likely to meet the needs of the patients. The significance is discussed in Chapter 6.

The standard deviation followed the expected trend of greatest for level 1 hospitals and lowest for level 3 hospitals. The assumption is that patients admitted to level 3 hospitals experience fewer high acuity days and more convalescent days.

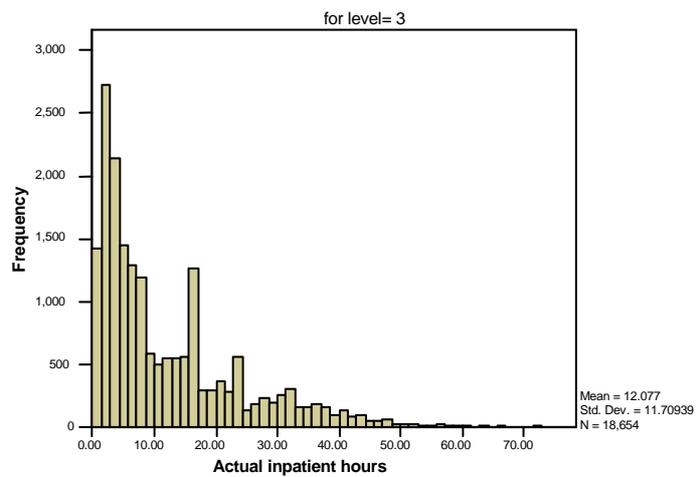
Convalescent days have lower mean hours of care and less variability which explains lower standard deviation.



**Figure 5.12 – Actual Hours per shift Level 1**



**Figure 5.13 – Actual Hours per shift Level 2**

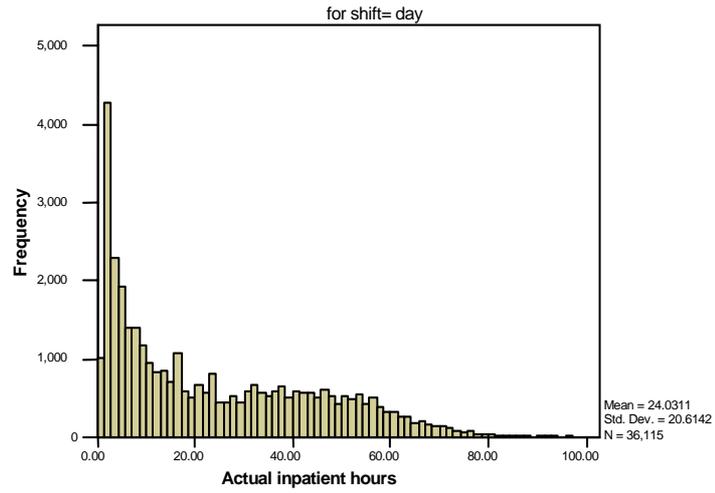


**Figure 5.14 – Actual Hours per shift Level 3**

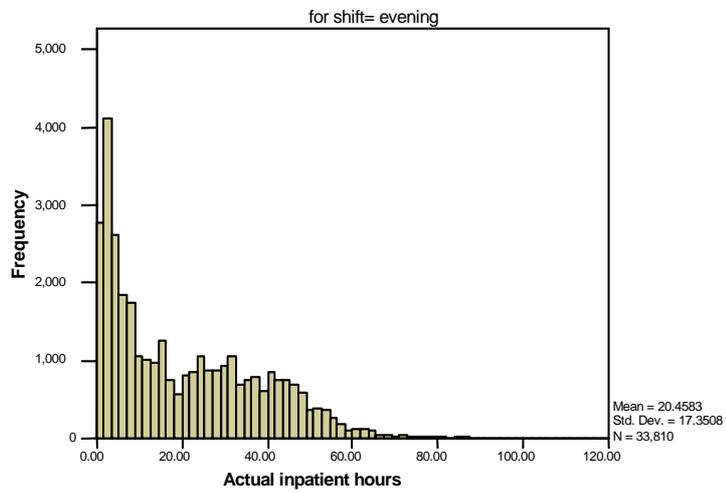
Note: Axes are not always identical.

Another important subset of the data is shift type. As expected, this analysis revealed that the mean actual hours were highest for day shift, less for evening shift and least for night shift. See Figures 5.15 – 5.17. This reflects what is already known about activity on each of these shifts. Day shift has the most meals and mini meals (morning and afternoon tea, supper) served, admissions and discharges, doctor's rounds, transfers to the operating room and other departments, visitors, enquiries, attendances to activities of daily living such as showers, toileting, patient buzzers to answer and dressings and medications. Day shift also has the greatest standard deviation. As Figures 5.28 - 5.39 demonstrate, the day shift has predictably higher actual hours. This suggests it would be easier to predict nursing resource requirements for this shift compared to evening and night shift which have lower, but less predictable requirements.

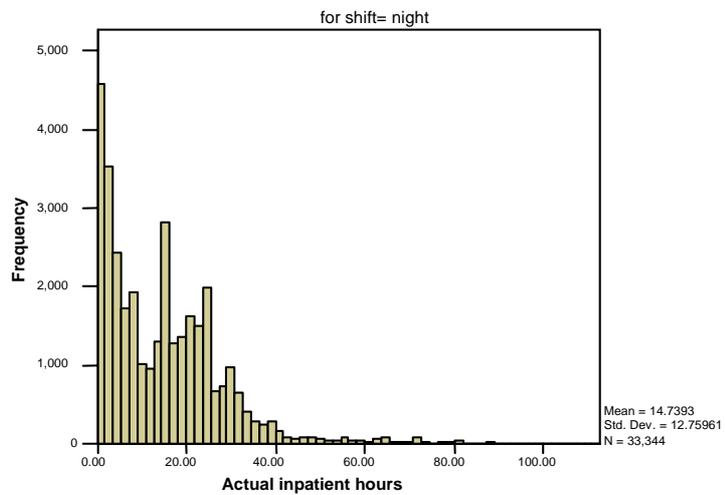
Night duty appeared to have several unusual peaks at 16, 24 and 32 hours when compared to the other shifts, see Figure 5.17. However, obvious peaks occurred at similar intervals for rural hospitals, in public hospitals and level 3 hospitals as shown in Figures 5.9, 5.10 and 5.14. These peaks could be explained by the hours which would be recorded for 2, 3, or 4 whole nurses in those settings. These expected peaks are discussed further in Chapter 6.



**Figure 5.15 - Actual hours-day shift**



**Figure 5.16 - Actual hours –evening shift**



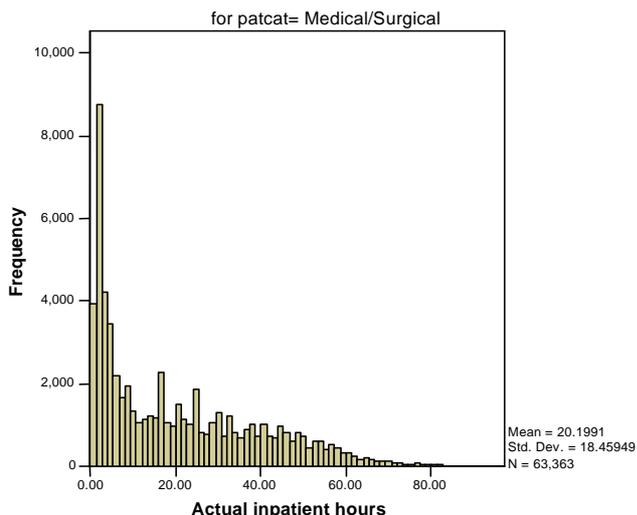
**Figure 5.17 - Actual hours –night shift**

Note: Axes are not always identical.

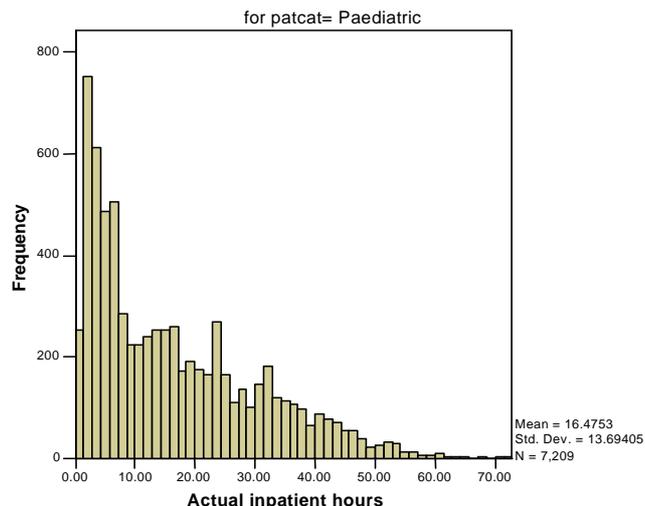
The next part of the analysis was conducted on actualized hours per shift for patient variables. See Figures 5.18 – 5.23. The histograms report by patient type categories for ease of reporting, but detailed patient type data is available directly from the researcher. There are differences as would be expected, particularly for the critical care patient type categories. The adult critical care mean hours is 23.95 but the non-adult critical care is very high at 33.37 which is the highest of the all patient type categories. The latter result is from a much smaller dataset as described earlier but it is significant because the result is much higher than the ‘other’ patient type category, which includes many dissimilar patient types and is 21.82.

The lowest mean actual hours are for ante/post natal which is 15.41. The least variable is also ante/post natal with a standard deviation of 13.37. This is a surprising result considering that this category has a significant mix of patient types, ranging from antenatal patients who are essentially self care and under observation, to those post-natal patients with complications and requiring full assistance with feeding.

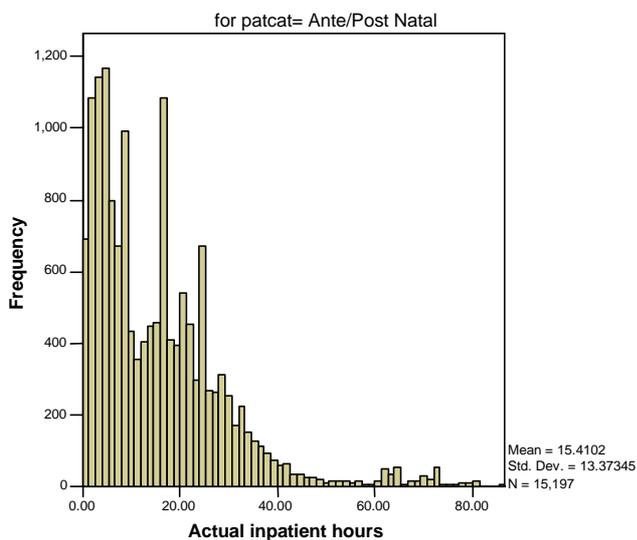
The mean and standard deviation for paediatric category are both significantly lower than for adult medical surgical which can be identified using TrendCare patient type categories. Under ratio practices, there is a limitation in that the paediatric patients would be mapped to adult ward equivalents and under that practice would be considered to have equivalent nursing requirements. It is clear from the histograms that in a sample of 7,209 paediatric shifts of care, the acuity and variability are significantly less than for adults. They may be over staffed under ratio practices which apply adult medical/surgical ward ratios but other influences such as minimum safe staffing level policies and the parents’ contribution to care may co-exist.



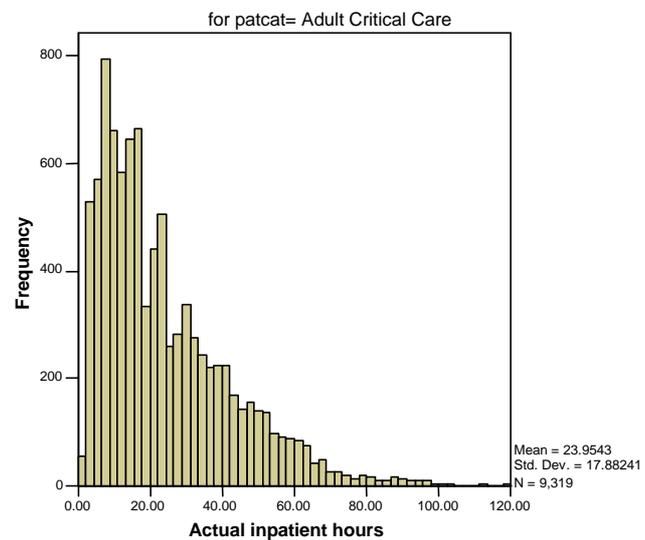
**Figure 5.18 Actual hours Medical/Surgical**



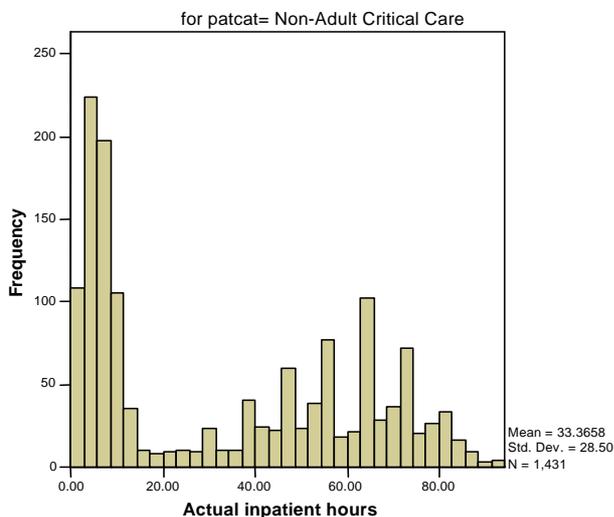
**Figure 5.19 Actual hours Paediatric**



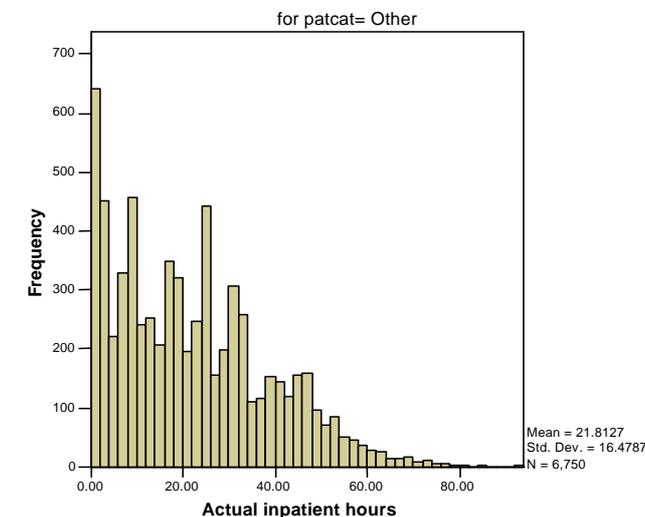
**Figure 5.20 Actual hours Ante/postnatal**



**Figure 5.21 Actual hours Adult Critical Care**



**Figure 5.22 Actual hours Non Adult Crit Care**



**Figure 5.23 Actual hours Other**

Note: Axes are not always identical

The results of the analysis of the actualized patient hours identified how the care that patients required varied according to various hospital, shift and patient variables. The variables which were not measured were actual hours by ward type as this would have required the measurement of ratios by a TrendCare measure; an interesting but pointless exercise. The results established a new understanding of the actualized hours.

### **5.2.3 Summary of descriptive statistics for outliers**

Finally, I report on the descriptive statistics for the 14 high outliers which were trimmed from the sample. These cases were excluded due to being over the 20 hour (1200 minutes) inclusion criteria. The 20 hour limit was set to exclude patients who required more care than that provided by specialising by 2 nurses for an entire shift. The 20 hour limit was based on the assumption that the longest shift was commonly 10 hours, as for many night shifts. It is acknowledged that some Intensive Care Units (ICU) operate with 12 hour shifts but only one of the outliers was from an ICU setting and the actualized hours were greater than 1440 minutes which would equal the time for care provided by two nurses for 12 hours.

All of the 14 shifts had significantly greater actualized hours than either TrendCare or ratios predicted. The actual hours ranged from, 3.73 times the TrendCare predicted hours, for shift 14, to 50 times the TrendCare predicted for shift 8. Similar results occurred for ratio predictions. There are two possible explanations for this. The first is that the records were in error. If in error, the cases should be trimmed. The second is that the patients experienced an unpredicted medical event, such as cardiac arrest or post partum haemorrhage, for which the care requirements were extremely high and could not have been predicted. These events, although not predictable, are a routine part of nursing care and the shifts should be included in the dataset. Few of this type of unpredicted medical event could be expected to require more than 2 nurses for an entire shift. In consideration of these two possible explanations, a decision was made

that the 14 cases had data which was more likely to have been recorded in error and they were excluded from the dataset. The details are provided in Table 5.4. Summary of outliers.

|       | Hospital         | Date        | Shift   | Ward Type        | Patient Type                  | No. Of Patient Shifts | TrendCare PND Required (mins) | Ratio Required (mins) | Actual inpat. Clinical (mins) |
|-------|------------------|-------------|---------|------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|
| 1     | Sydney Adventist | 02-AUG-2004 | day     | Medical/Surgical | short stay surgical           | 3                     | 225                           | 360                   | 9240                          |
| 2     | Sydney Adventist | 03-AUG-2004 | day     | Medical/Surgical | surgical                      | 2                     | 110                           | 240                   | 6544                          |
| 3     | Sydney Adventist | 28-JUL-2004 | day     | Medical/Surgical | short stay surgical           | 2                     | 110                           | 240                   | 6216                          |
| 4     | Mater Adults     | 07-MAY-2003 | day     | ICU              | intensive care                | 2                     | 1200                          | 960                   | 4485                          |
| 5     | Sydney Adventist | 29-JUN-2004 | evening | Medical/Surgical | short stay surgical           | 1                     | 45                            | 120                   | 3600                          |
| 6     | Sydney Adventist | 03-AUG-2004 | day     | Medical/Surgical | short stay surgical           | 1                     | 55                            | 120                   | 3272                          |
| 7     | Westmeade        | 28-JUN-2003 | evening | Ante/Postnatal   | maternity mother with baby    | 1                     | 55                            | 60                    | 2750                          |
| 8     | Ipswich          | 04-JUN-2003 | day     | Delivery Suite   | labour ward                   | 1                     | 120                           | 60                    | 1920                          |
| 9     | Westmeade        | 13-JUL-2003 | day     | Delivery Suite   | labour ward                   | 1                     | 270                           | 240                   | 1800                          |
| 10    | Calvary          | 03-JUN-2004 | evening | Delivery Suite   | maternity antenatal/postnatal | 1                     | 85                            | 80                    | 1760                          |
| 11    | Sydney Adventist | 08-MAY-2004 | night   | Delivery Suite   | labour ward                   | 1                     | 120                           | 60                    | 1740                          |
| 12    | Sydney Adventist | 21-MAY-2004 | night   | Delivery Suite   | labour ward                   | 1                     | 120                           | 60                    | 1680                          |
| 13    | Ipswich          | 14-AUG-2003 | day     | Delivery Suite   | labour ward                   | 1                     | 480                           | 60                    | 1652                          |
| 14    | Ipswich          | 19-AUG-2003 | day     | Delivery Suite   | maternity antenatal/postnatal | 1                     | 115                           | 120                   | 1651                          |
| Total | N                | 14          | 14      | 14               | 14                            | 14                    | 14                            | 14                    | 14                            |

**Table 5.4 - Summary of outliers**

### 5.3 Inferential statistics

The choice of statistical tests which were undertaken was concerned with parametric testing on data that had interval levels of measurement and non-parametric testing on data that had ordinal levels of measurement. The Pearson's  $r$  was suitable to test the difference in means (Forbes, 2004). There are also several non-parametric tests. Spearman rank order correlation was used to test for the existence of a relationship between two ordinal variables. The Chi-square test was suitable to measure the difference in distribution between two or more nominal variables. The Kruskal-Wallis (K-W) test was used to test the difference in HPPD for the hospitals in the Thailand subset (Forbes, 2004).

Confidence intervals are given to provide a range within which the true value is expected to lie, since the true value is not a single estimate (PSCU, 1995). The confidence interval is usually selected to be 95% probability of being right.

The evidence for or against a specific hypothesis is demonstrated by the  $p$  value.  $P$  values measure the strength of evidence against the null hypothesis. The  $p$  value is always between 0-1. The closer the value is to 0, the stronger the evidence. In this study, the probability of the predicted hours corresponding to the actual hours is measured.

The **unit of measurement** was a shift of care. A shift of care is the care provided during a morning, evening or night shift for each patient. With the exception of most day cases, each patient will usually receive three shifts of care in 24 hours. Nurses provide a shift of care to each patient in their care group.

However, the **unit of analysis** was the ward or unit. The design decision to report analysis by ward was entirely logical because this is an established boundary for nursing resources and the patient requirements. The decision was also supported by the custom and practice of hospital managers' understanding of a ward or group of

wards as a business unit. For a full understanding of those results, I begin with an overview of the first of the inferential statistical tests; correlation and cross tabulation.

### **5.3.1 Correlation and cross tabulation for ratio and TrendCare predicted hours**

The relationship between variables was measured to determine if changes in one variable were related to changes in another. In this section some relationships between pairs of variables are demonstrated. In the next section the relationship between three or more variables is demonstrated using regression. Correlation is a measure of the variation in the dependent variable, explained by 1 or more independent variables (PSCU, 1995). However, it is acknowledged that a relationship is not the same as cause and effect.

Correlation was used to test for a relationship between pairs of numerical variables (PSCU, 1995). These types of variables actually measure something, for example hours per patient day. Cross tabulation was used to test for a relationship between pairs of categorical variables. These types of variables are simply labels, for example patient type. Any association or correlation between the variable of interest or dependent variable, the actualized hours, and the independent variables was of interest. For this data, the independent variables were TrendCare predicted hours and ratio predicted hours.

Correlation was measured and is now reported using scatterplots and correlation matrices. The most significant feature in the results is the overall positive association between the variables. That means that there is a relationship between what both ratios and TrendCare predict and the actualized care provided. In other words, both practices do what they say they will do, most of the time. Both practices predict nursing resource requirements which are closely related to the patients' care requirements. The relationships were examined in the same groups as for the descriptive statistics. The analysis of the overall sample was followed by subsets of

interest by hospital shift and patient variables. The first reports are for hospital variables; see Tables 5.5 – 5.6, Correlation by hospital level and status for ratios and TrendCare. This is followed by correlation tests for shift and patient variables. See Figures 5.24 - 5.25. The scatterplots include 3 clouds of points colour coded by shift type; red is for day shift, green is for evening shift and blue is for night shift.

Spearman rank correlation was used for ordinal data and the Pearson correlation coefficient was used for interval data in this thesis. The Pearson correlation coefficient has a range of -1 to +1. When  $r = +1$ , there is perfect positive correlation, when  $r = -1$ , there is perfect negative correlation (Monash University, 2002). When  $r$  is around 0, this indicates an absence of any strong relationship between the variables (Monash University, 2002). In this thesis both ratios and TrendCare had a strong positive correlation which was close to 1 in all analyses. This is shown on the scatterplots by an upward trend to the right in a narrow cigar shape. More scattered observations indicate less correlation.

The coefficient of determination is  $r^2$ . It is the square of Pearson's co-efficient. This represents the amount of variation in one variable which is explained by variation in the other (Monash University, 2002). If  $r^2 = 1$  this would mean that all variations in one factor could be explained by the other. The practice with the highest  $r^2$  is the better model. In every analysis, TrendCare had the higher  $r^2$ . In the following correlation matrices, the Pearson co-efficient is significant for both ratios and TrendCare and can be located in the top right hand corner of each section of the Tables 5.5-5.6. For every variable, the correlation is greater for TrendCare by hospital level and status. For example for level 1 hospitals, the variability is explained by TrendCare 97.1% of the time and by ratios 87.6% of the time. Also for public hospitals, the variability is explained by TrendCare 96% of the time and by ratios 90% of the time. There is no variable in this group where the correlation is greater for ratios than for TrendCare.

| Hospital Level |                        |                     | Ratio predicted hours | TrendCare predicted hours |
|----------------|------------------------|---------------------|-----------------------|---------------------------|
| 1              | Actual inpatient hours | Pearson Correlation | .876(**)              | .971(**)                  |
|                |                        | Sig. (2-tailed)     | .000                  | .000                      |
|                |                        | N                   | 22555                 | 22555                     |
| 2              | Actual inpatient hours | Pearson Correlation | .927(**)              | .964(**)                  |
|                |                        | Sig. (2-tailed)     | .000                  | .000                      |
|                |                        | N                   | 62060                 | 62060                     |
| 3              | Actual inpatient hours | Pearson Correlation | .879(**)              | .931(**)                  |
|                |                        | Sig. (2-tailed)     | .000                  | .000                      |
|                |                        | N                   | 18654                 | 18654                     |

\*\* Correlation is significant at the 0.01 level (2-tailed).

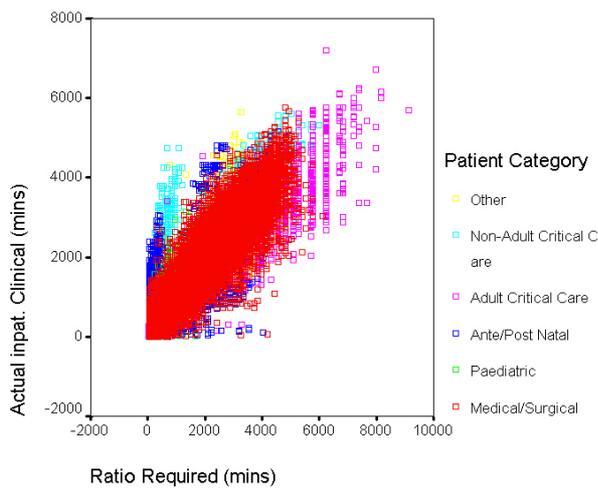
**Table 5.5 - Correlation by hospital level**

| Hospital status |                        |                     | Ratio predicted hours | TrendCare predicted hours |
|-----------------|------------------------|---------------------|-----------------------|---------------------------|
| Public          | Actual inpatient hours | Pearson Correlation | .900(**)              | .960(**)                  |
|                 |                        | Sig. (2-tailed)     | .000                  | .000                      |
|                 |                        | N                   | 45363                 | 45363                     |
| Private         | Actual inpatient hours | Pearson Correlation | .934(**)              | .969(**)                  |
|                 |                        | Sig. (2-tailed)     | .000                  | .000                      |
|                 |                        | N                   | 57906                 | 57906                     |

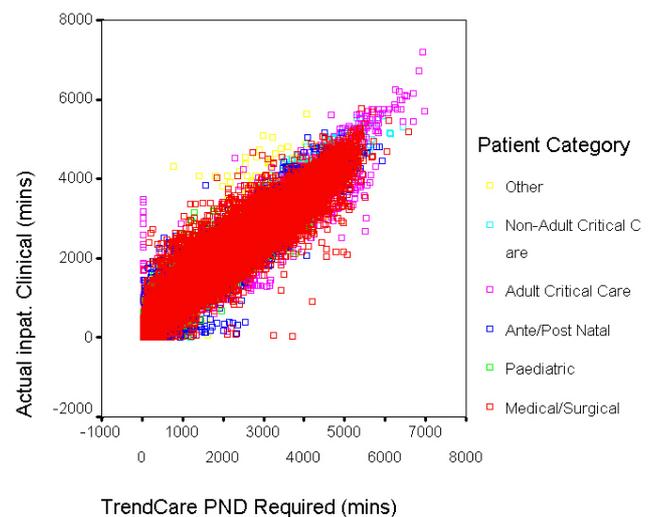
\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 5.6 - Correlation by hospital status**

The next group of variables for analysis was the overall correlation by patient type categories. A scatterplot of actual hours (vertical axis) against predicted hours (horizontal axis) is reported in Figures 5.24 and 5.25. The scatterplots record patient types by various colours with red reflecting the medical/surgical category. This category appears to be the most dominant because it reflects the highest number of shifts and also because red is on top. Other categories are concealed underneath except where they fall outside the main correlation cloud. The test shows greater correlation between TrendCare and the actualized care than there is for ratios by patient type category because there is less spread of the cloud of points. For ratios there is most variation in ante/postnatal and the critical care categories.



**Figure 5.24 - Ratio Correlation, patient type category**



**Figure 5.25 – TrendCare Correlation, patient type category**

On the following pages the results are reported as scatterplots of actual hours per patient shift by ratio hours per patient shift and TrendCare hours per patient shifts. The first scatterplot is a correlation by ratios by patient type for a subset of 4 hospitals. The subset was used to identify correlation between predicted and actualized hours of care by patient type. These patient types are from the range of 41 TrendCare types as opposed to the six TrendCare patient type categories reported

through most of this thesis. The subset was used for a preliminary explanation of any relationship, using a smaller number of shifts of care and patient types. The hospitals in this subset are Wakefield, Mater Mothers' Hospital, Mater Private and Ascot Hospital. The number of shifts of care is 19,181. See Figure 5.26.

The vertical columns are a feature of ratio scatterplots because they reflect whole nurses rather than a spread of hours as is seen in the TrendCare scatterplots. Ratios predict best for medical/surgical patient types and least well for labour ward, antenatal/postnatal patients, ICU and coronary care. The next scatterplot is a correlation by TrendCare by patient type for the same subset of 4 hospitals. See Figure 5.27. TrendCare predicts best for medical/surgical patients and least well for antenatal/postnatal patients for this subset.

Scatterplots for 41 patient types for the 21 hospitals in the sample are not reported in this thesis due to the volume of reports. It was considered more useful to report by the 6 patient type categories. Reports by patient type category on the following 3 pages relate to all shifts in the sample. See Figures 5.28 - 5.39.

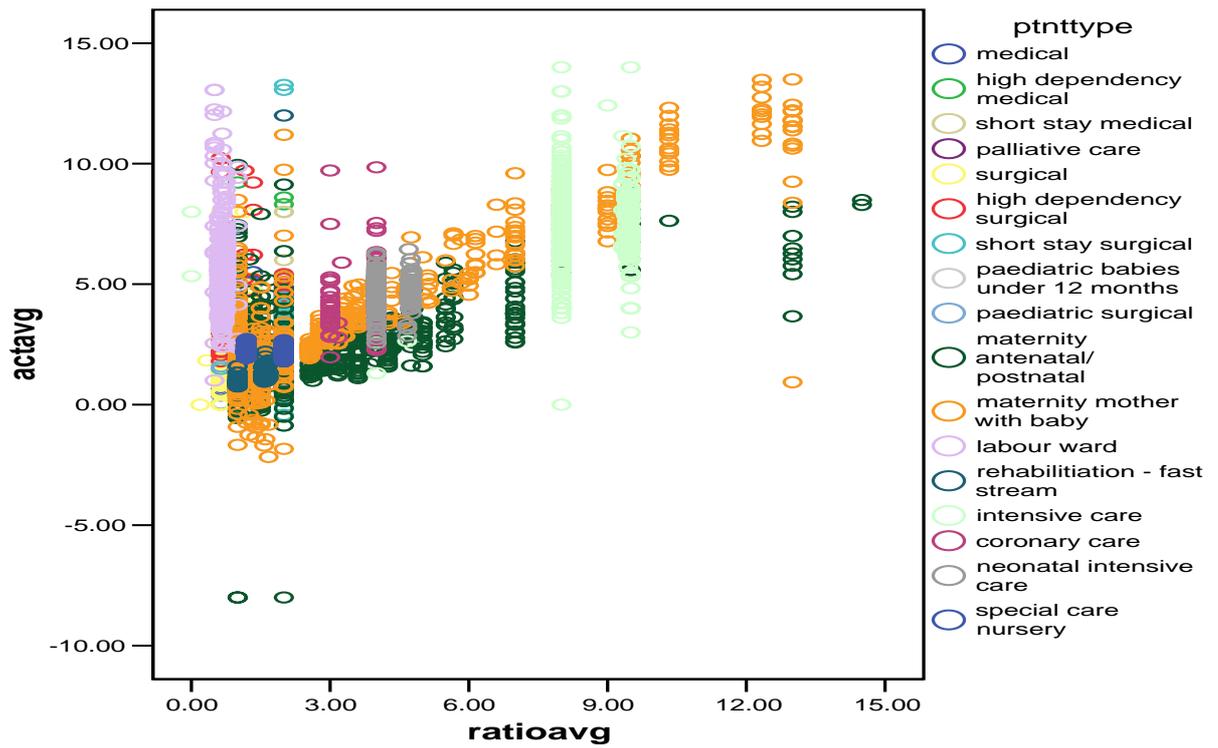


Figure 5.26 – Ratio Correlation by patient type

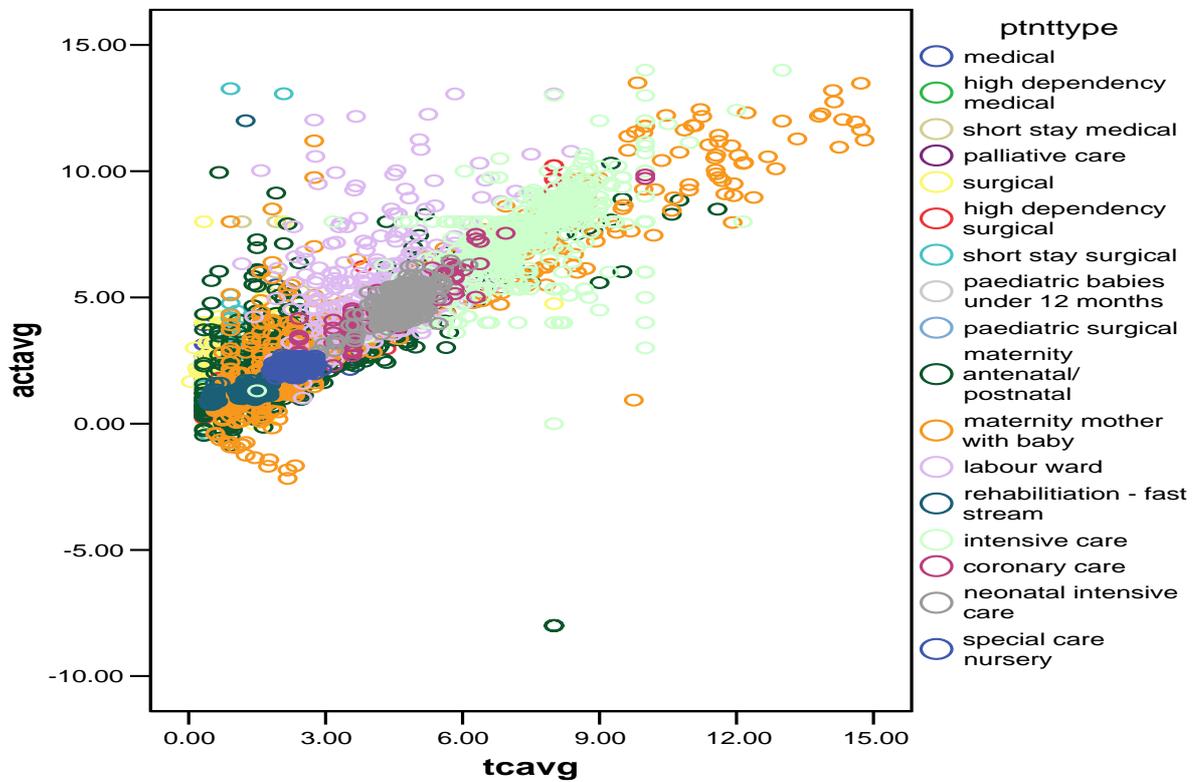
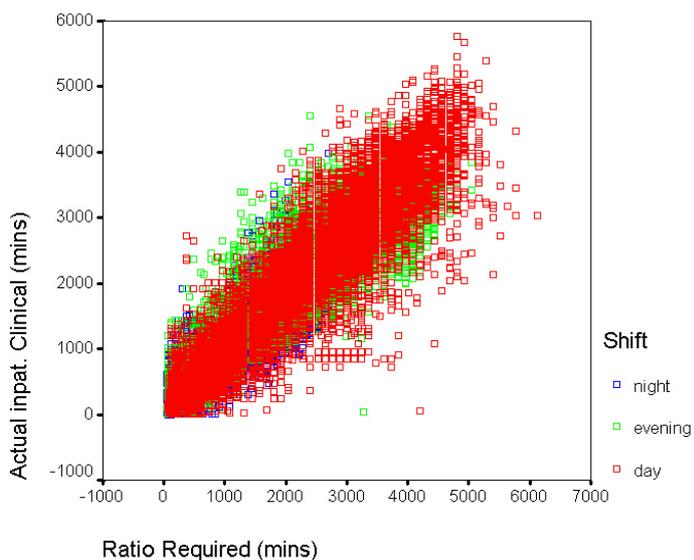
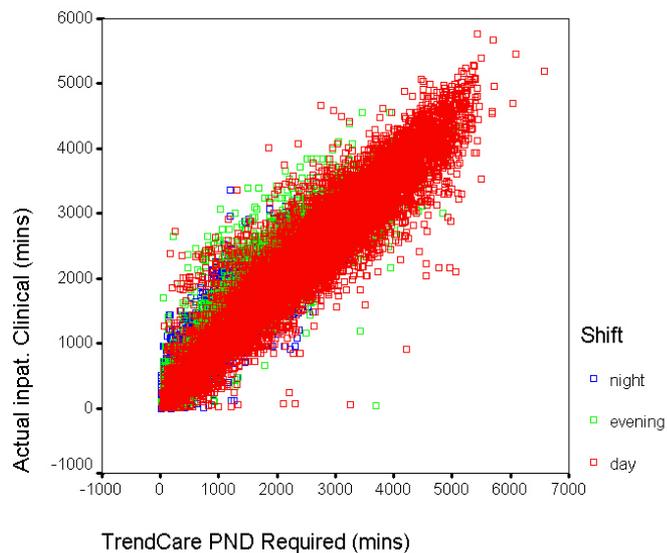


Figure 5.27 - TrendCare Correlation by patient type

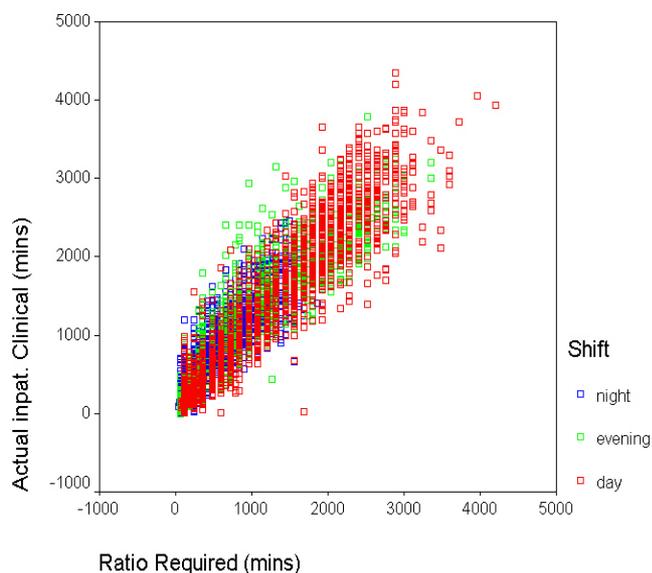


**Figure 5.28 - Ratio**

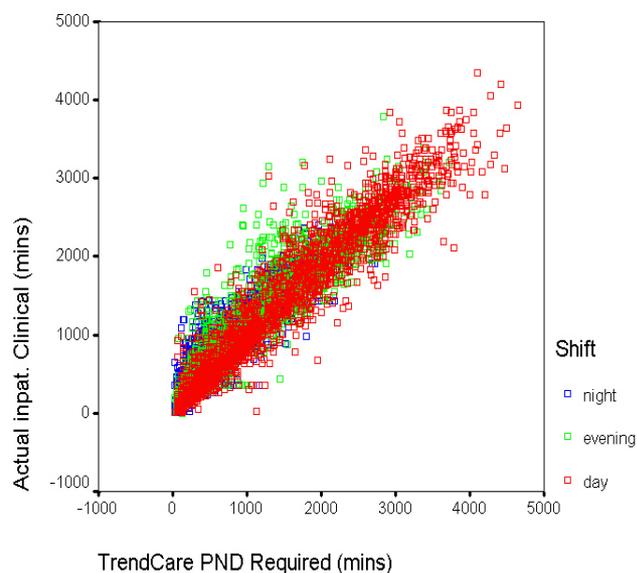


**Figure 5.29 - TrendCare**

**Correlation for patient category 1: Medical/Surgical**

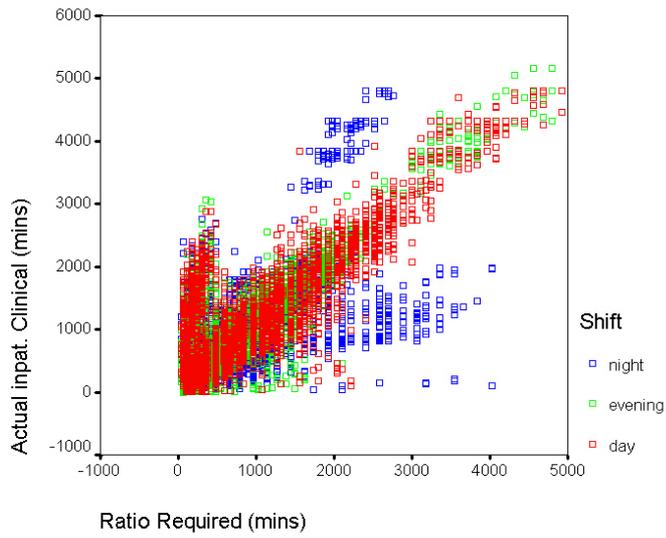


**Figure 5.30 - Ratio**

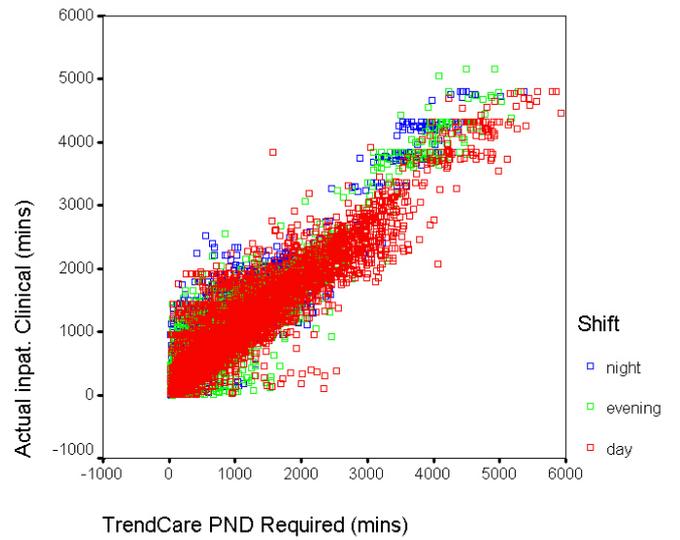


**Figure 5.31 - TrendCare**

**Correlation for patient category 2: Paediatric**

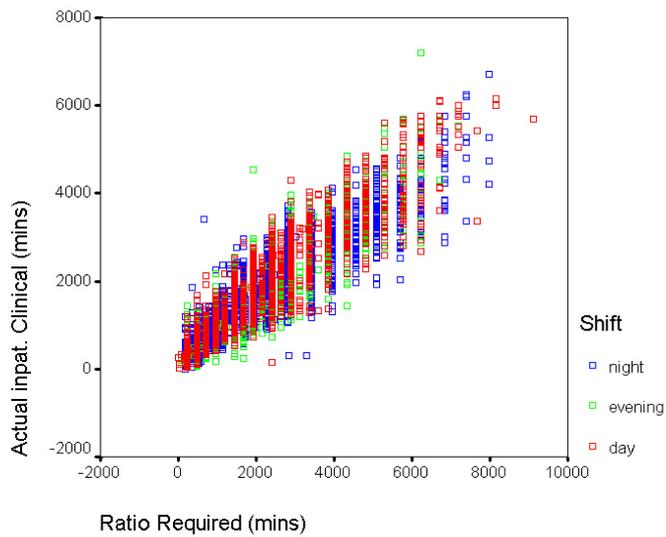


**Figure 5.32 - Ratio**

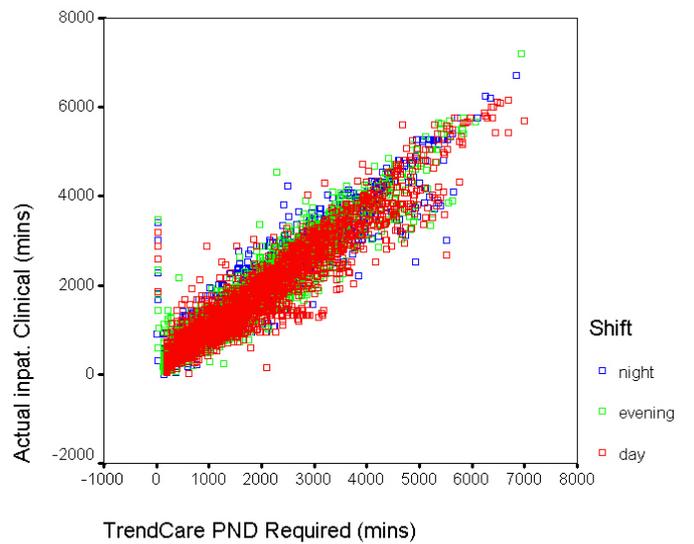


**Figure 5.33 - TrendCare**

**Correlation for patient category 3: Ante/postnatal**



**Figure 5.34 - Ratio**



**Figure 5.35 - TrendCare**

**Correlation for patient category 4: Adult Critical Care**

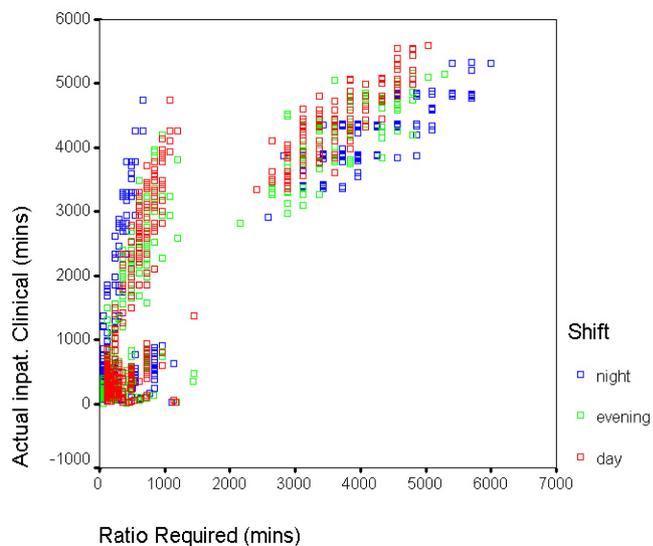


Figure 5.36 - Ratio

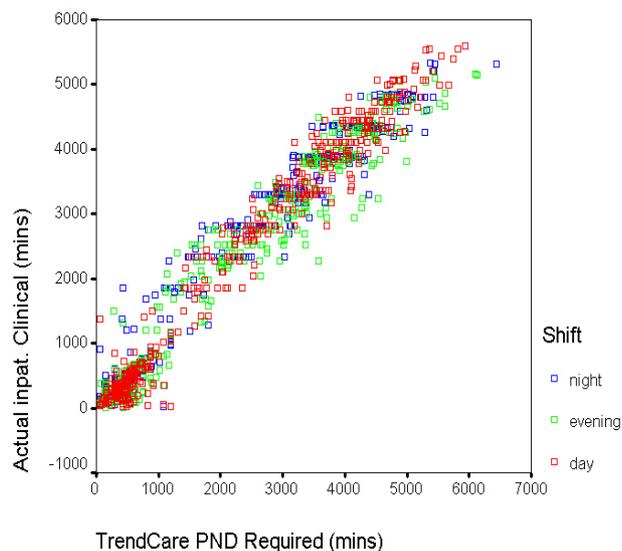


Figure 5.37 - TrendCare

**Correlation for patient category 5: Non-Adult Critical Care**

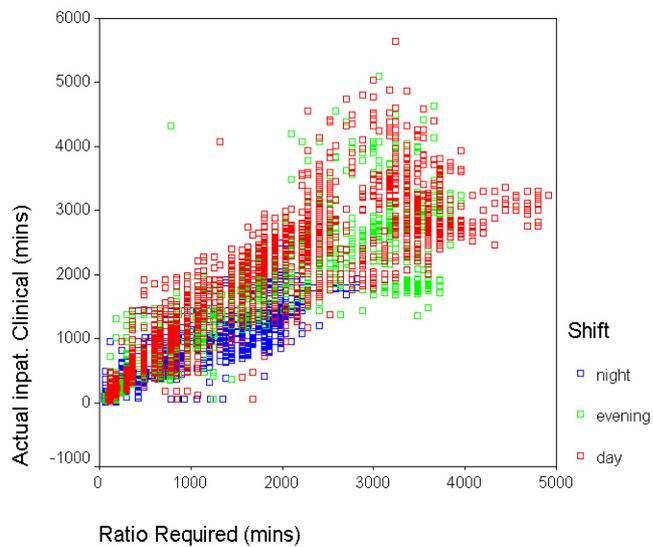


Figure 5.38 - Ratio

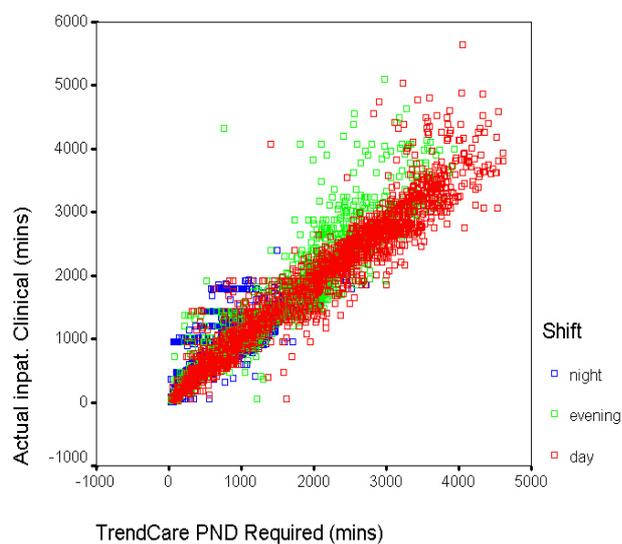


Figure 5.39 - TrendCare

**Correlation for patient category 6: Other**

From Figures 5.26 - 5.39 it is clear that there is a higher correlation between predicted and actual hours for TrendCare than for ratios, in every patient type category. Night shift observations tend to fall much further from the centre of the cloud of points for the antenatal/postnatal patient type category by ratios. The night shift is both under and over predicted by ratios, indicating that this shift is likely to be an important variable for this patient type category, for more formal analysis in the future.

### **5.3.2 Statistical artifact**

The vertical columns in the ratio correlation scatterplots may simply be statistical artifact of ratios. In the scatterplots presented, ratios require whole nurses by occupancy and not dependency. In short, if the patient is admitted to the care of a nurse with nurse patient ratio of 1:4, the patient is theoretically allocated 25% of the nurse's time under the Victorian public hospital model. There will be poor correlation where the dependency is either much higher or much lower than the average of the 4 patients (or whatever ratios apply). The artifact is in the visual presentation of the data and not necessarily with the statistics. Further analysis of the data was undertaken.

### **5.3.3 Multiple Regression – all shifts, Australia & New Zealand**

Multiple regression is a method of describing the relative degree of contribution of a series of variables. In this way regression could be used to predict care requirements in the future by variable and the information can be used rather than simply identifying an association. This is presented by scatterplots using multiple linear regression. Multiple regressions were used in this thesis, to control for ward type, hospital type and shift type.

In this thesis, several independent variables are used for prediction of the variability and the resulting statistic is the multiple correlation co-efficient (Polit et al, 2001). A measure of the fit of the regression model is the 'r Square' value, the 'adjusted r

square'. It can be interpreted as the proportion of variation in actual hours that can be explained by either ratios or the TrendCare prediction.

Regression analysis by shift type is shown in Tables 5.7 - 5.10. Regression analysis by hospital type is shown in Tables 5.11 - 5.14 and patient types in Figures 5.40 and 5.41 and Tables 5.17 - 5.18.

| Shift   | Model |                       | Unstandardized Coefficients |            | Standardized Coefficients | t       | Sig. | 95% Confidence Interval for B |             |
|---------|-------|-----------------------|-----------------------------|------------|---------------------------|---------|------|-------------------------------|-------------|
|         |       |                       | B                           | Std. Error | Beta                      |         |      | Lower Bound                   | Upper Bound |
| day     | 1     | (Constant)            | 3.117                       | .057       |                           | 54.766  | .000 | 3.005                         | 3.228       |
|         |       | Ratio predicted hours | .858                        | .002       | .935                      | 499.699 | .000 | .855                          | .862        |
| evening | 1     | (Constant)            | 3.843                       | .055       |                           | 69.366  | .000 | 3.734                         | 3.951       |
|         |       | Ratio predicted hours | .806                        | .002       | .914                      | 414.678 | .000 | .803                          | .810        |
| night   | 1     | (Constant)            | 4.092                       | .052       |                           | 78.045  | .000 | 3.989                         | 4.195       |
|         |       | Ratio predicted hours | .694                        | .002       | .845                      | 289.066 | .000 | .690                          | .699        |

A Dependent Variable: Actual inpatient hours

**Table 5.7 – Coefficients, all shifts by shift type - Ratio**

| Shift   | Model | R       | R Square | Adjusted R Square |
|---------|-------|---------|----------|-------------------|
| day     | 1     | .935(a) | .874     | .874              |
| evening | 1     | .914(a) | .836     | .836              |
| night   | 1     | .845(a) | .715     | .715              |

A Predictors: (Constant), Ratio predicted hours

**Table 5.8 – Model Summary, all shifts by shift type - Ratio**

| Shift   | Model |                           | Unstandardized Coefficients |            | Standardized Coefficients | t       | Sig. | 95% Confidence Interval for B |             |
|---------|-------|---------------------------|-----------------------------|------------|---------------------------|---------|------|-------------------------------|-------------|
|         |       |                           | B                           | Std. Error | Beta                      |         |      | Lower Bound                   | Upper Bound |
| day     | 1     | (Constant)                | 1.496                       | .039       |                           | 38.741  | .000 | 1.420                         | 1.572       |
|         |       | TrendCare predicted hours | .887                        | .001       | .972                      | 780.706 | .000 | .885                          | .889        |
| evening | 1     | (Constant)                | 1.982                       | .036       |                           | 54.334  | .000 | 1.910                         | 2.053       |
|         |       | TrendCare predicted hours | .924                        | .001       | .966                      | 683.908 | .000 | .921                          | .926        |
| night   | 1     | (Constant)                | 2.790                       | .034       |                           | 83.099  | .000 | 2.724                         | 2.856       |
|         |       | TrendCare predicted hours | .936                        | .002       | .940                      | 504.328 | .000 | .933                          | .940        |

A Dependent Variable: Actual inpatient hours

**Table 5.9 – Coefficients, all shifts by shift type - TrendCare**

| Shift   | Model | R       | R Square | Adjusted R Square |
|---------|-------|---------|----------|-------------------|
| day     | 1     | .972(a) | .944     | .944              |
| evening | 1     | .966(a) | .933     | .933              |
| night   | 1     | .940(a) | .884     | .884              |

A Predictors: (Constant), TrendCare predicted hours

**Table 5.10 – Model summary, all shifts by shift type - TrendCare**

From these analyses, it can be determined from the adjusted R square values, that TrendCare predicts a greater proportion of variation in actual care requirements than ratios, for each shift type. For example, TrendCare predicts the variability for day shifts 94.4% of the time compared to 87.4% of the time for ratios. Also TrendCare predicts the variability for evening shifts 93.3% of the time compared to 83.6% for ratios. The difference is even greater on night duty, as is seen in Tables 5.8 and 5.10. From these results, it is clear that for all shift types there is less prediction accuracy for ratios than for TrendCare. It is also clear that evening and night shifts have less prediction accuracy than day shift for both practices. Evening and night shifts attract penalty rates for nurses' wages and the implications of having least predictability on the highest cost shifts are discussed in Chapter 6.

Regression by the group of hospital variables is reported next, beginning with hospital level. See Table 5.11, ratio and TrendCare model summaries. The model summaries are reported, but the co-efficients are not, due to the volume of results. All confidence intervals were 95%.

| Hospital Level | Model | Ratio R | Ratio R Square | Ratio Adjusted R Square | TrendCare R | TrendCare R Square | TrendCare Adjusted R Square |
|----------------|-------|---------|----------------|-------------------------|-------------|--------------------|-----------------------------|
| 1              | 1     | .876(a) | .767           | .767                    | .971(a)     | .943               | .943                        |
| 2              | 1     | .927(a) | .859           | .859                    | .964(a)     | .929               | .929                        |
| 3              | 1     | .879(a) | .772           | .772                    | .931(a)     | .867               | .867                        |

A Predictors: (Constant), TrendCare predicted hours

**Table 5.11 – Model summary - All shifts by hospital level**

From these analyses, it can be determined from the adjusted R square values, that TrendCare predicts a greater proportion of the variation in actual care requirements for each hospital level. For example, TrendCare predicts the variability for level 1 hospitals 94.3% of the time compared to 76.7 % of the time for ratios. Also TrendCare predicts the variability for level 2 hospitals 92.9 % of the time compared to 85.9 % of the time for ratios. There is a similar trend in the results for analyses by hospital status, country and region. See Table 5.12. TrendCare predicts more of the variability for both public and private hospitals, for Australian and New Zealand hospitals and for metropolitan and rural hospitals than ratio practices. Notice that the ratio results demonstrate that ratio practices predict more of the variability in New Zealand hospitals compared to Australian hospitals; private hospitals compared to public hospitals and rural hospitals compared to metropolitan hospitals. This is an interesting result considering Victorian public metropolitan hospitals are predicted least well by ratios but nurses at those hospitals are apparently most satisfied with the ratio agreement.

| Variable    | Model | Ratio R | Ratio R Square | Ratio Adjusted R Square | TrendCare R | TrendCare R Square | TrendCare Adjusted R Square |
|-------------|-------|---------|----------------|-------------------------|-------------|--------------------|-----------------------------|
| Public      | 1     | .900(a) | .810           | .810                    | .960(a)     | .921               | .921                        |
| Private     | 1     | .934(a) | .872           | .872                    | .969(a)     | .939               | .939                        |
| Australia   | 1     | .913(a) | .833           | .833                    | .970(a)     | .941               | .941                        |
| New Zealand | 1     | .923(a) | .851           | .851                    | .951(a)     | .905               | .905                        |
| metro       | 1     | .912(a) | .831           | .831                    | .969(a)     | .938               | .938                        |
| rural       | 1     | .922(a) | .851           | .851                    | .952(a)     | .906               | .906                        |

a Predictors: (Constant), TrendCare predicted hours

**Table 5.12 – Model summary - All shifts by Status, Country & Region**

Regression analysis was conducted for shifts which were comparable to the majority of shifts in Victorian public hospitals. This subset was known as the most common shift profile. The profile was Australian public hospitals, level 2, medical/surgical ward, for a morning shift. There were 8664 shifts of care in the most common shift profile subset representing just over 8% of the total. The results were split by metropolitan and rural region. See Table 5.13. The shifts were approximately evenly spread with slightly more in the rural region. A summary of regression analysis for both ratio and TrendCare predicted and actual hours for the most common profile is reported in Table 5.14.

|       |       | Frequency | Percent |
|-------|-------|-----------|---------|
| Valid | metro | 4023      | 46.4    |
|       | rural | 4641      | 53.6    |
|       | Total | 8664      | 100.0   |

**Table 5.13 – Frequency, most common profile shifts by region**

| Region | Mode | Ratio R | Ratio R Square | Ratio Adjusted R Square | TrendCare R | TrendCare R Square | TrendCare Adjusted R Square |
|--------|------|---------|----------------|-------------------------|-------------|--------------------|-----------------------------|
| metro  | 1    | .956(a) | .914           | .914                    | .976(a)     | .953               | .953                        |
| rural  | 1    | .972(a) | .944           | .944                    | .984(a)     | .968               | .968                        |

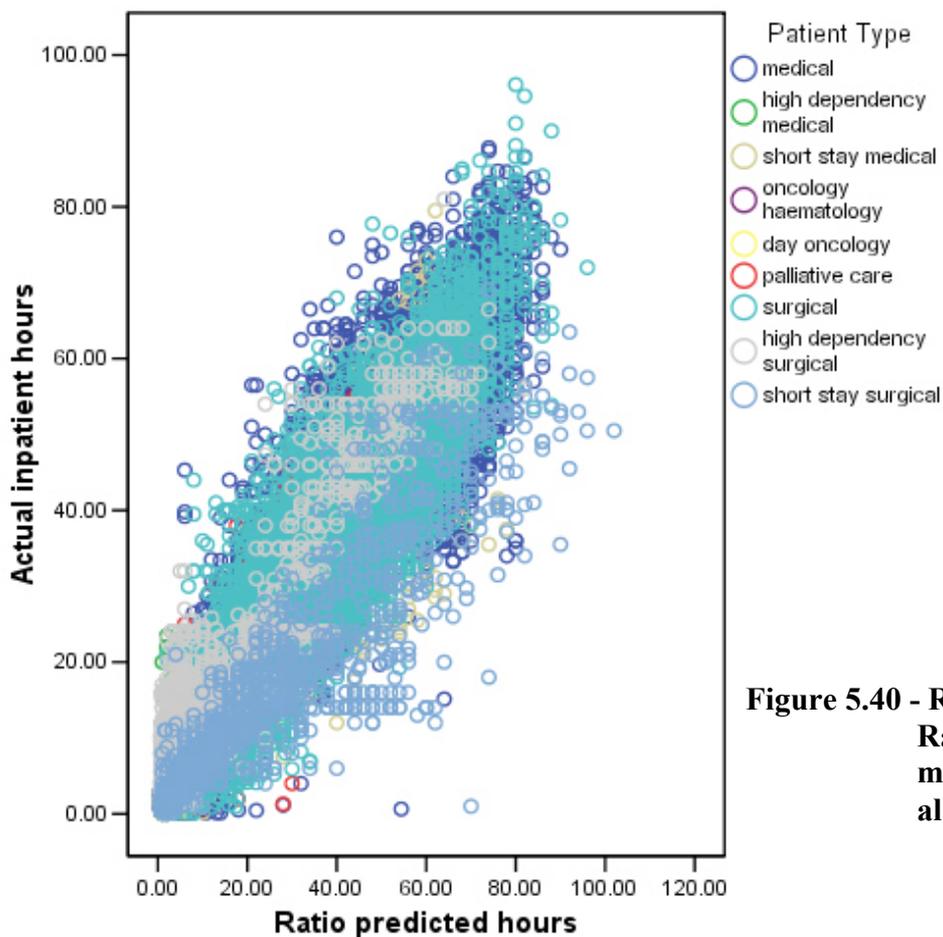
**Table 5.14 – Model summary - Most common profile shifts by region**

For the most common profile of shifts TrendCare predicts more of the variability in both metropolitan and rural settings. This means that TrendCare is likely to better predict the requirements for the majority of shifts in Victorian public hospitals, than ratio practices. Both practices explain a greater proportion of variation in actual care requirements in rural hospitals than for metropolitan hospitals.

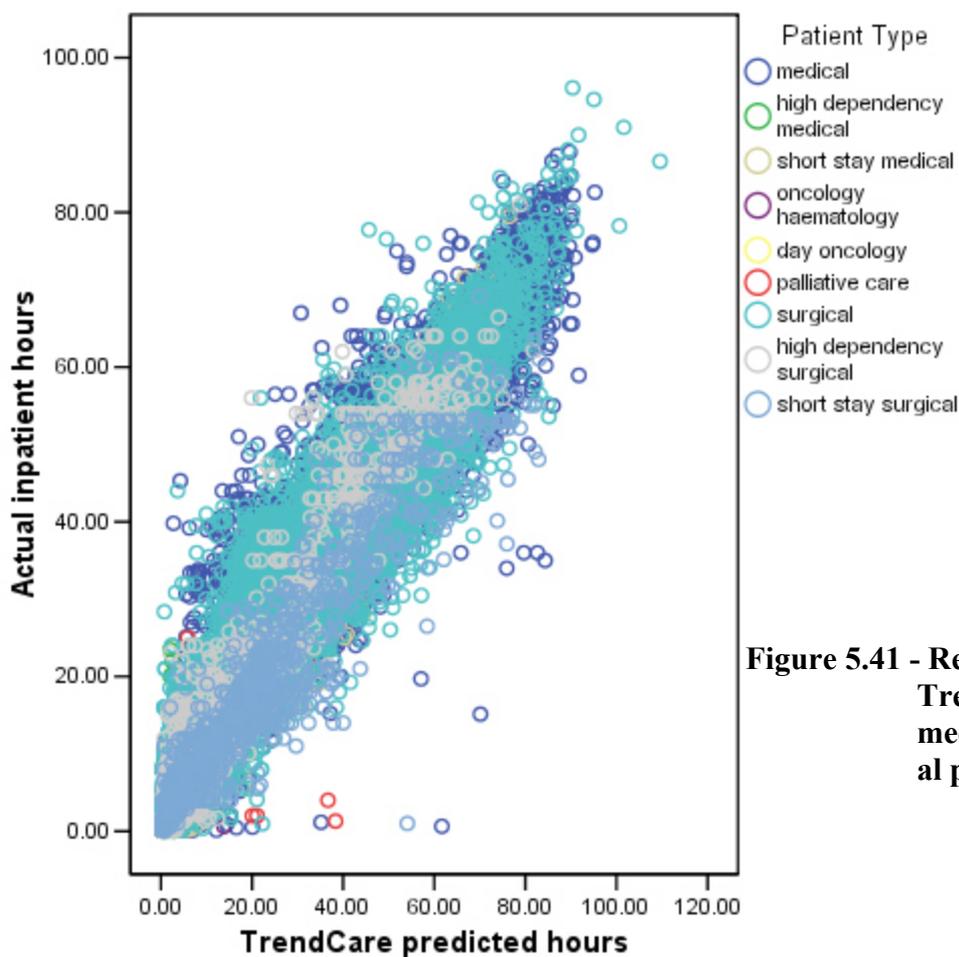
On the following page regression analysis is reported for the most frequently occurring patient type category – medical/surgical category. Within this category are 9 TrendCare patient types as described in Chapter 4. The 9 patient types are all the types that comprise the medical surgical category as derived for the purposes of this thesis to simplify reporting. A scatterplot was used to demonstrate regression for the various patient types as colour coded. The first scatterplot is regression for ratio predicted hours and actualized hours for medical/ surgical patient type. The second scatterplot is for TrendCare. See Figures 5.40 and 5.41. Ratio and TrendCare predicted hours by medical/surgical patient types.

The results in the regression scatterplots for medical/surgical patient type category show high proportions of variation in actual care requirements explained by both ratios and TrendCare. Once again, higher proportions are explained by TrendCare. Ratios predict least well for medical and short stay surgical patient types where some observation points fall outside the main cloud of points, both under and over

predicting the requirements. TrendCare predicts least well for medical patients although prediction is generally more accurate compared to ratios.



**Figure 5.40 - Regression, Ratios by medical/surgical patient type**



**Figure 5.41 - Regression, TrendCare by medical/surgical patient type**

The correlation between ratio predicted hours and actual hours for medical/surgical patient type category is 95.1 %. The regression relationship is shown in Table 5.15.

Coefficients (a)

| Model |                       | Unstandardized Coefficients |            | t       | Sig. | 95% Confidence Interval for B |             |
|-------|-----------------------|-----------------------------|------------|---------|------|-------------------------------|-------------|
|       |                       | B                           | Std. Error |         |      | Lower Bound                   | Upper Bound |
| 1     | (Constant)            | <b>1.701</b>                | .033       | 51.576  | .000 | 1.636                         | 1.765       |
|       | Ratio predicted hours | <b>.862</b>                 | .001       | 773.306 | .000 | .859                          | .864        |

A Dependent Variable: Actual inpatient hours

**Table 5.15 - Regression by actual hours - Ratio**

This means that we can describe the average relationship between ratio predicted hours (per ward) and actual clinical hours (per ward) as

$$\text{Actual} = 1.701 \text{ hours} + 0.862 * \text{Ratio predicted hours.}$$

The correlation between TrendCare predicted hours and actual is 97.2%. The regression relationship is shown in Table 5.16.

## Coefficients (a)

| Model |                           | Unstandardized Coefficients |            | t        | Sig. | 95% Confidence Interval for B |             |
|-------|---------------------------|-----------------------------|------------|----------|------|-------------------------------|-------------|
|       |                           | B                           | Std. Error |          |      | Lower Bound                   | Upper Bound |
| 1     | (Constant)                | <b>1.945</b>                | .025       | 78.867   | .000 | 1.896                         | 1.993       |
|       | TrendCare predicted hours | <b>.901</b>                 | .001       | 1037.895 | .000 | .900                          | .903        |

A Dependent Variable: Actual inpatient hours

**Table 5.16 - Regression by actual hours - TrendCare**

This means that we can describe the average relationship between TrendCare predicted hours (per ward) and actual clinical hours (per ward) as

$$\text{Actual} = 1.945 \text{ hours} + 0.901 * \text{TrendCare predicted hours.}$$

This analysis shows how TrendCare more closely predicts the actualized hours for the medical-surgical patient type category. Scatterplots were analysed but are not reported for the less frequent patient type categories. Regression for these patient type categories is reported, including coefficients and confidence intervals in Tables 5.17 - 5.18. The proportion of variation in actual explained by TrendCare prediction is higher than the proportion of variation in actual in-patient hours explained by ratio prediction, for all patient type categories. For example, TrendCare predicts the variability for medical/ surgical patients 94 % of the time compared to 90% of the time for ratios. The most extreme example of a difference between the two practices is TrendCare prediction of 96% of the proportion of variation in actual for non adult critical care compared to 68% for ratios. See the last columns of Table 5.18.

The following tables report regression analysis for all patient type categories followed by summaries.

| Ratios                  |       |                           |                             |            |                           |          |      |                               |             |
|-------------------------|-------|---------------------------|-----------------------------|------------|---------------------------|----------|------|-------------------------------|-------------|
| Patient Category        | Model |                           | Unstandardized Coefficients |            | Standardized Coefficients | t        | Sig. | 95% Confidence Interval for B |             |
|                         |       |                           | B                           | Std. Error | Beta                      |          |      | Lower Bound                   | Upper Bound |
| Medical/Surgical        | 1     | (Constant)                | 1.701                       | .033       |                           | 51.576   | .000 | 1.636                         | 1.765       |
|                         |       | Ratio predicted hours     | .862                        | .001       | .951                      | 773.306  | .000 | .859                          | .864        |
| Paediatric              | 1     | (Constant)                | 2.735                       | .084       |                           | 32.599   | .000 | 2.570                         | 2.899       |
|                         |       | Ratio predicted hours     | 1.033                       | .005       | .935                      | 223.876  | .000 | 1.024                         | 1.042       |
| Ante/Post Natal         | 1     | (Constant)                | 5.907                       | .098       |                           | 60.436   | .000 | 5.715                         | 6.099       |
|                         |       | Ratio predicted hours     | .818                        | .006       | .755                      | 141.843  | .000 | .807                          | .829        |
| Adult Critical Care     | 1     | (Constant)                | 4.793                       | .114       |                           | 42.086   | .000 | 4.570                         | 5.017       |
|                         |       | Ratio predicted hours     | .677                        | .003       | .917                      | 221.384  | .000 | .671                          | .683        |
| Non-Adult Critical Care | 1     | (Constant)                | 14.443                      | .550       |                           | 26.253   | .000 | 13.364                        | 15.523      |
|                         |       | Ratio predicted hours     | .899                        | .016       | .823                      | 54.766   | .000 | .867                          | .931        |
| Other                   | 1     | (Constant)                | 3.288                       | .158       |                           | 20.747   | .000 | 2.977                         | 3.598       |
|                         |       | Ratio predicted hours     | .774                        | .005       | .874                      | 148.103  | .000 | .763                          | .784        |
| TrendCare               |       |                           |                             |            |                           |          |      |                               |             |
| Medical/Surgical        | 1     | (Constant)                | 1.945                       | .025       |                           | 78.867   | .000 | 1.896                         | 1.993       |
|                         |       | TrendCare predicted hours | .901                        | .001       | .972                      | 1037.895 | .000 | .900                          | .903        |
| Paediatric              | 1     | (Constant)                | 2.748                       | .073       |                           | 37.499   | .000 | 2.605                         | 2.892       |
|                         |       | TrendCare predicted hours | .879                        | .003       | .950                      | 258.026  | .000 | .872                          | .886        |
| Ante/Post Natal         | 1     | (Constant)                | 3.623                       | .058       |                           | 61.992   | .000 | 3.509                         | 3.738       |
|                         |       | TrendCare predicted hours | .863                        | .003       | .921                      | 291.714  | .000 | .857                          | .869        |
| Adult Critical Care     | 1     | (Constant)                | 2.943                       | .088       |                           | 33.634   | .000 | 2.772                         | 3.115       |
|                         |       | TrendCare predicted hours | .869                        | .003       | .955                      | 309.372  | .000 | .863                          | .874        |
| Non-Adult Critical Care | 1     | (Constant)                | .497                        | .219       |                           | 2.270    | .023 | .068                          | .927        |
|                         |       | TrendCare predicted hours | .992                        | .005       | .982                      | 197.049  | .000 | .982                          | 1.002       |
| Other                   | 1     | (Constant)                | 3.116                       | .098       |                           | 31.912   | .000 | 2.925                         | 3.308       |
|                         |       | TrendCare predicted hours | .882                        | .004       | .950                      | 249.699  | .000 | .875                          | .889        |

**Table 5.17 – Coefficients by patient type category**

### Patient type categories

| Patient Category        | Ratio R | Ratio R Square | Ratio Adjusted R Square | Ratio Variation* | TrendCare R | TrendCare R Square | TrendCare Adjusted R Square | TrendCare Variation+ |
|-------------------------|---------|----------------|-------------------------|------------------|-------------|--------------------|-----------------------------|----------------------|
| Medical/Surgical        | .951(a) | .904           | .904                    | 90%              | .972        | .944               | .944                        | 94%                  |
| Paediatric              | .935(a) | .874           | .874                    | 87%              | .950        | .902               | .902                        | 90%                  |
| Ante/Post Natal         | .755(a) | .570           | .570                    | 57%              | .921        | .848               | .848                        | 85%                  |
| Adult Critical Care     | .917(a) | .840           | .840                    | 84%              | .955        | .911               | .911                        | 91%                  |
| Non-Adult Critical Care | .823(a) | .677           | .677                    | 68%              | .982        | .965               | .964                        | 96%                  |
| Other                   | .874(a) | .765           | .765                    | 77%              | .950        | .902               | .902                        | 90%                  |

\*The proportion of variation with Actual 'explained' by Ratio prediction.

+ The proportion of variation with Actual 'explained' by TrendCare prediction.

**Table 5.18 – Model summary patient type categories**

#### **5.4 Thailand, New Zealand and Australian subset**

The results of statistical analysis for Phya Thai hospital 3 are reportedly separately for several reasons. The first reason is that the data from this hospital were forwarded in two report formats which were different to the reports provided by Australian and New Zealand Hospitals. The reports were the Hospital Period Comparison report and the Hospital Monthly Clinical HPPD report, as discussed in Chapter 4 and appended, Appendix F and G (current versions). The second reason is that some models of care in Thailand involve significantly different nursing resource consumption, as discussed in Chapter 3. For example, in Thailand midwifery patients have a long convalescence of 7 days resting in bed after delivery and are therefore more highly dependent during that period. The casemix there is also very different. An example is that the majority of the paediatric admissions are for diarrhoea and vomiting compared to the majority of paediatric admissions to Australian and New Zealand hospitals, which are paediatric surgical patient types. A further example is the high number of elective and cosmetic procedures conducted to international patients to whom Phya Thai hospital 3 actively markets.

The different reporting formats provided by Phya Thai hospital 3 meant that different types of comparisons were required. In addition, the differences in casemix and models of care meant that if the data from Thai hospitals was included in the overall results, such results could potentially be skewed. Therefore as discussed in Chapter 4, a design decision was made to report the Thailand results separately, with a subset of Australian and New Zealand hospitals which provided a statistically similar number of shifts by patient type. The hospitals selected were MidCentral Hospital New Zealand, Sydney Adventist Hospital NSW, Mater Children's Hospital, Mater Mothers' Hospital, Mater Private Hospital QLD and Greenslopes QLD. The number of shifts within the patient type categories corresponding to the information available for Thailand is listed in the 'Cross tabulation Table' 5.19. For example, there were 25 available shifts for patient types in the medical/surgical (i.e. patient types 1-9)

category for Mid-Central hospital compared to 18 for the Thai hospital. Note that labels for data and analyses for Phya Thai hospital 3 are reported as ‘Thailand’.

|          |                                | Patient Type Category |            |                    |                           |                                   | Total |       |
|----------|--------------------------------|-----------------------|------------|--------------------|---------------------------|-----------------------------------|-------|-------|
|          |                                | Medical/Surgical      | Paediatric | Ante/Post<br>Natal | Adult<br>Critical<br>Care | Non-<br>Adult<br>Critical<br>Care |       | Other |
| Hospital | Mid-Central                    | 25                    | 8          | 4                  | 4                         | 1                                 | 4     | 46    |
|          | Sydney<br>Adventist<br>Mater   | 36                    | 22         | 16                 | 8                         | 0                                 | 0     | 82    |
|          | Children’s<br>Mater<br>Mothers | 0                     | 8          | 4                  | 0                         | 4                                 | 0     | 16    |
|          | Mater<br>Private               | 0                     | 2          | 16                 | 0                         | 4                                 | 0     | 22    |
|          | Greenslopes                    | 26                    | 1          | 0                  | 8                         | 0                                 | 4     | 39    |
|          | Thailand                       | 28                    | 0          | 1                  | 8                         | 0                                 | 12    | 49    |
|          | Total                          | 18                    | 6          | 12                 | 8                         | 1                                 | 9     | 54    |
|          |                                | 133                   | 47         | 53                 | 36                        | 10                                | 29    | 308   |

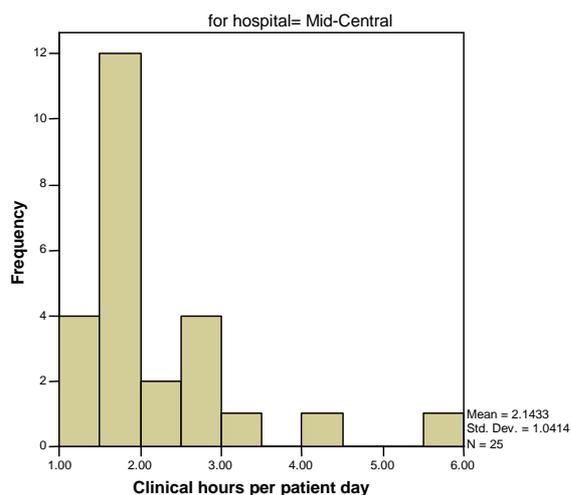
**Table 5.19 – Thailand subset, patient type category cross tabulation**

In the patient type categories, non adult critical care and other, small numbers of patient shifts are recorded and were not analysed further in this thesis. It was considered useful to consider comparisons for hospitals in the categories of medical/surgical, paediatric, ante/post natal and adult critical care. Some hospitals are compared for all 4 categories and others in the only relevant categories. For example Mater Children’s hospital QLD only appears in the paediatric analysis. The frequency of shifts for medical/ surgical patient type category is shown in Table 5.20.

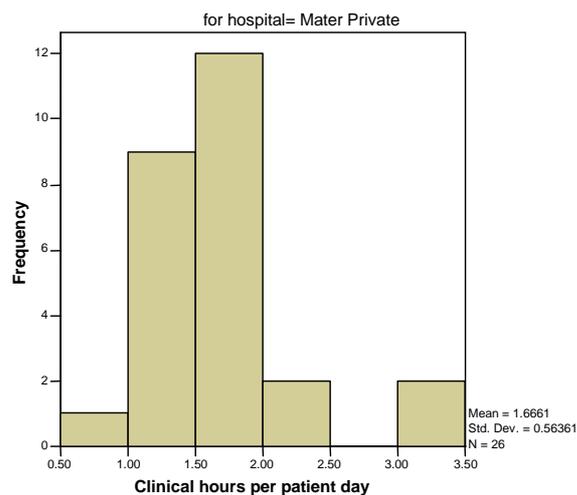
| Hospital         | Medical/Surgical shifts |
|------------------|-------------------------|
| Mid-Central      | 25                      |
| Sydney Adventist | 36                      |
| Mater Private    | 26                      |
| Greenslopes      | 28                      |
| Thailand         | 18                      |
| Total            | 133                     |

**Table 5.20 – Thailand subset, Frequency - medical/surgical shifts.**

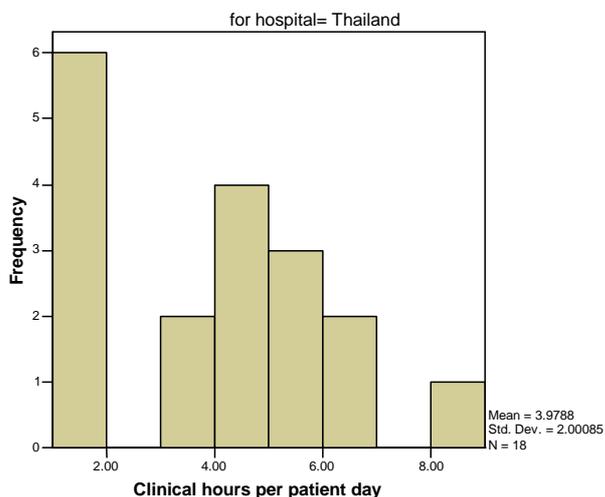
Descriptive statistics are reported for the frequency, mean and standard deviation of the five hospitals for actual HPPD reported by histogram. See Figures 5.42-5.46. These results reveal that the mean hours for Thailand (Phya Thai hospital 3) are the highest at 3.98 compared to, for example 1.63 hours at Greenslopes and 1.67 at Mater Private. The results also reveal that Thailand has the greatest standard deviation at 2 hours compared to for example Sydney Adventist at 0.39 hours. For medical/surgical patient type category, Phya Thai hospital 3 has a significantly higher mean and standard deviation than for the Australian and New Zealand hospitals in the subset.



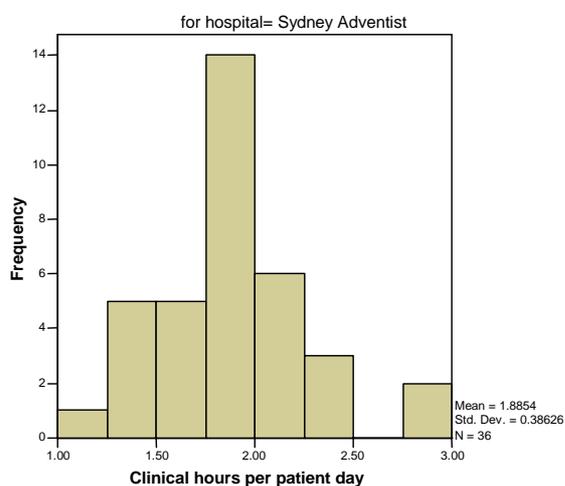
**Figure 5.42 – Mid Central Actual HPPD**



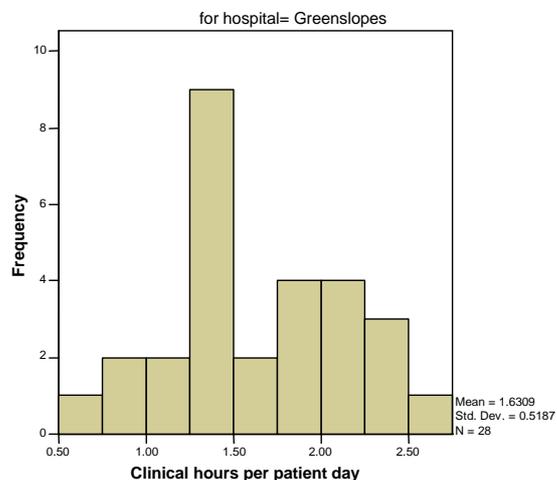
**Figure 5.43 – Mater Private Actual HPPD**



**Figure 5.44 – Thailand Actual HPPD**



**Figure 5.45 – Sydney Adventist Actual HPPD**



**Figure 5.46 – Greenslopes Actual HPPD**

Note: All axes are not identical.

The histograms in Figures 5.42-5.46 are generally not very ‘smooth’ as there are not many observations. Because the distributions are skewed and not generally centered on the mean, a standard Analysis of Variance or ANOVA, procedure was not done. Instead, the Kruskal-Wallis (K-W) test was used, which is a ‘non-parametric’ version of ANOVA (Monash University, 2002). The K-W procedure tests whether or not the distribution of actual hours per patient day was the same for each of the five hospitals. If the  $p$ -value, or observed significance level, of the test is less than 0.05, then it could be concluded that the distributions of actual hours per patient day are not the same for each hospital. That is, there is less than a 5% chance that as sample like this could be observed, if the hospitals all have the same distribution for actual hours per patient day (Forbes, 2004).

The K-W test results are reported in Table 5.21 for the medical/surgical patient category

|             | Actual hours per patient day |
|-------------|------------------------------|
| Chi-Square  | 25.149                       |
| df          | 4                            |
| Asymp. Sig. | .000                         |

**Table 5.21 – KW Test - Medical/ Surgical patient category**

a Kruskal Wallis Test

b Grouping Variable: Hospitals for Med/Surg Comparison

The ‘Asymp.Sig’ refers to the  $p$ -value, or observed significance level. In this case, this number is so small that it is less than 0.001, and hence shows up as ‘0.000’ on the table. The ‘null hypothesis’ of a common distribution of actual hours per day across these five hospitals is rejected in favour of the ‘alternative hypothesis’ that at least one hospital has a distribution of actual hours per day that is different from the others.

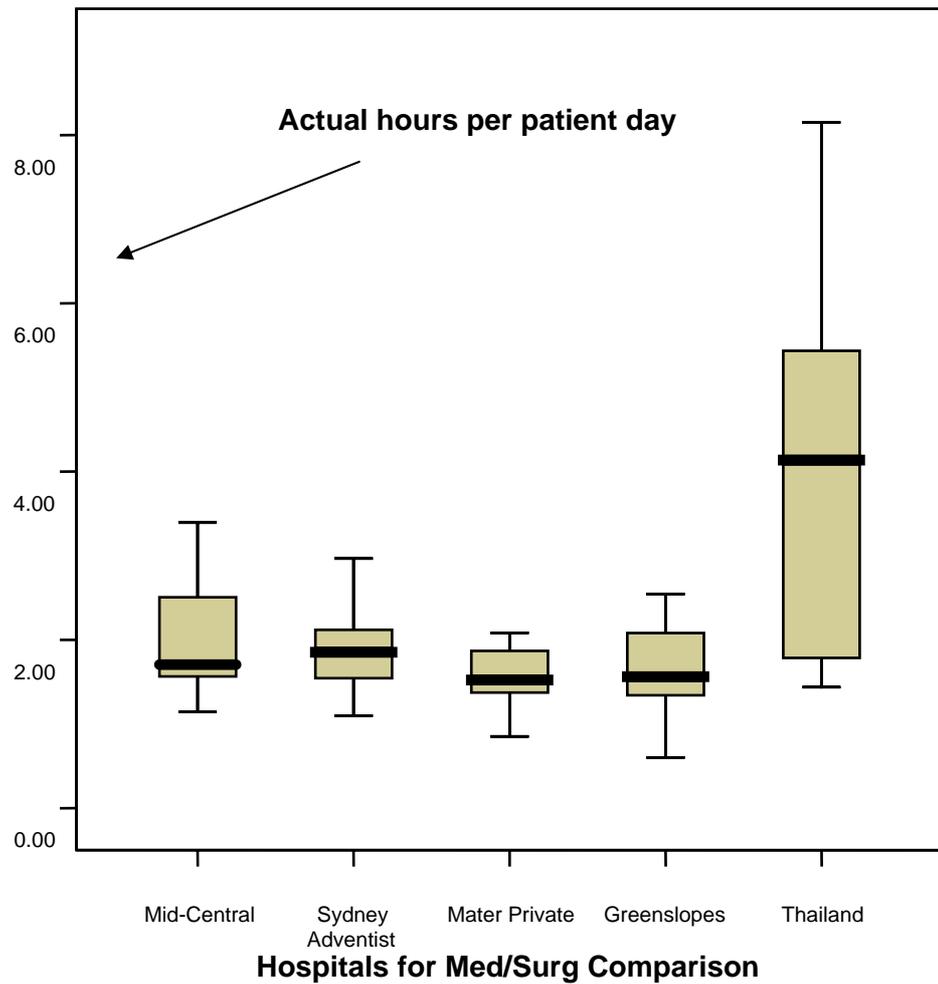
Where the distribution is not symmetric, the median or the measure of central tendency and the interquartile range is reported from 25-75<sup>th</sup> percentiles. See Table 5.22. For this subset, box and whisker plots have been used because they give more

information about the distribution of the dependent variable and the possible influence of other categorical variables. These graphs really demonstrate the differences between the distributions very well. The ‘box’, or shaded portion, shows where the middle 50% of the distribution is. The bar in the middle of the box is the median value (i.e. the 50<sup>th</sup> percentile) lies. The whiskers show the spread of the distribution. If the whiskers are of equal length, and the median is in the middle of the box, then the distribution is symmetric. None in the subset are symmetric, which is why the standard ANOVA didn’t apply. The whiskers can be at most 1.5 times the length of the interquartile range (IQR), which is the difference between the 25<sup>th</sup> and the 75<sup>th</sup> percentiles, but will not go past the furthest observation so they can be shorter. If there were observations past the 1.5 times IQR, they were reported individually.

|                              | Hospitals for Med/Surg Comparison | Percentiles |        |        |
|------------------------------|-----------------------------------|-------------|--------|--------|
|                              |                                   | 25          | 50     | 75     |
| Actual hours per patient day | Mid-Central                       | 1.5628      | 1.7056 | 2.5769 |
|                              | Sydney Adventist                  | 1.5435      | 1.8533 | 2.1221 |
|                              | Mater Private                     | 1.3700      | 1.5227 | 1.8714 |
|                              | Greenslopes                       | 1.3352      | 1.5621 | 2.0863 |
|                              | Thailand                          | 1.7714      | 4.1372 | 5.5274 |

**Table 5.22 – Thailand subset, Percentiles actual HPPD**

For the medical/surgical patient type category, the distributions for the non-Thai hospitals are not all identical, but they are more similar to each other than the distribution for the Thailand hospital. The median for Thailand is around 4 hours per patient day for medical/surgical as opposed to < 2 hours per patient day for the other hospitals. This is demonstrated well in Figure 5.47.



**Figure 5.47 – Hospitals for Med/Surg Comparison**

The next part of the analysis was a paediatric comparison. For this analysis the Mater hospitals were grouped together for a total of 11 shifts of care. The frequencies in the paediatric comparison are shown in Table 5.23 followed by the K-W test, see Table 5.24 and percentiles, and see Table 5.25. The Asympt.Sig is .002. Once again it is clear that the non-Thai hospitals are similar at each percentile and that Phya Thai hospital 3 has approximately twice the number of actual hours at 4.74 hours.

|          |                  | Paediatric |
|----------|------------------|------------|
| Hospital | Mid-Central      | 8          |
|          | Sydney Adventist | 22         |
|          | Mater Children's | 8          |
|          | Mater Mothers    | 2          |
|          | Mater Private    | 1          |
|          | Thailand         | 6          |
| Total    |                  | 47         |

} Combine Mater hospitals together → 11

**Table 5.23 – Thailand subset, Frequency of shifts - paediatric patient type category**

**Test Statistics<sup>a,b</sup>**

|             | Clinical hours per patient day |
|-------------|--------------------------------|
| Chi-Square  | 14.913                         |
| df          | 3                              |
| Asymp. Sig. | .002                           |

a. Kruskal Wallis Test

b. Grouping Variable: Hospitals  
for Paediatric Comparison

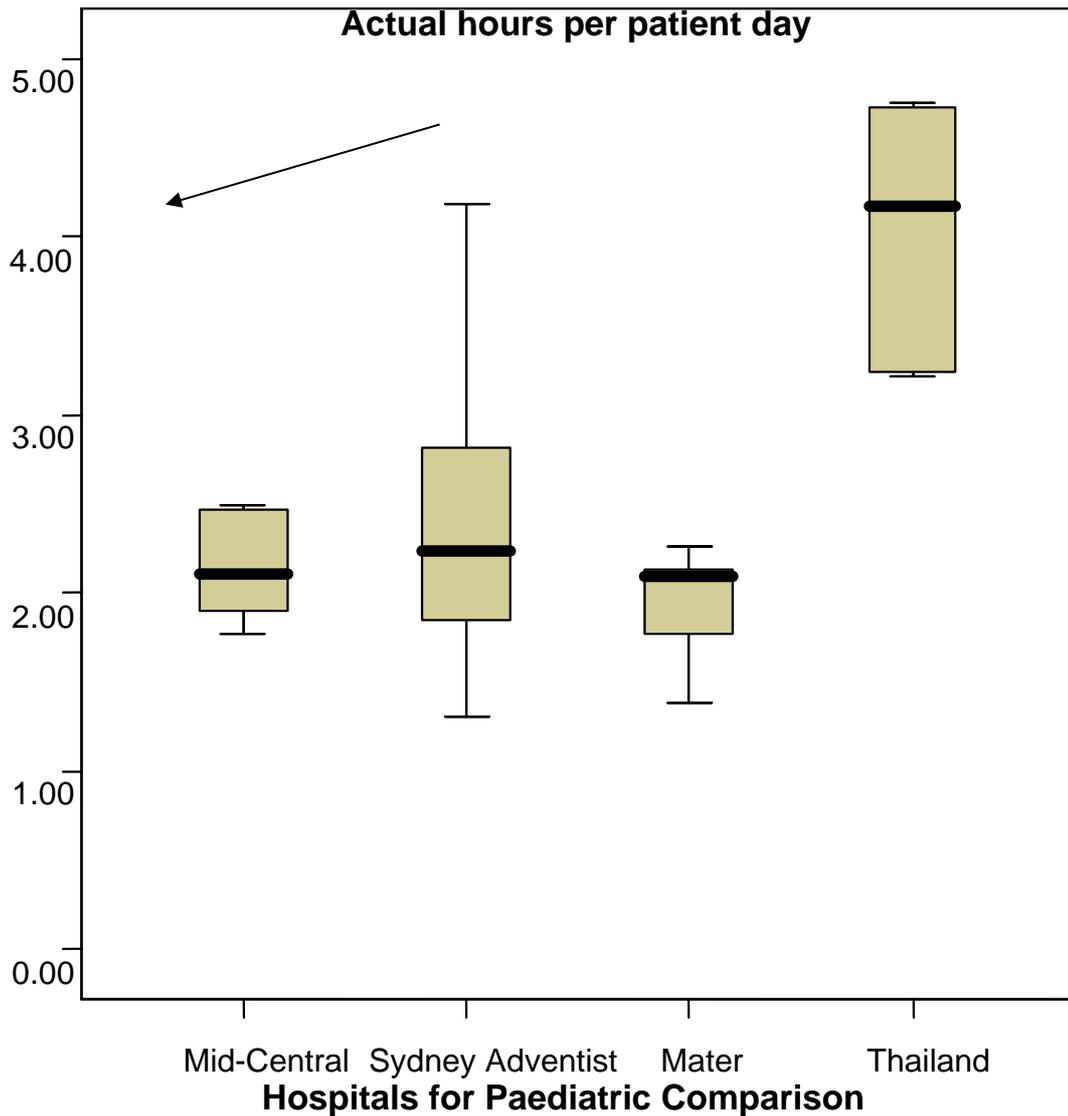
**Table 5.24 – K-W test, paediatric subset**

**Percentiles**

| Hospitals for Paediatric Comparison |                  | Percentiles |        |        |
|-------------------------------------|------------------|-------------|--------|--------|
|                                     |                  | 25          | 50     | 75     |
| Actual hours per patient day        | Mid-Central      | 1.8528      | 2.1104 | 2.4704 |
|                                     | Sydney Adventist | 1.8450      | 2.2386 | 2.8518 |
|                                     | Mater            | 1.4833      | 2.0898 | 2.1377 |
|                                     | Thailand         | 3.2375      | 4.1743 | 4.7351 |

**Table 5.25 – Thailand subset, Percentiles actual HPPD - paediatric patient type category**

The percentiles are again demonstrated well in whisker and box plots. See Figure 5.48, for paediatric distribution and in Figures 5.49 and 5.50 for other patient type categories.



**Figure 5.48 – Hospitals for paediatric comparison**

Antenatal and postnatal shifts for hospitals in the Thailand subset were compared. Once again the Mater hospitals were combined and this time provided 20 shifts of care. See Table 5.26. The K-W test is seen in Table 5.27 and percentiles in Table 5.28. The Asympt.Sig is .008. There were just three hospitals in the sample including the combined Mater Group.

|          |                  | Ante/Post Natal |
|----------|------------------|-----------------|
| Hospital | Sydney Adventist | 16              |
|          | Mater Children's | 4               |
|          | Mater Mothers    | 16              |
|          | Thailand         | 12              |
| Total    |                  | 53              |

} Combine Mater hospitals together → 20

**Table 5.26 – Thailand subset, Frequency - ante/post natal patient type category**

**Test Statistics(a,b)**

|             | Clinical hours per patient day |
|-------------|--------------------------------|
| Chi-Square  | 9.653                          |
| df          | 2                              |
| Asymp. Sig. | .008                           |

a Kruskal Wallis Test

b Grouping Variable: Hospitals for Ante/Post Natal Comparison

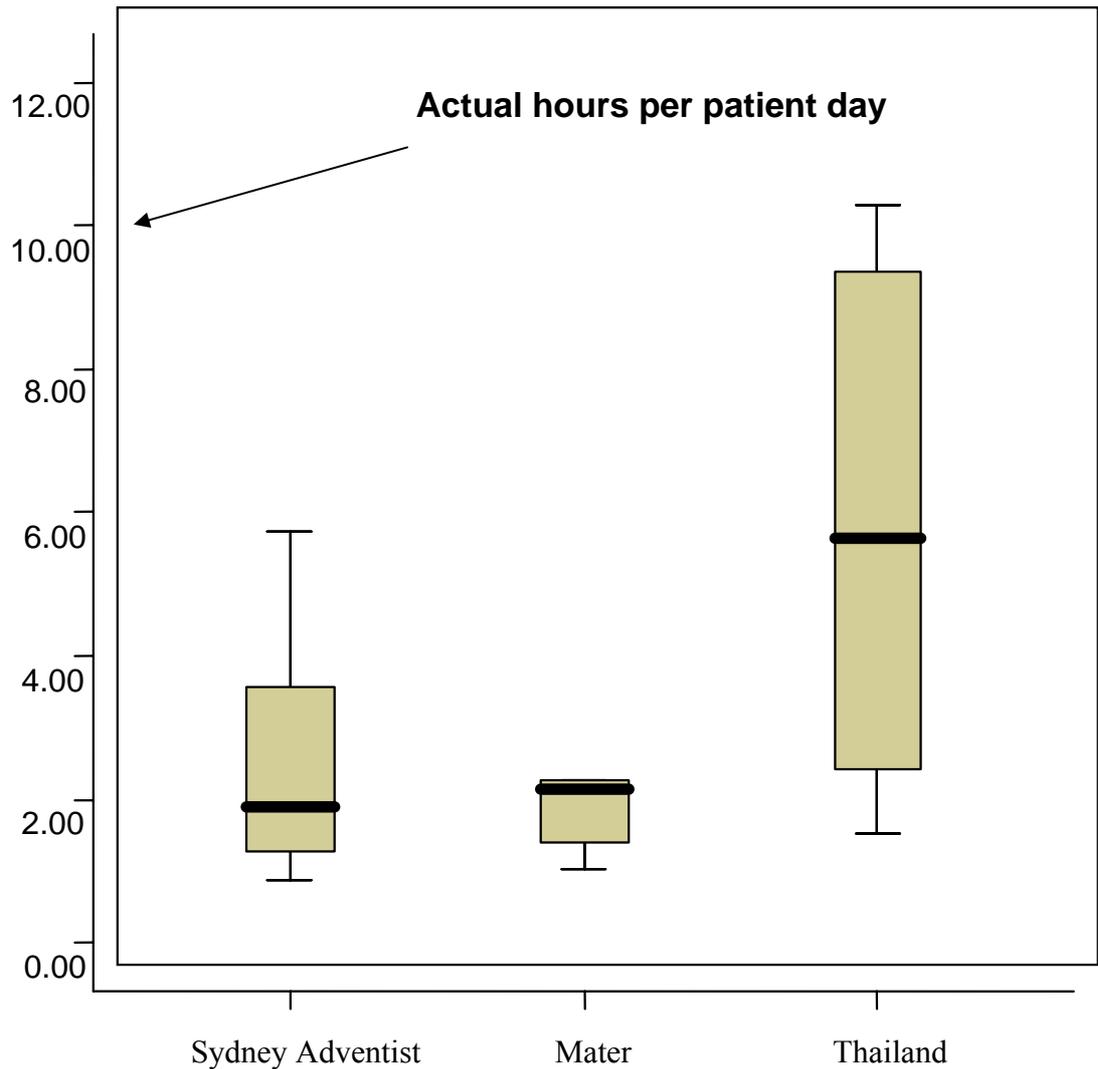
**Table 5.27 – K-W test, ante/post natal subset**

**Percentiles**

|                              |                  | Hospitals for Ante/Post Natal Comparison |        |        |
|------------------------------|------------------|------------------------------------------|--------|--------|
|                              |                  | 25                                       | 50     | 75     |
| Actual hours per patient day | Sydney Adventist | 1.1880                                   | 1.8934 | 4.0573 |
|                              | Mater            | 1.3983                                   | 2.1555 | 2.2696 |
|                              | Thailand         | 2.2042                                   | 5.6456 | 9.4030 |

**Table 5.28 – Thailand subset, Percentiles actual HPPD - ante/post natal patient type category**

Sydney Adventist and Mater hospitals have obvious asymmetric distributions compared to Phya Thai hospital 3. Both the Australian hospitals have medians which are less than the 25<sup>th</sup> percentile for Phya Thai hospital 3, which is demonstrated well in Figure 5.49.



### Hospitals for Ante/Post Natal Comparison

**Figure 5.49 - Hospitals for ante/post natal comparison**

Finally adult critical care shifts of care were compared. There were 4 hospitals in the sample. The frequency is reported in Table 5.29; the K-W test is reported in Table 5.30 and percentiles in Table 5.31. The Asympt.Sig is .003. The difference is illustrated graphically in Figure 5.50.

| Hospital         | Adult Critical Care |
|------------------|---------------------|
| Sydney Adventist | 8                   |
| Mater Private    | 8                   |
| Greenslopes      | 8                   |
| Thailand         | 8                   |
| Total            | 32                  |

**Table 5.29 – Thailand subset, Frequency - adult critical care patient type category**

**Test Statistics<sup>a,b</sup>**

|             | Clinical hours per patient day |
|-------------|--------------------------------|
| Chi-Square  | 14.236                         |
| df          | 3                              |
| Asymp. Sig. | .003                           |

a. Kruskal Wallis Test

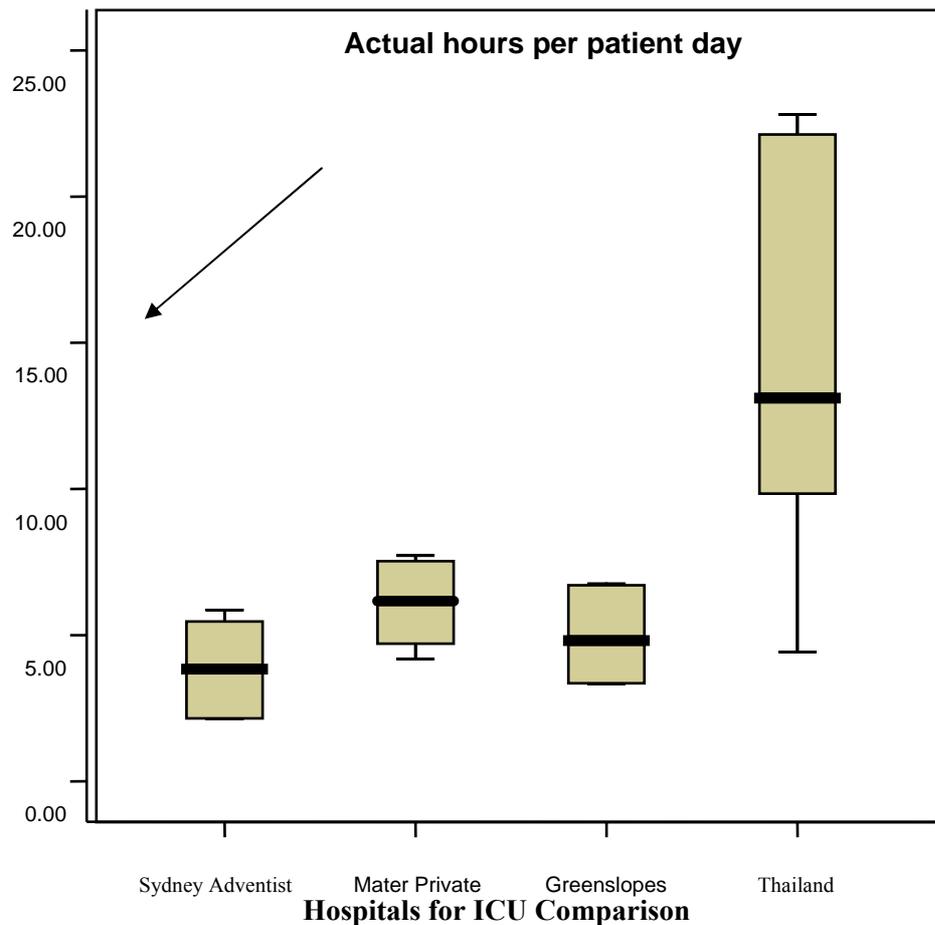
b. Grouping Variable: Hospitals for ICU Comparison

**Table 5.30 – K-W test, adult critical care subset**

**Percentiles**

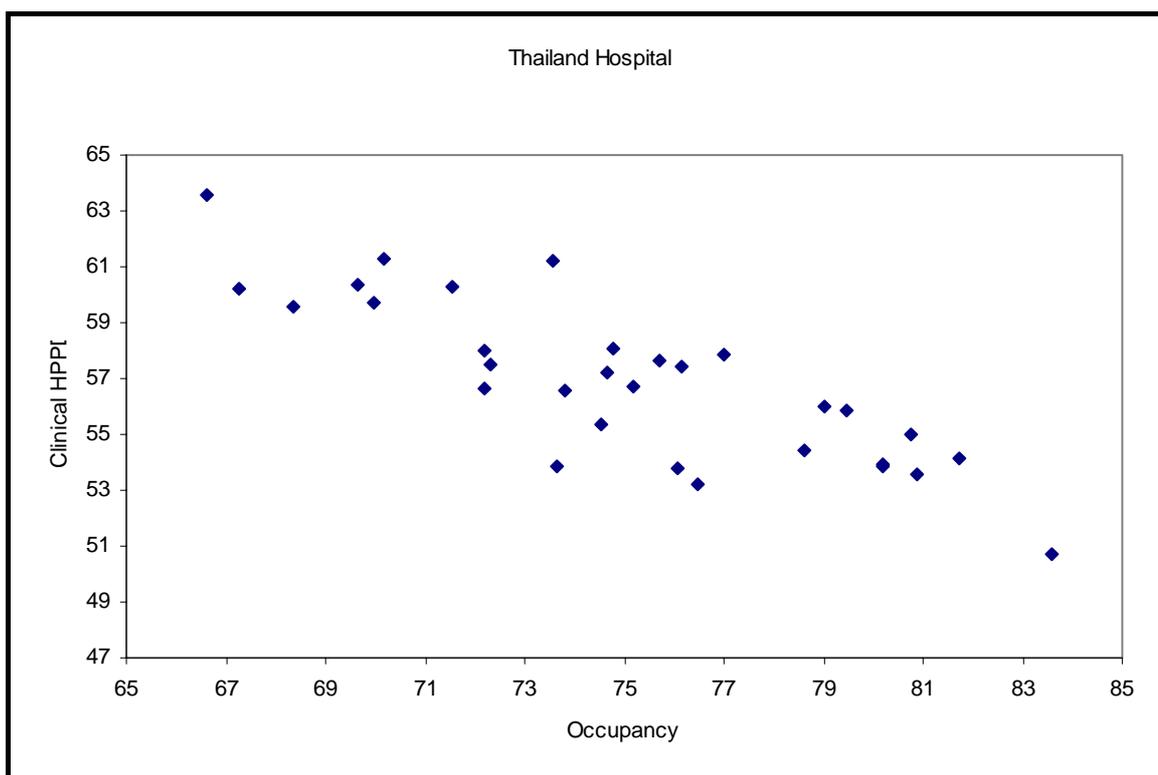
|                                |                  | Hospitals for ICU Comparison |         |         |
|--------------------------------|------------------|------------------------------|---------|---------|
|                                |                  | 25                           | 50      | 75      |
| Clinical hours per patient day | Sydney Adventist | 2.1525                       | 3.8352  | 5.5112  |
|                                | Mater Private    | 4.6368                       | 6.1657  | 7.5633  |
|                                | Greenslopes      | 3.3486                       | 4.8123  | 6.7128  |
|                                | Thailand         | 8.2810                       | 13.1090 | 22.2816 |

**Table 5.31 – Thailand subset, Percentiles actual HPPD, adult critical care patient type category**



**Figure 5.50 – Hospitals for ICU comparison**

Arising from the analysis of actual HPPD by hospitals in the Thailand subset for 4 patient type categories was the question of the impact of the casemix and the convalescent days on both the actual and predicted HPPD. While it was not possible to determine the details of the effect of either of these variables from the data provided, it was possible to determine if another variable ‘occupancy’ had any impact on HPPD. It has been an established view among hospital managers that clinical HPPD decrease with an increase in occupancy. This is the opposite trend to what would be expected. The variable of ‘occupancy’ was analyzed using the Thai data. An interesting result followed from a correlation between the actual clinical hours and occupancy.



**Figure 5.51 – Correlation between occupancy and HPPD, Thailand subset**

The line through the points in Figure 5.54 relates to the equation

$$\text{Clinical HPPD} = -0.551 \times \text{Occupancy} + 98.237.$$

That is, on average, if occupancy increases by one unit, or 1 %, the clinical HPPD decreases by just over half an hour (0.551) per patient day. In other words, greater efficiencies in actual clinical hours are achieved during periods of higher occupancy. Under ratio practices, higher occupancy results in more nurses. More nurses would mean that actual HPPD would increase as occupancy increases in a trend opposite to what happens in non-ratio settings. This is discussed further in the next chapter. An associated question related to efficiencies, was the effect of the rounding rule on actual HPPD.

## 5.5 The effect of the rounding rule

In this section, the effect of the rounding rule for hospitals in the sample is analysed as if the hospitals were subject to the Victorian public hospital ratio agreement. The

aim of the analysis was to determine if there were any financial or nursing resource implications arising from the application of the rounding rule. For Victorian public hospitals, the application of nurse patient ratios may result in *'a number of nurses, plus an additional requirement of more than 0.5% and rounding up shall be required* (Schedule C, part 1B Interpretation - General medical surgical wards part (f), 2001)' and where the application results in *'a number of nurses plus an additional requirement of 0.5% or less, rounding down shall be regarded as being in compliance with the ratio* (Schedule C, part 1B Interpretation - General medical surgical wards part (g), 2001)'.

Rounding down, which occurs at exactly 0.5% additional requirement, is subject to patient care not being compromised and by agreement with nurses under the guidance of the Agreement Implementation Committee. It is not clear how the determination that patient care will not be compromised is measured or recorded in the absence of a dependency system in Victorian public hospitals. In any case, rounding up occurs twice as often as rounding down as described in Chapter 3. This means the application of the rounding rule is likely to cost hospitals more than if the rounding rule was not applied.

In order to extrapolate the effect of the rounding rule for Victorian public hospitals, hospitals in the sample were requested to submit two reports as described in the research design. The reports were the Hospital PND Ratio Variance Summary Report; the first with the rounding rule applied (See Figure 4.9, previous chapter) and the second report without the rounding rule applied (See Figure 4.5, previous chapter). The comparison of these two reports was aimed at identifying how the ratio rounding rule effected variance between predicted and actualized hours for ratios, for the same patient cohort according to the Victorian rounding rule.

Where the rounding rule has been applied, the calculations are by **ward type**. This means that the ratios are calculated by applying the ratios for that ward type across all

patients admitted to that ward. For example, a surgical ward would have all ratios calculated as medical/surgical ratios regardless of the patient casemix. The casemix may include but is not limited to surgical, aged care, antenatal, paediatrics and high dependency patients. The calculations are made according to ratio practices.

Where the rounding rule has not been applied, TrendCare calculates the predicted ratio hours by **patient type**. That means the ratios are calculated by applying the ratios for individual patient types within each ward. For example, a ward would have all ratios calculated according to the individual ratio allocations for each patient type, such as aged care, antenatal, paediatrics. The calculations are made according to TrendCare HPPD practices.

One of two key potential effects of the rounding rule is that the rule may cost hospitals more or less than without rounding, or an averaging effect may occur resulting in little difference. It is a reasonable assumption that supporters of ratios expect that the averaging effect will be cost neutral to hospitals but to date there has been no empirical study. A detailed analysis of the financial effect was outside the scope of this thesis due to the high volume of shifts of care for analysis i.e. almost 207,000 shifts or twice the sample size. A financial analysis would identify if what is being paid for nursing matches what should be paid for nursing. A crude preliminary analysis is reported in Table 5.32. The results are discussed later in this section. A second key potential effect is that ratio calculations by patient type (with no rounding rule) may better predict actualized ratios i.e. the variance between predicted and actualised hours may be less than if the rounding rule was applied and ratio calculations were by ward type.

The calculations were based on the following formula;

$$\frac{* \text{ ratio variance} - \# \text{ ratio variance}}{\# \text{ Ratio required}} \times 100 = \% \text{ in hh:mm}$$

**Key:**

\* = Hospital PND Ratio Variance Summary Report (Rounding rule, ward type)

# = Hospital PND Ratio Variance Summary Report (No rounding rule, patient type)

The two data sets are compared (Table 5.32). In this table a mixture of effects is demonstrated for the hospitals ranging from -13.5 to +12.1% change in ratio hours when the rounding rule is applied i.e. when ratio calculations change from patient type to ward type. The results were not available for 6 hospitals where the rounding option was not installed in the TrendCare version used. There was also a mixture in results showing changes to variance to ratio predicted hours. Approximately half of the hospitals showed an increase in variance and half showed a decrease in variance. A decrease in variance is obviously preferred because this means greater predictability, resulting in better rostering, better patient care and better budgeting.

| Hospital                  | % change in ratio hrs when rounding rule applied i.e. ratio calculations change from pt to ward type | Increased variance from predicted ratio hours | Decreased variance from predicted ratio hours |
|---------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Calvary, ACT May 04       | -13.5                                                                                                | √                                             |                                               |
| Calvary, ACT June 04      | -12.5                                                                                                | √                                             |                                               |
| Good Health Wanganui,     | +12.1                                                                                                | √                                             |                                               |
| John James, ACT           | -7.9                                                                                                 |                                               | √                                             |
| Mercy, Auckland, NZ       | -7.2                                                                                                 | √                                             |                                               |
| Mater Mothers Hospital    | -2.2                                                                                                 |                                               | √                                             |
| Mater Children's Hospital | +5.2                                                                                                 | √                                             |                                               |
| Grey base 2004            | -4.4                                                                                                 |                                               | √                                             |
| Hollywood, WA             | -4.4                                                                                                 | √                                             |                                               |
| Mater Private Hospital    | +4.4                                                                                                 |                                               | √                                             |
| Westmead Private          | -3.6                                                                                                 | √                                             |                                               |
| Mater Adults Hospital     | +3.3                                                                                                 |                                               | √                                             |
| Mater Mothers Private     | -6.8                                                                                                 |                                               | √                                             |
| Grey base 2003            | -1.9                                                                                                 |                                               | √                                             |
| Bundaberg                 | -1.2                                                                                                 |                                               | √                                             |
| Sydney Adventist          | -0.6                                                                                                 | √                                             |                                               |
| Hawkes Bay                | +0.5                                                                                                 | √                                             |                                               |
| Greenslopes               | +3.2                                                                                                 |                                               | √                                             |
| Mid Central, NZ           | Not available                                                                                        |                                               |                                               |
| Taranaki, NZ              | Not available                                                                                        |                                               |                                               |
| Ipswich                   | Not available                                                                                        |                                               |                                               |
| Ascot, NZ                 | Not available                                                                                        |                                               |                                               |
| Wakefield, NZ             | Not available                                                                                        |                                               |                                               |
| Phya Thai 3               | Not available                                                                                        |                                               |                                               |
| Mercy                     | -6.7                                                                                                 | √                                             |                                               |

**Table 5.32 - Effect of the rounding rule**

This was an important analysis because the change in ratio hours associated with the rounding rule may indicate higher costs for hospitals if positive or lower costs if negative. Whether positive or negative the rounding rule has the potential to also bring hospitals closer to paying for what patients actually require. In other words rounding may have the potential to cost hospitals more or less but of greater significance is whether it accounts for under or over calculating the actual resources required. In Table 5.32, a positive result in the first column means that rounding would costing the hospital more and a negative result means that rounding would cost the hospital less, by the per cent shown, if the hospital was located in Victoria. The last two columns in the table show whether the rounding rule decreased the variance or increased it.

The application of the rounding rule had a range of effects on hospitals, see Table 5.32;

1. Where the rounding % is negative, hospitals would have predicted less ratio hours by applying the 50% rule for rounding. This occurred for 13/19 hospitals who reported on this rule. For six hospitals, John James, Mater Mothers, Mater Mothers Private, Bundaburg and Greybase 2003 & 2004, fewer staff was desirable and decreased the variance. For the others the negative result of rounding increased the variance. The effect for the majority of hospitals may be that rounding would mean less staff are rostered than if the unrounded ratio formula was applied. This is calculated in non-ratio sites and is the opposite of what happens in Victorian public hospitals where as already discussed, rounding up occurs twice as often as rounding down. This suggests that at least some of the rounding up in Victoria is not explained by the 50% rule.
2. Where the rounding % is positive, hospitals would have predicted more ratio hours by applying the 50% rule for rounding. This occurred for 6/19 hospitals that reported on this rule. For 3 hospitals, Greenslopes, Mater Adult and Mater Private, more staff

was desirable and decreased the variance. However for 3 other hospitals Mater Children's, Good Health Wanganui and Hawkes Bay, this was undesirable and increased the variance.

Rounding increases ratio hours variance away from what is needed by patient type in 10/19 hospitals and decreases the variance in the remaining 9. Rounding does not capture the required hours accurately for several reasons. The first reason is that the default ward type ratios do not necessarily reflect the care required by the range of patient types on those wards. For example high dependency patient types admitted to medical/surgical wards. The second reason is that rounding based on occupancy would not capture variation associated with length of stay increases, where for most patient types, actual HPPD decreases for each additional day of stay. There are some exceptions, for example patients with burns. Thirdly rounding does not capture the decrease in HPPD associated with increased occupancy. Finally, under Victorian ratio rules, rounding down is subject to no compromise to patient care, which is decided arbitrarily and is largely unrecorded. For these reasons a decision was made to conduct all inferential statistics on reports with no 50% rule applied to the data.

## **5.6 Costing analysis**

The analysis of the effects of the rounding rule on costs to hospitals raised further questions about costs. If the actualized hours are what are required to meet the needs of the patients, which system better predicts the actual hours and therefore better predicts the costs of care? In other words, would it cost hospitals more to provide the actualized care requirements by ratio practices or by TrendCare? The evidence of the statistical tests so far indicate that ratios predict the actual less satisfactorily than TrendCare for all hospital, shift and patient variables. In addition, the accuracy of ratios is further reduced by the application of the rounding rule. The costing analysis was undertaken to determine if less predictability of ratio practices equates to higher cost, lesser cost or the same cost as for TrendCare.

In most hospitals, nursing rosters are established on budgeted and predicted patient requirements. Hospitals pay nurses according to rostered hours which may or may not match the actualized care provided. They may not match where predictions of patient requirements are based on occupancy rather than dependency. Payment of rostered hours derived from predicted occupancy levels means that payment is for hours where rostered nurses ‘turned up for work’ rather than for hours of care provided. Although the nurses will be paid the same amount, the payment will be for different workloads. With this method it is more likely that some nurses will be paid for work they didn’t do and some nurses will not be paid for all the care they did provide during the same shift. Indeed some organisations provide significant amounts of free nursing care. Where predicted hours closely match actualized hours, there can be a closer and fairer match between what is being paid for and the care provided.

Assuming that TrendCare actualized HPPD is a reliable measure of the care required, it is now feasible to predict the cost of required care. A comparison of predicted costs by ratios and by TrendCare with what was actualized will demonstrate the difference between costs by both practices and more accurate costs. Costings are based on a first look and some crude assumptions and would benefit from more detailed analysis. The results are expected to provide some preliminary information for hospital managers and policy developers.

### **5.6.1 Cost prediction comparison**

The first part of the analysis gives the dollar value of total hospital direct care nursing costs, followed by the costs by patient type categories. The analyses are:

1. All hospitals. Table 5.33
2. All hospitals, by patient type category. Table 5.34
3. Australian, Public, Metropolitan, Level 2. Table 5.35

4. Australian, Public, Rural, Level 2. Table 5.36
5. Australian, Public, Metropolitan, Level 1 or Level 2, Table 5.37 by patient type category.

The dollar value is based on an industry accepted working measure of \$40 per nursing hour in Australia (Lowe, 2003, Athan, 2003). This amount is inclusive of all nursing wage levels but excludes executive managers. The amount includes the compulsory on-costs of superannuation, shift penalties, annual leave, long service leave, payroll tax, orientation and safety training. It excludes sick leave and other training. The amount of \$40 could be substituted for another amount for other settings, such as for New Zealand or Thailand or for other time periods which could be adjusted according to the consumer price index (CPI) or another measure.

Overall, TrendCare seems to under predict the total actual costs by about as much as ratio seems to over predict, at least for this sample. See Table 5.33. But, there are also several cases where ratio over predicts the actual total more than TrendCare does, and vice-versa.

|                           | N      | Sum        | Mean    | Std. Deviation | Total Cost   |
|---------------------------|--------|------------|---------|----------------|--------------|
| Actual inpatient hours    | 103269 | 2051049.23 | 19.8612 | 17.73146       | \$82,041,969 |
| TrendCare predicted hours | 103269 | 2019200.30 | 19.5528 | 19.12870       | \$80,768,012 |
| Ratio predicted hours     | 103269 | 2088085.03 | 20.2199 | 19.86600       | \$83,523,401 |

**Table 5.33 - Cost analysis - All hospitals, all shifts**

| Patient Type Category   |                           | N     | Sum        | Mean    | Std. Deviation | Total Cost   |
|-------------------------|---------------------------|-------|------------|---------|----------------|--------------|
| Medical/Surgical        | Actual inpatient hours    | 63363 | 1279878.05 | 20.1991 | 18.45949       | \$51,195,122 |
|                         | TrendCare predicted hours | 63363 | 1283228.98 | 20.2520 | 19.90268       | \$51,329,159 |
|                         | Ratio predicted hours     | 63363 | 1360295.40 | 21.4683 | 20.37116       | \$54,411,816 |
| Paediatric              | Actual inpatient hours    | 7209  | 118770.15  | 16.4753 | 13.69405       | \$4,750,806  |
|                         | TrendCare predicted hours | 7209  | 112598.27  | 15.6191 | 14.80118       | \$4,503,931  |
|                         | Ratio predicted hours     | 7209  | 95865.87   | 13.2981 | 12.39210       | \$3,834,635  |
| Ante/Post Natal         | Actual inpatient hours    | 15197 | 234189.23  | 15.4102 | 13.37345       | \$9,367,569  |
|                         | TrendCare predicted hours | 15197 | 207556.28  | 13.6577 | 14.27377       | \$8,302,251  |
|                         | Ratio predicted hours     | 15197 | 176592.10  | 11.6202 | 12.34282       | \$7,063,684  |
| Adult Critical Care     | Actual inpatient hours    | 9319  | 223229.87  | 23.9543 | 17.88241       | \$8,929,195  |
|                         | TrendCare predicted hours | 9319  | 225356.83  | 24.1825 | 19.64746       | \$9,014,273  |
|                         | Ratio predicted hours     | 9319  | 263585.88  | 28.2848 | 24.19768       | \$10,543,435 |
| Non-Adult Critical Care | Actual inpatient hours    | 1431  | 47746.48   | 33.3658 | 28.50000       | \$1,909,859  |
|                         | TrendCare predicted hours | 1431  | 47417.85   | 33.1362 | 28.21746       | \$1,896,714  |
|                         | Ratio predicted hours     | 1431  | 30112.08   | 21.0427 | 26.08304       | \$1,204,483  |
| Other                   | Actual inpatient hours    | 6750  | 147235.45  | 21.8127 | 16.47870       | \$5,889,418  |
|                         | TrendCare predicted hours | 6750  | 143042.08  | 21.1914 | 17.74230       | \$5,721,683  |
|                         | Ratio predicted hours     | 6750  | 161633.70  | 23.9457 | 18.62731       | \$6,465,348  |

**Table 5.34 - Cost analysis - All Hospitals, all shifts by Patient Type Category**

Analysis were then undertaken by patient type and hospital variables, See Tables 5.35 – 5.37.

| Patient Type Category |                           | N    | Sum      | Mean    | Std. Deviation | Total Cost  |
|-----------------------|---------------------------|------|----------|---------|----------------|-------------|
| Medical/Surgical      | Actual inpatient hours    | 4023 | 82599.97 | 20.5319 | 16.10417       | \$3,303,999 |
|                       | TrendCare predicted hours | 4023 | 87474.97 | 21.7437 | 17.85130       | \$3,498,999 |
|                       | Ratio predicted hours     | 4023 | 88337.00 | 21.9580 | 17.85618       | \$3,533,480 |
| Adult Critical Care   | Actual inpatient hours    | 716  | 16235.35 | 22.6751 | 14.58144       | \$649,414   |
|                       | TrendCare predicted hours | 716  | 14489.62 | 20.2369 | 14.50061       | \$579,585   |
|                       | Ratio predicted hours     | 716  | 14497.02 | 20.2472 | 13.36028       | \$579,881   |

**Table 5.35 - Cost analysis - Australian Metropolitan Public Level 2 Hospitals, by Patient Category**

| Patient Type Category   |                           | N    | Sum       | Mean    | Std. Deviation | Total Cost  |
|-------------------------|---------------------------|------|-----------|---------|----------------|-------------|
| Medical/Surgical        | Actual inpatient hours    | 4641 | 96091.73  | 20.7050 | 19.94226       | \$3,843,669 |
|                         | TrendCare predicted hours | 4641 | 98909.32  | 21.3121 | 21.83544       | \$3,956,373 |
|                         | Ratio predicted hours     | 4641 | 100013.00 | 21.5499 | 21.34659       | \$4,000,520 |
| Paediatric              | Actual inpatient hours    | 839  | 12610.37  | 15.0302 | 9.48404        | \$504,415   |
|                         | TrendCare predicted hours | 839  | 11387.38  | 13.5726 | 10.60726       | \$455,495   |
|                         | Ratio predicted hours     | 839  | 9769.00   | 11.6436 | 8.95657        | \$390,760   |
| Ante/Post Natal         | Actual inpatient hours    | 2163 | 31183.78  | 14.4169 | 9.06069        | \$1,247,351 |
|                         | TrendCare predicted hours | 2163 | 25162.10  | 11.6330 | 9.45387        | \$1,006,484 |
|                         | Ratio predicted hours     | 2163 | 18000.00  | 8.3218  | 6.53476        | \$720,000   |
| Adult Critical Care     | Actual inpatient hours    | 1044 | 19847.80  | 19.0113 | 11.59666       | \$793,912   |
|                         | TrendCare predicted hours | 1044 | 18661.53  | 17.8750 | 12.16538       | \$746,461   |
|                         | Ratio predicted hours     | 1044 | 20415.00  | 19.5546 | 12.72377       | \$816,600   |
| Non-Adult Critical Care | Actual inpatient hours    | 1    | 1.58      | 1.5833  | .              | \$63        |
|                         | TrendCare predicted hours | 1    | 6.42      | 6.4167  | .              | \$257       |
|                         | Ratio predicted hours     | 1    | 8.00      | 8.0000  | .              | \$320       |
| Other                   | Actual inpatient hours    | 1193 | 19434.88  | 16.2908 | 12.41106       | \$777,395   |
|                         | TrendCare predicted hours | 1193 | 17904.22  | 15.0077 | 13.08185       | \$716,169   |
|                         | Ratio predicted hours     | 1193 | 16957.00  | 14.2137 | 10.84997       | \$678,280   |

**Table 5.36 - Cost analysis - Australian Rural Public Level 2 Hospitals, by Patient Type Category**

In Table 5.36, N = 1 for non-adult critical care and should be discounted in preference for the equivalent patient type category in Table 5.37, where N = 763. This means that in the sample of Australian public hospitals, all but one shift of care was provided in Metropolitan level 1 and 2 hospitals for children and babies. There are no rural public level 1 hospitals in the sample.

| Patient Type Category   |                           | N    | Sum      | Mean    | Std. Deviation | Total Cost  |
|-------------------------|---------------------------|------|----------|---------|----------------|-------------|
| Medical/<br>Surgical    | Actual inpatient hours    | 4023 | 82599.97 | 20.5319 | 16.10417       | \$3,303,999 |
|                         | TrendCare predicted hours | 4023 | 87474.97 | 21.7437 | 17.85130       | \$3,498,999 |
|                         | Ratio predicted hours     | 4023 | 88337.00 | 21.9580 | 17.85618       | \$3,533,480 |
| Paediatric              | Actual inpatient hours    | 2419 | 64215.23 | 26.5462 | 14.09407       | \$2,568,609 |
|                         | TrendCare predicted hours | 2419 | 65291.67 | 26.9912 | 16.01600       | \$2,611,667 |
|                         | Ratio predicted hours     | 2419 | 53571.00 | 22.1459 | 13.25130       | \$2,142,840 |
| Ante/Post Natal         | Actual inpatient hours    | 2518 | 55512.13 | 22.0461 | 21.74175       | \$2,220,485 |
|                         | TrendCare predicted hours | 2518 | 54896.57 | 21.8017 | 22.75990       | \$2,195,863 |
|                         | Ratio predicted hours     | 2518 | 42734.00 | 16.9714 | 18.76285       | \$1,709,360 |
| Adult Critical Care     | Actual inpatient hours    | 716  | 16235.35 | 22.6751 | 14.58144       | \$649,414   |
|                         | TrendCare predicted hours | 716  | 14489.62 | 20.2369 | 14.50061       | \$579,585   |
|                         | Ratio predicted hours     | 716  | 14497.02 | 20.2472 | 13.36028       | \$579,881   |
| Non-Adult Critical Care | Actual inpatient hours    | 763  | 43486.98 | 56.9947 | 17.72631       | \$1,739,479 |
|                         | TrendCare predicted hours | 763  | 42340.25 | 55.4918 | 20.14025       | \$1,693,610 |
|                         | Ratio predicted hours     | 763  | 27246.00 | 35.7090 | 28.34835       | \$1,089,840 |

**Table 5.37 - Cost analysis - Australian Metropolitan Public Level 1 and 2 Hospitals, by Patient Type Category**

These results were analysed further by considering four possible scenarios. The scenarios are shifts where:

1. Both TrendCare and ratios over predict
2. Both TrendCare and ratios under predict
3. TrendCare over predicts but ratio is satisfactory
4. Ratio over predicts and TrendCare is satisfactory

The scenarios were analysed on a subset of data which most closely matches shifts in Victorian public hospitals. The cost analysis was conducted on data from Australian public hospitals, for 3 hospital levels and 2 regions, focussing on medical/surgical, paediatric and maternity patient types.

The parameters are where:

1. TrendCare predicted less than actual and ratio predicted less than actual;
2. TrendCare predicted less than actual and ratio predicted at least as much as actual;
3. TrendCare predicted at least as much as actual and ratio predicted less than actual;
4. TrendCare predicted at least as much as actual and ratio predicted at least as much as actual.

That is:

1. Both TrendCare and ratio 'under-budgetted' nurses for care actually required;
2. TrendCare 'under-budgetted' for nurses, but ratio did not;
3. Ratio 'under-budgetted' for nurses, but TrendCare did not;
4. Neither TrendCare nor ratio 'under-budgetted' for nurses.

In each of these cases, the focus was on;

- a. The TrendCare variance (actual – TrendCare predicted);
- b. The ratio variance (actual – ratio predicted);
- c. Which prediction method was closest to actual?

To investigate a. and b. above, I considered the four scenarios for all patient categories and for each of the patient type categories and for the different hospital groups. See Tables 5.38-5.47.

The mean and standard deviation were calculated for each of these cases. The means are in hours per ward, per shift. They are not presented in terms of dollars and special cases could be selected for analysis. For example, the results show that for all hospitals and all cases, the scenario when both TrendCare and ratio under predict actual hours, the average number of hours per ward and per shift for this sample that TrendCare under predicts is 4.0273 hours. See Table 5.39. This corresponds to \$40 per hour or \$161 per ward, per shift, on average for this sample. In comparison, ratio under predicts by 5.4519 hours, or \$218 per ward, per shift, on average for this sample.

The hours are reported in terms of 'per cent of actual'. This is because for some wards, under predicting by 4 hours might not be a lot whereas for other wards it might be very significant. It is clear that, on average, for all hospitals and wards, when both TrendCare and ratio under predict actual need, TrendCare under predicts by 27.8% of actual, whereas ratio under predicts by 35% of actual. This means that nurses are working harder under ratio practices than TrendCare in these circumstances.

To determine part c. above, 'ABS (ratio variance) – ABS (TrendCare variance)' was used, which is simply the difference in the absolute values of the two different variance measures. In Table 5.39, where both TrendCare and ratio under predicted actual, ratio under predicted by 7.2% of actual more than TrendCare did. This means that if budgets are developed on predicted, then hospitals using TrendCare would have paid out more (7.2% more) for these cases than hospitals using ratio.

If the ratio variance is larger in absolute value than the TrendCare variance, then this measure will be positive. In all but two cases, this number was positive, meaning that

TrendCare almost always appears to outperform the ratio method for predicting actual clinical need.

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N     | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|-------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 34833 | 4.0273  | 4.38686        | 27.8%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 34833 | 5.4519  | 6.13494        | 35.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 34833 | 1.4245  | 5.10348        | 7.2%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 18525 | 2.3136  | 2.83058        | 17.2%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 18525 | -4.2592 | 5.48736        | -34.3%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 18525 | 1.9456  | 5.58337        | 17.1%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 16185 | -1.9203 | 2.66141        | -10.8%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 16185 | 3.4942  | 5.46970        | 20.9%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 16185 | 1.5738  | 5.36311        | 10.1%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 33726 | -3.5644 | 4.26754        | -35.2%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 33726 | -6.0663 | 6.93401        | -59.5%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 33726 | 2.5018  | 5.97656        | 24.4%       |

**Table 5.38 Cost analysis by scenario. All cases, all Australian public hospitals**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N     | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|-------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 18506 | 3.5870  | 4.26279        | 24.9%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 18506 | 3.9782  | 4.14125        | 29.5%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 18506 | .3912   | 3.42594        | 4.6%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 11958 | 2.0582  | 2.44436        | 15.1%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 11958 | -3.5956 | 3.98693        | -29.3%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 11958 | 1.5374  | 4.40200        | 14.2%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 9764  | -1.4741 | 2.30324        | -9.4%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 9764  | 2.1787  | 2.65084        | 18.6%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 9764  | .7046   | 2.92624        | 9.2%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 23135 | -3.4559 | 4.14781        | -27.7%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 23135 | -5.7192 | 6.05151        | -52.7%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 23135 | 2.2633  | 5.12234        | 25.0%       |

**Table 5.39 Cost analysis by scenario. Medical/surgical patient type category, Australian public hospitals**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 3905 | 3.6230  | 3.64025        | 28.5%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 3905 | 5.1788  | 4.39846        | 37.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 3905 | 1.5558  | 3.23783        | 8.5%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 362  | .9726   | 1.43349        | 15.7%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 362  | -.9186  | 1.21943        | -19.1%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 362  | -.0540  | 1.65341        | 3.4%        |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1615 | -2.4119 | 2.77916        | -12.5%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1615 | 3.7561  | 3.71867        | 19.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1615 | 1.3442  | 4.16198        | 6.5%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 1327 | -3.3404 | 3.85882        | -52.7%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1327 | -2.3003 | 2.84042        | -49.8%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1327 | -1.0402 | 2.99376        | -3.0%       |

**Table 5.40 Cost analysis by scenario. Paediatric Patient Type Category, Australian public hospitals**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 7364 | 5.3280  | 4.62088        | 37.7%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 7364 | 8.4728  | 7.72683        | 50.9%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 7364 | 3.1448  | 6.21622        | 13.3%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 2231 | 1.9182  | 2.29197        | 24.5%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 2231 | -4.4331 | 6.29694        | -69.8%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 2231 | 2.5149  | 5.85803        | 45.3%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 2471 | -2.8421 | 3.17695        | -14.6%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 2471 | 6.3138  | 7.94164        | 29.3%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 2471 | 3.4717  | 7.78102        | 14.7%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 3131 | -3.1488 | 4.16892        | -90.1%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 3131 | -3.3560 | 4.87771        | -120.0%     |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 3131 | .2071   | 4.82724        | 29.9%       |

**Table 5.41 Cost analysis by scenario. Ante/Post Natal Patient Type Category, Australian public hospitals**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1452 | 2.8772  | 4.65066        | 18.2%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1452 | 3.7435  | 3.40741        | 26.7%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1452 | .8662   | 4.83558        | 8.5%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 521  | 1.6776  | 2.28950        | 10.9%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 521  | -3.3659 | 4.18684        | -28.1%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 521  | 1.6883  | 4.45780        | 17.2%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 962  | -1.0414 | 1.42022        | -8.8%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 962  | 1.9840  | 2.11553        | 19.1%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 962  | .9426   | 2.36605        | 10.3%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 1804 | -3.9796 | 4.04982        | -22.9%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1804 | -5.3155 | 4.81259        | -37.7%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1804 | 1.3359  | 3.83232        | 14.9%       |

**Table 5.42 Cost analysis by scenario. Australian Public Metropolitan Public Level 2 Hospitals – All patient Type Categories**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1030 | 2.1928  | 2.58285        | 16.4%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1030 | 3.1572  | 2.57913        | 28.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1030 | .9644   | 2.56587        | 11.6%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 409  | 1.5186  | 1.56902        | 9.7%        |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 409  | -3.4762 | 3.16351        | -27.6%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 409  | 1.9576  | 3.55533        | 17.9%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 902  | -.9605  | 1.29199        | -7.8%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 902  | 1.8011  | 1.80363        | 19.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 902  | .8406   | 2.04724        | 11.3%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 1682 | -4.0953 | 4.11914        | -21.4%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1682 | -5.4647 | 4.87943        | -38.4%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1682 | 1.3694  | 3.88223        | 17.0%       |

**Table 5.43. Cost analysis by scenario. Australian Public Metropolitan Public Level 2 Hospitals – Medical/Surgical Patient Category**

There were no cases for paediatric or ante/post natal patient type categories in Australian Public Metropolitan Public Level 2 Hospitals – in the sample.

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 3902 | 3.9481  | 3.89323        | 29.0%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 3902 | 5.8419  | 5.84198        | 37.5%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 3902 | 1.8939  | 4.15734        | 8.5%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 1640 | 1.6781  | 1.82087        | 17.9%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1640 | -2.7423 | 2.92742        | -32.7%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1640 | 1.0642  | 3.01893        | 14.9%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1694 | -1.8571 | 2.26860        | -8.7%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1694 | 3.3214  | 4.46176        | 18.0%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1694 | 1.4644  | 4.33549        | 9.4%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 2645 | -2.9763 | 3.98916        | -21.8%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 2645 | -3.7490 | 4.57076        | -43.7%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 2645 | .7727   | 3.31970        | 21.9%       |

**Table 5.44 Cost analysis by scenario. Australian Public Rural Public Level 2 Hospitals – All Patient Categories**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1339 | 2.5129  | 2.65766        | 23.3%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1339 | 3.3279  | 3.27672        | 26.8%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1339 | .8150   | 2.48253        | 3.5%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 820  | 1.3063  | 1.51894        | 14.0%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 820  | -2.5586 | 2.87154        | -27.4%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 820  | 1.2523  | 2.89647        | 13.5%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 726  | -1.5529 | 2.16423        | -7.6%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 726  | 1.8296  | 2.23856        | 14.3%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 726  | .2766   | 2.66374        | 6.8%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 1756 | -3.4886 | 4.53651        | -20.0%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1756 | -4.3323 | 5.01615        | -42.5%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1756 | .8437   | 3.39131        | 22.5%       |

**Table 5.45 Cost analysis by scenario. Australian Public Rural Public Level 2 Hospitals – Medical/Surgical Patient Type Category**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N   | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|-----|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 524 | 3.4844  | 2.82494        | 27.8%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 524 | 4.9506  | 3.31153        | 37.1%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 524 | 1.4661  | 2.40102        | 9.3%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 24  | .7285   | .63523         | 13.0%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 24  | -.5736  | .90495         | -11.0%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 24  | -.1549  | .99149         | -2.0%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 187 | -1.5599 | 1.68433        | -8.6%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 187 | 2.4662  | 2.75933        | 13.7%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 187 | .9063   | 3.09708        | 5.1%        |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 104 | -3.1601 | 3.18299        | -62.9%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 104 | -1.9245 | 3.09107        | -81.7%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 104 | -1.2356 | 2.45200        | 18.9%       |

**Table 5.46 Cost analysis by scenario. Australian Public Rural Public Level 2 Hospitals – Paediatric Patient Type Category**

| Indicator for TC bigger than Actual            | Indicator for Ratio bigger than Actual     |                                               | N    | Mean    | Std. Deviation | % of Actual |
|------------------------------------------------|--------------------------------------------|-----------------------------------------------|------|---------|----------------|-------------|
| TrendCare predicted less than Actual           | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 1300 | 5.4554  | 4.51217        | 37.2%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 1300 | 9.0476  | 7.64061        | 53.4%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 1300 | 3.5921  | 5.64242        | 16.2%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 229  | 1.3594  | 1.24799        | 30.6%       |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 229  | -2.5777 | 2.52220        | -75.9%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 229  | 1.2183  | 2.64207        | 45.4%       |
| TrendCare predicted at least as much as Actual | Ratio predicted less than Actual           | TrendCare Variance (Actual - Predicted)       | 391  | -2.4803 | 2.87562        | -11.2%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 391  | 6.4052  | 7.20477        | 29.2%       |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 391  | 3.9249  | 6.65457        | 18.1%       |
|                                                | Ratio predicted at least as much as Actual | TrendCare Variance (Actual - Predicted)       | 243  | -1.6951 | 1.85510        | -24.4%      |
|                                                |                                            | Ratio Variance (Actual - Predicted)           | 243  | -2.0255 | 2.06958        | -50.6%      |
|                                                |                                            | ABS(Ratio Variance) - ABS(TrendCare Variance) | 243  | .3304   | 2.54059        | 26.2%       |

**Table 5.47 Cost analysis by scenario. Australian Public Rural Public Level 2 Hospitals – Ante/Post Natal Patient Category**

For metropolitan and rural Australian hospitals, ratio variance is greater than TrendCare variance and the absolute values are positive in all cases except for Australian rural public level 2 hospital paediatric patients, where ratios outperform. This result should be interpreted with caution since, other than for the Royal Children's hospital; there are no paediatric ratios for other public hospitals under Victorian public hospital mandated ratio formula.

## **5.7 Conclusion**

The statistical analysis enabled the reporting of results for descriptive and inferential statistics for the overall sample, the most common shift profile and the Thailand subset of 7 hospitals. The analysis also enabled a rudimentary analysis of the effect of the rounding rule and the costs of care under both practices.

The results identified relationships between actualized care hours and the hours of care predicted by both ratios and TrendCare HPPD. Both practices showed a high positive correlation between the care requirements predicted and the care actually provided. TrendCare had a higher correlation than ratios for all hospital, shift type and patient type variables. Regression analysis was undertaken for the purposes of predicting care requirements in the future. TrendCare predicted a greater proportion of the variability in actual care requirements than ratios for every hospital, shift type and patient type variable.

Ratios were designed for Victorian public hospitals. Statistical tests were conducted on a subset of hospitals which were representative of the majority of shifts for those hospitals. This subset was known as the 'most common shift profile'. Once again, TrendCare predicted a greater proportion of the variability than ratios. An analysis of ratio predicted and ratio actualized hours showed that ratios predicted least well in the settings for which they were designed. For example, ratios predicted less of the

variability in public hospitals rather than private and less in Australian hospitals than New Zealand hospitals. Ratios also predicted less of the variability in metropolitan hospitals than rural hospitals and less in level 1 hospitals than either level 2 or 3 hospitals. TrendCare outperforms ratios as occupancy increases, i.e. using TrendCare HPPD reduce as occupancy increases and using ratios, more nurses are allocated as occupancy increases. Rudimentary costing analyses also demonstrate that hospitals using TrendCare would have lower direct care nursing costs than hospitals using Victorian mandated nurse patient ratios for the same patient and staff cohort.

The information derived from the analysis of the data enabled the testing of the hypothesis. The hypothesis is that both ratios and TrendCare can predict a fair allocation of nursing resources to patients, since they were both designed to do this, but that TrendCare predicts with greater accuracy since it has more detailed data inputs. The hypothesis is upheld since the evidence of the multiple statistical tests undertaken in this analysis is clear and convincing; TrendCare predicts actual direct nursing care requirements with greater accuracy than ratios for the full range of settings and patient types and this facilitates better allocation of nursing resources.

In the final chapter, the information gained from the results of the statistical tests is integrated with existing knowledge on the way nurses predict and allocate their workloads. More importantly, the next chapter looks at integration of the new information with current and future policy development in nursing resource management.

*'Ratios and TrendCare are both about more than just calculating nursing time. They are entire methodologies in themselves that have consequences quite beyond the hours they produce (Diers, 2005)*

## CHAPTER SIX

### DISCUSSION AND CONCLUSIONS

#### 6.1 Introduction

The primary aim of this study was to examine the variation between predicted and actualized nursing care for two contemporary nursing workload allocation practices. The analysis was undertaken to determine if a correlation exists between predicted and actualized hours per patient day for mandated Victorian public hospital nurse patient ratios and/or the TrendCare dependency system. The analysis also examined whether either practice reliably predicts the nursing resources appropriate to the variations in patient requirements in acute care hospitals.

The analysis included a range of patient types and other variables such as shift type and hospital type. De-identified data was provided from shifts of care from 22 acute care hospitals in Thailand, New Zealand and Australia. The staff of all hospitals in the sample were experienced TrendCare users and they were supported by a program of inter-rater reliability testing. The periods sampled were the months of May to August in 2003 and 2004, i.e. the winter demand for New Zealand and Australia. The data analyzed were from standard reports in TrendCare versions 2.1 to 3.1.2. Ethical approval was provided by SCERH of Monash University, participant hospitals and Maori health care providers. The study did not include an analysis of indirect nursing care or standards or quality of care.

The study began with a discussion about the importance of nursing care for hospitals. It identified nursing care as the principal reason for admission to hospital and one of the highest cost items in a hospital operating budget. As discussed in the first chapter,

nursing workload practices should be high on the policy agenda for hospital managers and funding agencies. Historically, difficulties have been faced by nurses and their managers. More recent endeavors to identify patient care requirements and allocate nursing workloads accurately and equitably remain mostly unresolved.

The evolution of staff allocation practices and the classification of patient care was described in a critical discussion of the literature undertaken in Chapter 2. That chapter included an examination of the history of nurse costing studies during the 1990s. It outlined the attempts that were made to develop a method of measuring nursing work which would be compatible with the casemix funding methodology. Two popular contemporary practices for measuring nursing were identified and discussed. A detailed discussion of these practices followed in Chapter 3, which was dedicated to the development of practices of nurse patient ratios and the TrendCare dependency system. Their influence on nurse staffing policy in Victoria and other local and international settings was presented.

In Chapter 4, the research design was described, including the design decisions made for mapping data between the ratio method and the TrendCare dependency method. The limitations to the research were also discussed. The results of the statistical tests were reported in Chapter 5. Since funding policy relates to the rules for the distribution of resources, it was logical to consider not only the distribution or allocation of nurses according to patient requirements but also some discussion on costs is included in this chapter.

In this chapter I reflect on the strategies adopted to overcome difficulties and to fulfil the research aim and consider the impact of the results for nursing. I also reflect on potential influences of this research on the future management of nursing resources and nurse staffing policy. Finally, I make recommendations for on-going research relevant to understanding nurses' work in this dynamic and exciting area of nursing resource management.

## **6.2 The strategies adopted to fulfill the research aim**

The strength of the research design was supported by several strategies which were adopted to fulfill the aim of this study and ensure optimum data quality and quantity for the analysis. After identifying what data was comparable and what was not, strategies were developed to manage variables. These strategies helped to identify what mattered in terms of fulfilling the research aim and what didn't.

Participation by expert TrendCare users who conducted inter-rater reliability testing for nurses was the main strategy for ensuring data quality. The technical and nursing expertise of expert users also ensured that the entire data set could be electronically transferred for inclusion in this study.

Simultaneous recording of both practices for the same patient and staff cohort ensured comparability of the ratio and TrendCare data. Several mapping techniques were used to support the comparability. For example, mapping was undertaken from hospital ward name to ANF ward type. Hospitals were allocated a 'level' which would apply if the hospital was located in Victoria, so that Victorian public hospital ratios could be applied by the formula appropriate to hospital level 1, 2 or 3. The results could then be extrapolated to Victorian public hospitals.

Some data were not directly comparable and were environment specific. In some of these cases a separate analysis was undertaken. Two examples of separate analyses are firstly those conducted on the Thailand subset of 7 hospitals, and secondly the most common profile to model Victorian public hospital equivalence. In other cases, the comparison of data was made but the interpretation considers the differences. For example, the interpretation of the results of the tests for Phya Thai hospital 3 data where dependency is greater for cultural reasons. The data are interpreted in consideration of different models of care, casemix and social customs in Thailand compared to those for Australia and New Zealand.

While the research design was strong and many extraneous variables could be controlled by the simultaneous recording of the two practices, there were several matters over which there was no control. The most significant was the protracted data collection period. There was an unexpected delay in roll-out of TrendCare version 3.1. This version included the ability to de-identify certain report fields, the simultaneous inclusion of Victorian nurse patient ratios, the TrendCare dependency HPPD, and the ability to electronically transfer reports. All three capabilities were essential to the research design initially; however, the need to be able to de-identify certain fields was not required after a design decision was made to request summary reports which did not include any identifying information. The delayed roll-out, postponed data collection for 12 months and the results were not available until after the Victorian public hospital EBA negotiations. It was hoped that the results would contribute to those negotiations.

The delay was followed by on-going difficulties for larger sites, where the size of the files resulted in Microsoft timing out before the report could be executed. This meant that some hospitals were required to wait for patches or 'fixes' for some months or withdraw from the sample. Further delays were attributed to poor timing for inclusion in information technology upgrade schedules of different hospitals. This meant that some hospitals had the upgraded versions and patches but were unable to have them installed in time for the data collection due to IT scheduling priorities.

Change of hospital ownership during the study did not affect participation for some hospitals but it did effect data collection from Phya Thai hospitals 1 and 2. The subsequent withdrawal of these hospitals reduced the sample of shifts of care in Thailand to those from one hospital, which was undesirable for extrapolation of the results to other Thai hospitals. The withdrawals resulted in changes to the research design. A subset of hospitals was created, including Phya Thai 3 hospital and Australian and New Zealand hospitals with similar patient types and statistically

comparable numbers of shifts of care. There were several changes to Directors of Nursing in Australian hospitals, some of whom required new ethics approval applications. The new applications were processed but data collection was delayed in each case. Several ethics committees disbanded or merged but this did not affect the timeliness of data collection.

The withdrawal of Victorian public hospitals was also outside the control of the researcher. In the original research design, it was desirable to include expert Victorian TrendCare users. In an unexpectedly positive turn of events, the decision by DHS to prohibit the participation by Victorian public hospitals enabled the study to analyze data recorded by nurses outside mandated nurse patient ratio environments and not in negotiations for wages and conditions. This had the presumed effect of enhancing data quality, since data recorded by nurses outside Victoria was unlikely to be perceived by them to be used for a purpose other than workload allocation.

As discussed in Chapter 3, Victorian nurses had expressed concerns during the evaluation of the PND pilot, that the data in TrendCare could be used by government to reduce ratios and reduce costs (Monash University, 2004a). The inclusion of data from Victorian public hospitals during this period may have included data at risk of being incomplete or up-scaled. A further design decision subsequently resulted in the exclusion of Victorian private hospitals which were also beginning negotiations for private sector ratios. Although it was desirable to have all the original participants contribute data, it did not matter from a design perspective that the Thai sample was not larger, that 6 hospitals who participated for three years could not submit data for technical or other reasons or that Victorian hospitals were not participating, because the final sample was statistically powerful enough for the analysis.

### 6.3 What the results mean for nursing allocation and costing

At the end of Chapter 5, I rejected the null hypothesis in favour of the hypothesis. Levels of significance (p values) were close to 0 and less than 0.001 for some tests. The results showed that both ratios and TrendCare can predict a fair allocation of nursing resources to patients, however, TrendCare predicts with greater accuracy. As described in Chapter 5, the evidence of the multiple statistical tests undertaken in this analysis is now indisputable. TrendCare predicts actual direct nursing care requirements with greater accuracy than ratios for the full range of settings and patient types and this facilitates better allocation of nursing resources.

The key findings should be interpreted in consideration of the study limitations. The limitations were described in detail in Chapter 4. Several limitations are likely to increase the reported variance between predicted and actualized hours for ratios. The limitations are:

- the ratio hours were calculated on all occupied beds. In Victoria, nurses close beds when minimum ratios cannot be met. This would have the effect of reducing the actualized hours for Victorian hospitals while predicted hours remained the same for all hospitals;
- ratios include some indirect care for the in-charge person on night shift. Indirect care in TrendCare is recorded elsewhere;
- the rounding rule does not apply to predicted hours for ratios. This would have the effect of increasing (for rounding up) or decreasing (for rounding down) the actual hours by approximately 8 hours, i.e. a whole nurse for that shift while predicted hours remain unchanged;
- there is no provision for psychiatric or paediatric wards in Schedule C. The results for these ward types were mapped to adult medical/surgical wards.

These limitations mean that there is likely to be even less correlation between predicted and actualized hours for ratios than reported, especially if the hospitals were located in Victoria. This also means that ratios are even less likely to be able to predict the variability in nursing than reported for any of the variables.

The other study limitations, described in Chapter 4, were unlikely to affect the results of the statistical tests. However, there are three considerations which are likely to affect the interpretation of the costing analysis if the hospitals were located in Victoria. The first is the additional costs associated with rounding up, which as discussed in Chapter 3 occurs twice as often as rounding down, in Victoria. The second is the loss of revenue for patients who cannot be cared for in 'closed' beds when minimum ratios cannot be met. The third consideration is the management of the cost of penalty rates of pay. Although penalty rates were built into the \$40 per hour average rate used for the purpose of costing calculations, there are some practices which are likely to increase that average. The practices are:

- 10 – 10.5 hour night shift – resulting in a 2 or 2.5 hour shift overlaps. This means hospitals will pay for as much as 26.5 hours of care for each 24 hours. Therefore, hospitals are not only paying for a superfluous 2.5 hours of care each day when there are twice as many staff caring for patients, they are also paying those additional hours on the shift that attracts the highest penalty rates. A half hour overlap, or other period which matches the unpaid meal breaks means 24 hours of care is being paid for in each 24 hours. For example the shift allocation could be 3 x 8.5 hour shifts each with 0.5 hour unpaid meal break. Most Victorian public hospitals have 10 hour night shifts. By contrast most private hospitals and Queensland public hospitals have shorter night shifts.
- applying the same ratios for 7 days week including weekends and public holidays when penalty rates are at their highest and acuity rates are

usually at their lowest. In short, some hospitals may be paying twice the money for half the work on weekends.

- resource allocation is generally focused on the busiest shifts, rather than those with least predictability and highest penalty rates. The results showed that although the morning shift has the highest occupancy and mean actual HPPD, that shift had the lowest standard deviation. In other words, evening and night shifts may have lower average acuity and fewer patients but they are more unpredictable and they cost more in penalty rates of pay. The focus should be on these shifts so that costly mistakes are not made by inaccurate resource predictions.

Some Nurse Managers suggest that the use of ratios may reduce costs in some cases because they reduce the frequency of employing casual staff at higher rates of pay. This argument is not well founded since it implies that permanent staff will be rostered, at non-casual rates of pay, whether they are needed or not. If the latter occurs, payers are paying more than they need to for actual care and this is supported in the costing analysis.

In summary, the study limitations which mattered were limitations to ratio practices which would be expected to decrease the accuracy of prediction of care requirements and increase the cost of care using ratios. This increase could be greater than that reported in the results, if the hospitals were located in Victoria. These variations could be quantified with further analysis of the same data in future studies.

The key findings in this study are:

- Both ratios and TrendCare showed a high correlation between the hours of care predicted by each practice and the care actually provided;

- There is a higher correlation between TrendCare predicted hours and actualized hours than for ratios for each hospital level, for both public and private hospitals, for all patient type categories, for morning, evening and night shifts. There is no category of variable where ratios have a higher correlation than TrendCare;
- TrendCare predicts more of the variability than ratios for each hospital level, public and private hospitals, for Australian and New Zealand hospitals, metropolitan and rural hospitals, all patient type categories and morning, evening and night shift, with 95% confidence intervals. There is no category of variable where ratios predict more of the variability than TrendCare;
- Actual HPPD decreases as occupancy increases. This means that TrendCare users become more efficient as occupancy increases. In Victorian public hospitals, more nurses are rostered as occupancy increases. Ratio practices are likely to be less efficient in use of resources as occupancy increases;
- The rounding rule of the Nurses (Victorian Public Health Sector) Multi-business Agreement 2000-2004 Schedule C, part 1B had a range of effects. It increases the ratio variance by a range of 0.5 to 13.5% for approximately half of the hospitals in the sample and decreases the variance by a range of 1.2 to 7.9% for the others. This reflects the averaging effect that was desirable with this rule. In Victoria, as described previously, rounding up occurs 65.4% of the time which indicates that some rounding up occurs for reasons other than the rounding rule.
- Mean actual hours per shift are higher for metropolitan hospitals than rural. This means that metropolitan and rural hospitals of the same level may be allocated the same ratios under Victorian mandated ratio rules, but have

significantly different patient requirements in wards and shifts of the same type;

- Mean actual hours per shift are higher for level 2 hospitals than for level 1 hospitals. This result may be due, in part, to lower occupancy in level 2 hospitals or lower acuity for the same patient types. That could not be analyzed on the data available. This means that level 2 hospitals may be disadvantaged under Victorian mandated ratio rules where level 1 hospitals attract lower nurse patient ratios.
- Ratios predict less of the variability in the majority of the shift types for which they were they were designed, than for other shift types i.e. shifts in Australian, public metropolitan, level 1 hospitals, in medical/surgical wards for morning shifts. This means that, as well as for the ward and shift type variables, TrendCare predicts more of the variability in Australian public hospitals. Therefore, TrendCare is also likely to predict more of the variability in Victorian public hospitals. This means that ratios perform least well, not only in the settings for which they were designed, but also in the settings in which they are most popular. This suggests that the popularity with ratios may not be the in accuracy. Other factors may include the legal enforceability of the practice, ensuring that staffing cannot be manipulated by hospital managers without agreed process. Another factor may be the relatively higher cost of ratios compared to the actual cost of care. The budget implication is a lack of efficient use of resources. The popularity would arise from the satisfaction of the majority of nurses. Most nurses would be employed in level 1 hospitals which have lower ratios than level 2 hospitals despite having a lower mean HPPD.
- TrendCare under predicts the costs of the actual hours of care by about as much as ratios over predicts those costs. This demonstrates that the budgeted

cost of nursing care would be less for hospitals using TrendCare than for ratios. The over prediction by ratios is likely to be higher in Victorian public hospitals due to the reasons described earlier about limitations to the interpretation of the costing analysis results. This means that the actual cost of nursing care by ratios is likely to be higher in Victoria than anywhere else in Australia.

The most important interpretation of the cost analysis is as follows; the provision of nursing care at lower cost using a dependency system rather than ratios, can be organised to meet patient requirements by using less nursing hours and better management of the allocation of hours and skill mix. This is an important outcome for the costs of care and for distribution of the limited nursing resources.

Other findings are:

- mean actual hours of care are highest for Thailand and lowest for Australia.
- the patient type category with both the lowest mean actual hours and standard deviation is ante/post natal;
- the patient type category with both the highest mean actual hours and standard deviation is non-adult critical care.
- the patient type group 'other' has one of the lowest levels of variability despite the group being all patient types other than the 5 specialty areas of study. The reason for the low variability has not been explored in this study.

The results also revealed that some anticipated associated results were not supported in the data, although of a lower order than those which fulfilled the research aim. The data did not show more variability in actualized hours for hospitals where there are dynamic departments which influence the peaks and troughs of activity levels throughout those hospitals; for example, departments such as delivery suites or

accident and emergency departments. The data also did not demonstrate more variability for smaller hospitals where the peaks of actualized care are less able to be provided for by the recruitment of indirect care staff mid shift as would be available to larger hospitals: for example, the mid-shift recruitment of the night nurse supervisor, clinical teachers or nurse quality managers. Indirect care staff is more readily available in larger hospitals. They may also be more readily available in the not for profit sector, but this was outside the scope of the study. Finally the data did not show more variability in public hospitals in comparison to private hospitals even if the trend of the latter hospital type was procedural, i.e. surgical. Public hospitals tend to be medical; 69.7% of separations were for medical DRGs in 2001 compared to 36.3% in the private sector (Dept of Health and Ageing, 2003:10, 11). It was anticipated that a predominance of surgical wards would account for less variability for an individual hospital but this was not demonstrated.

What the data didn't show also supports the argument that the greatest influences on the acuity and variability of patient requirements are not hospital type or size. Hospital size, or level, and occupancy are key features of the ratio formula and both have been found to be unrelated to acuity and variability of patient requirements. The theoretical framework underpinning the development, use and implementation of ratios is the concept of fair and equitable workloads which nurses achieve by the allocation of an *equivalent number of patients per nurse*. The theoretical framework underpinning the development, use and implementation of patient dependency systems is to assign the *right nursing resources to the right patient*.

#### **6.4 A new understanding of nursing workloads**

The results have offered a new understanding of patient dependency and workload allocation. They have revealed a greater than expected difference between the frequencies of ward type and patient type categories. This demonstrated that the label associated with ward type does not accurately capture the range of nursing care

requirements of the range of patient types admitted to those wards. The frequency by ward type reveals that 83% of the sample was shifts for medical/surgical wards. This leaves only 17% of ward types which have an alternative ratio formula. By contrast medical/surgical patient types account for just 63% of the shifts. That means that 20% of patients in medical/surgical wards, by ratio rules, have another patient type classification in TrendCare. This significant proportion of patients is likely to have different requirements to medical/surgical patients and may be allocated different ratios if they were accommodated in another ward type.

Ratio allocation by ward types also does not adequately capture the range of requirements for several other patient types. For example low acuity medical patients are allocated the same ratios as high dependency surgical patients; antenatal patients who are essentially self care are allocated the same ratios as postnatal mothers and babies and there are no psychiatric or paediatric ratios. Ratios cannot accommodate changes in the ward case mix in a timely fashion. There is a process of committees and ballots which precede any permanent change except where patient care is compromised.

In general, ratios are reliable and useful where there is no alternative. They have been one factor in the recruitment of additional nursing staff in Victoria and California. It would also be reasonable to assume that as LOS decreases, there may be more homogeneity in nursing care but at higher levels of patient acuity. This means that ratios may have a place, at least for same day cases. While it is true that same day cases have risen from 30.6% in 1991 to 50.6% in 2001 (Dept of Health and Ageing, 2003:10, 11), the acuity of those same day patients may continue to remain highly variable despite their short stay. Ratio practices would require the support of dependency to determine that homogeneity, or lack of it, as in the case of same day patients.

Whether the care requirements have become more or less similar over time, nurses now want workload fairness. For example, according to the Melbourne TrendCare User Group, nurses would prefer to undertake 8 hours work in an 8 hour shift if that means 5 patients in a dependency allocated workload located in different rooms, rather than be allocated 10 hours of work in an 8 hour shift for 4 patients located together in a 4 bed ward (TrendCare User Group, 2004). Nurses also want flexibility. For example, TrendCare was in place in St Andrews Hospital in Brisbane, an original participant in this study, and nursing staff, aware of success of ratios, grew reluctant to do IRR testing and wanted to stop using the system. The Director of Nursing allowed them to stop using TrendCare, advising they could replace the system with ratios but they would be fixed. There could be no flexing up or down. The nurses reversed their decision and are content with TrendCare and IRR testing once more. Rather than have unfair or inflexible workloads which may progress to industrial action, bed closures, or escalating nursing care costs which result in arbitrary nursing budget cuts, it is preferable to focus on a better understanding of patient dependency and nursing work and initiate timely and co-coordinated policy development

Nurses need to understand their work and they need to record it in a retrievable format to participate fully at the policy table. With information and knowledge they are in a better position to negotiate their wages and conditions including fair and equitable workloads. Payers also need to receive the amount of work they paid for. It is reasonable to assume that many payers (outside Victoria at least) are getting more than they pay for. At the opening of the Asia Pacific Congress in Sydney in November 2004, Australian Federal Health Minister Tony Abbott praised Australia's nurses (and doctors) after his recent and only first hand experience of nursing, after admission to hospital during the 2004 federal election campaign. He said that *'sometimes we in government tax and try that on-going commitment and idealism'* (Arlington, 2004). He observed that nurses are central to the health system but the wages and conditions have resulted in approximately 23,000 qualified nurses are not

working nationally and 20% of nursing students leave the profession one year after graduating. While it is heartening that the health minister now has a new understanding of nurses' conditions, his understanding was prompted by a kidney stone and not strategic inquiry within a policy framework. Nurses must continue to actively research and develop tangible and timely information for policy makers.

In the Australian health system, we have a vast amount of expertise in data management and data analysis. We have a national minimum data set, national coding standards, a standard chart of accounts, national diagnosis and procedure; and DRG classification system and on-going monitoring and analysis by commonwealth and state health departments, the Australian Institute of Health and Welfare, the Australian Bureau of Statistics, the Commonwealth Department of Veteran's Affairs, various compensation and insurance organisations, the Health Insurance Commission and the Private Health Insurance Administrative Council. Those accountable for managing the budgets of the nation's hospitals require substantial detail of nursing workloads, to better quantify nursing care in acute hospitals.

Prior to this study, data showing variations in patient acuity and dependency was not routinely available for comparison, because nursing care is neither classified nor coded and often not directly comparable for workload or cost analysis. The TrendCare system would seem to be a resource currently available for these purposes. The system quantifies many variables and makes nursing visible and accountable for nurses and other consumers. It provides an opportunity to re-develop trust between management and nurses that is supported by data rather than inflexible legislation. As already discussed, the mandated aspect of ratios has been an overriding factor of their success, rather than the ratios themselves. Buchan summarized the situation very well when he said '*Ratios are a blunt instrument for achieving employer compliance, where reliance on alternative, voluntary (and often more sophisticated) methods of determining nurse staffing have not been effective*' (2004:3). Staffing by dependency

system has worked well under some EBAs i.e. Djerriwah, Colac and Hamilton public hospitals in Victoria.

As a result of this research, there is now a new understanding of two contemporary practices of predicting hours of care and allocating nursing work loads. Where it was difficult to account for and allocate nursing work in the past, accurate data and nursing resource allocation systems can be provided by TrendCare and possible by similar systems of the future. If TrendCare is accepted by all stakeholders and more widely implemented then we can provide the data that removes the need for ratios. This information will also enhance our ability to establish trends in conversion of clinical documentation into dependency classifications.

We now know, as a result of the research, that there is a need to determine the acuity of patients rather than a method which allocates numbers of patients to determine dependency. We also know that the acuity of patients is not affected by the location, type or size of the hospital. For example, the acuity of a patient requiring post-operative care post prostatectomy, with no other complications, co-morbidities or age factors, is the same in a level 3 rural hospital in New Zealand as for a level 2 metropolitan hospital in Australia. The acuity variables are captured in the indicators in TrendCare.

TrendCare is a form of patient dependency that provides decision support and the option for overruling the predictions by clinical judgment. Fixed ratios reduce the ability to make alternate decisions about nursing resources. Where some ratio flexibility has been introduced, documentation or justification of the rounding to ensure patient care is not compromised is still not required. The clinical judgment used in partnership with patient dependency systems can flow on to contribute to updated indicator timings. Timings in TrendCare are up-dated on this basis in addition to formal timing studies every 2-3 years (Lowe, 2003, 2004).

When patient acuity is understood, as in the case of users of TrendCare, the patient requirements can be matched with the skills and competencies and preferences of the nursing team. For example, Nurse Managers may choose to allocate 7.5 hours to each graduate nurse and 8 hours to each experienced nurse on the same shift. Nurse Managers can ensure that graduate nurses do not run on negative variances (higher workloads than predicted) but may decide that experienced nurses can. Unpredicted and unproductive care allowances can be adjusted to suit the mix of patients and staff. Matching the dual requirements of patients and nurses takes patient dependency and workload allocation to the next step. Mandated nurse patient ratio systems do not match the right patient to the right nurse.

Some strong conclusions have been drawn from the research and may be applied to other settings, including Victoria. The results are on a limited sample but the sample was large enough and the results are statistically significant to extrapolate others in similar sites in the future. The results show that we are now able to predict reasonably well by using either practice. What really matters is what should be budgeted for and what should be paid. If we can filter out where both practices are equally successful in predicting care requirements, we can concentrate on identifying the characteristics of those extreme cases. This will enable better management of the shifts for which ratios are not hitting the mark, resulting perhaps in acuity derived ratios in the future.

### **6.5 Integrating the results with the literature, current knowledge & practice**

Beat (1970) observed that the old system of determining departmental staffing levels purely on the number of beds occupied had no place in modern management technique. She asked, *'How can a matron convince a group of lay people that a certain number of nurses are required for her hospital? How can she convince the medical staff that her nurses can no longer cope with further admissions? How could all this information be recorded and be put forward in a graph form so that anyone*

*looking at it, either professional or lay could understand what he saw'* (1970:1)? I trust that 35 years later I have been able to provide such graphs, so that a lay person, or even a health minister, can understand that nurses can now predict their work with high levels of accuracy, regardless of the variables, and they have the data to rightfully take their place at the policy table.

Ratios had their place in recruiting nurses to rescue failing health systems in Victoria and California; they were simple, inexpensive and required no training or technology. As described in Chapter 3, ratios contributed to the return of over 3,300 nurses to Victorian public hospitals and the 1:5 ratio for medical-surgical wards improved staffing patterns in over 80% of Californian hospitals. Ratios often been used in conjunction with dependency systems in many settings. For example, nurses from the Democratic Nurses Organisation of South Africa have turned to patient dependency systems to support claims for a different type of ratio based on skill mix. This was an alternative to number of nurses i.e. higher ratios of qualified nurses, especially in the private sector. As a result, negotiations in 2004 resulted in one large private hospital group agreeing to at least 50% RN ratio, and another hospital agreed to abolishing ratios and implementing a patient dependency system.

The 2004-2007 EBA for nurses in Victorian public hospitals includes provision for ratio variation according to the clinical assessment of patient needs, environmental demands such as ward layout, occupational health and safety, workloads and occupancy. The EBA includes provision for the use of dependency systems, WIES, skill mix, DRGs, separations or LOS to determine these variations. Short shift provision has been re-introduced, which is an indicator of acknowledgement of peaks and troughs in workload by the ANF. The DHS has conducted a series of meetings with managers of Victorian public hospitals since the agreement was finalised and advised that ratios such as 1:4 can be averaged over 4 week roster period, e.g. 1:6 on Sunday or Public Holiday and 1:3.5 on 'post-op' mornings (Mitchell, 2005). It would

be reasonable to suggest that TrendCare was used by DHS and hospitals to negotiate this. This means that the ratios are no longer rigidly fixed, but how do nurses in Victorian public hospitals determine the variable ratios, or record and track them? Will the last of the 4 weeks be unfairly 'ratioed' if that is the balance after 3 busy weeks or poor allocation practices? Will nurses make arbitrary decisions or use another system to achieve new ratio mixes within the 4 week averaging rule? Mandated ratio practices in Victoria have now adopted some of the features of dependency systems and will probably need a dependency system to support decisions made within it. It is potentially now easier to 'game' a ratio system than TrendCare.

The increasing frequency of high dependency type patients has many implications for acute care nursing. Higher numbers of high dependency patients is associated with advances in complex medicine and surgery, the increasing age of patients, higher levels of co-morbidities and risk of complications, shorter LOS and the trend is likely to be sustained. Higher dependency nursing such as that provided in CCU, ICU, HDU, SCN and dialysis, are highly resource intensive. This means that more nurses with specialized skills will be required to care for the same number of patients in the future. The limited beds available in these units means that many patients who cannot be accommodated will increasingly be accommodated on general wards. The results of this study have demonstrated that. Accordingly, there will also be higher demand for more nurses with specialized skills for the general wards. The care of older Australians and other influences such as defensive medicine, advances in technology and communications, delayed discharge for non-acute medical reasons, and the declining health of indigenous populations are further examples of impending nursing demand. The future demand for nursing is expected to be compounded by a decreased capacity to provide the nurses required. This combination of circumstances demands strong and informed nursing leadership, to manage the working conditions and the distribution of current and future nursing resources.

What it means for nursing is that we must go beyond ratios and analysing data and link workload allocation practices to clinical pathways, skill mix, variance analysis, clinical indicators, patient outcomes and population based care in the future. We must illuminate the key concepts of acuity, dependency and workload allocation, so that we can move onto bigger agendas such as realistic nursing budgets and the achievement of sound financial and clinical outcomes within the context of existing government policy. Nurse dependency systems can provide the rudder for future policy direction.

## **6.6 On-going research directions**

The future is funding policy for care quality. This is a welcome rebound from the financial focus of the formative casemix years in Australia, which purported to address many of the past inefficiencies. I argue that efficiencies in nursing were gained by stealth since there was little reliable information to do otherwise. Some nurses now have access to that information and can realistically focus on quality outcomes and associated funding issues. Quality outcomes require integrated, co-coordinated and reliable data. Success in the industrial relations setting does not equate to quality nursing care. Nursing cannot stand alone and claim that there is no need to record data for acuity, dependency or workload purposes because mandated nurse patient ratios have been successfully re-negotiated. Nurses know they need to record data about their work and interface with the care systems of the rest of the multi-disciplinary team. They also know they need to provide documented publicly accountable quality care. Securing fair workloads by arbitration was a logical first step and moved hospital managements out of the 'driver's seat', so that nurses could re-establish control of their workloads. With that control secured, it is now time to return to the quality agenda and research is an integral part of the process.

In this study, it is clear that nursing requirements can now be predicted with a high level of accuracy and that this can be provided more equitably and at lower cost using a dependency system rather than ratios. The challenge for nurses is to steer staffing

policy. The researcher proposes a shift from maintaining and supporting a centralized policy based on prescribed ratios, towards a decentralized policy of staffing to demand which is now possible using systems such as TrendCare. The consequences are considerable, including change to the amount of government and ANF control and a threat to workload equity for nurses between wards and between hospitals. These are significant hurdles.

The cost analysis was the first reasonable estimate of a comparison between the two practices using routinely collected data. On-going analysis of this type of data, rather than ad hoc trials, will establish a database for routine and more sophisticated cost and clinical analyses. The use of live current data also enhances the ability to predict accurately. Reliable nursing cost data needs to be linked by DRG to the financial systems for costing and budgeting.

Unfortunately, Victorian public hospitals are still funded for nursing costs which are reported inclusive of ward nursing, ward consumables, ward catering, patient transport as well as direct care (Clinical Costing Standards of Australia CCS 2 version:10.9). All Victorian public hospitals report nursing and are funded in this way under the standard chart of accounts which was effective from 1 July 2004 (Clinical Costing Standards of Australia CCS 2 version: 10.9). Reliable nursing cost data cannot be buried in ancillary costs and retain its newly identified high levels of predictability.

In the future, AR-DRG version 4.1 could be linked to TrendCare. Australian and New Zealand governments' model acute care costs by DRG unit level but they are not a nursing classification by definition. There is no reason why we can't measure according to smaller or more nursing appropriate units, for example, shifts of care as undertaken in this study. On-going research in interfacing nursing costs by dependency of shift of care to the DRG financial systems is highly recommended

The Commonwealth Government acknowledges that there is no hard evidence about acuity of care and is planning future research in this area. The government is considering the inclusion of predominantly nursing procedures in the ICD-AM classification. (Dept of Health and Ageing, 2003:93). This will begin building the pathway to coding, costing and accounting for nursing more precisely at the federal level. It is recommended that future research is planned for interfacing clinical pathways and dependency reports to identify trends, frequencies and the capacity to code nursing procedures and practices.

## **6.7 Conclusion**

This study was located in the policy arena of the Victorian public hospital nursing experience, where a staffing law was passed that trumped acuity-based staffing. The study was designed to shed light upon a situation in which policy was already established, in the absence of data, and the alternative was never tested. This was the first international, empirical study of the introduction of mandated nurse patient ratios and experience has been established for future studies in this area.

I have demonstrated that the Victorian model is fair for ratios but there are differences in some areas and TrendCare is better able to predict those differences. Further, I have provided the evidence that, in this sample, TrendCare can provide fairer and more equitable workloads, and at a lower cost, than the Victorian mandated nurse patient ratios. Although expressed differently, ratios and HPPD essentially mean the same thing. They are both about averages by categories. We need to review the way we use them and focus on developing policy based on a co-operative relationship between the two practices. For example, in Victoria, the future may include negotiated ratios based on the data provided by dependency HPPD.

The increased ability to predict patient requirements accurately, in an environment with a corresponding decrease in ability to actually provide for those requirements,

complicates the landscape for nursing resource management. However, long term management solutions for the shortage of nurses remain in the policy area (Diers, 2004). I hope this research will inform policy development for nursing resource management in acute hospitals and bring about a long awaited change to nursing workload allocation practice.

## REFERENCES

- Abdellah, F. G. and Levine E. (1954). Work-Sampling Applied to the Study of Nursing Personnel. *Nursing Research* 3(1): 11-16.
- Abernethy, M. A. and Stoelwinder J. U. (1986). Management Information systems in Public Hospitals. 347-352.
- Abernethy, M.A, Magnus, A. and Stoelwinder, J.U. (1990) Costing nursing services, A preliminary report. Commonwealth Department of Health
- Adcock, P. (2003). Department of Human Services, Victoria Classification of Health Services. Personal communications.
- Aiken, L. Sloan, D. Sochalski, J. (1998). Hospital organisation and outcomes. *Reality in Health Care*, 7(4) 222-6 December.
- Alward, R. (1983). Patient Classification Systems; The Ideal vs. the Reality. *Journal of Nursing Administration* 13(2): 14-19.
- American Nurses' Association (1989). Classification Systems for Describing Nursing Practice. *Working Papers*. Kansas City.
- Arlington, K. (2004). Health Minister gets stony awakening to nursing care. *Nursing Review*. Canberra: 3.
- Athan, D. (2002) Personal communication
- Athan, D. (2003) Personal communication
- Athan, D. (2004) Personal communication
- Australian Casemix Bulletin, (1993) 5 (1).

- Australian Centre for Industrial Relations Research – see Buchanan, J.B., Bearfield, S. Jackson, S. (2004)
- Australian Industrial Relations Commission, (2000). Decision, Threatened industrial action, by ANF against VHIA (C No. 35605 of 2000). Melbourne.
- Australian Industrial Relations Commission, (2000). Nurses (Victorian Public Sector) Multi-Employer Agreement 2000-2004
- Australian Industrial Relations Commission, (2004). Nurses (Victorian Public Sector) Multi-Employer Agreement 2004-2007
- Australian Institute of Health and Welfare (1999). The Nursing Labour Force 1998. Canberra, Australian Institute of Health and Welfare.
- Australian Institute of Health and Welfare (2004). Rural, Regional and Remote Health. A guide to remoteness classifications. Canberra.
- Australian Nursing Federation (1990). *Nursing and Casemix*. The Australian Nursing Federation Conference, Melbourne.
- Australian Nursing Federation (1999) The Nursing Workforce Survey.
- Australian Nursing Federation (1999) Work, Time, Life Survey.
- Australian Nursing Federation (Vic Branch), (2002a). Nurse to Patient Ratios - Nursing Shortage. *ANF Report*, Melbourne.
- Australian Nursing Federation, (Vic. Branch), (2002b). Nurse-patient ratios information. Retrieved 20/11/02 from <http://www.anfvic.asn.au>.
- Australian Nursing Federation, (Vic. Branch), (2004a). Statewide public sector and Psych services meeting.

- Australian Nursing Federation, (Vic. Branch), (2004b). Nurses will leave if ratios go. *On the record*. Feb. 2004.
- Australian Nursing Federation (Vic Branch), (2004c) Nurses EBA claim & response.
- Aydelotte, M. (1973). Nurse Staffing Methodology. A review and critique of selected literature. Washington DC, US Govt Printing Office.
- Bangkok Post, (2003) Phya Thai Group Profit, retrieved 28/6/03, Finance Section.
- Barnard, C. and Truman E. (1981). "DRG-Based Reimbursement: The Use of Concurrent and Retrospective Clinical Data." *Medical Care* X1X(11): 1071-1082.
- Barr, A. (1984). Hospital Nursing Establishments and Costs. *Hospital and Health Services Review* January 1984: 31-37.
- Barr, A., Moores, B. Rhys-Hearn, C. (1973). A review of the various methods of nursing the dependency of patients on nursing staff. *International Journal of Nursing Studies* 10: 195-208.
- Beat, J. W. S. (1970). Ward Analysis. *Nursing Times* 66(29): Supp 101-104.
- Benko, L. B. (2004) Editorial, *Modern HealthCare Alert* 26/4/04.
- Bennett, M. (1990). Nursing research in Australia: development of patient dependency scales. *Nursing Research for Nursing Practice*. R. Bergman. Melbourne, Australia, Chapman and Hall: 145-161.
- Bernstein, E., Cooper, M. Darling, C. Felton, E. Hanson, M. Kulibert, L. and Moore, S. (1954). How long is the nurse at the patient's bedside ? *The American Journal of Nursing* 54(9): 1115-1116.

- Bigbee, J. L., Collins, J. Deeds, K. (1992). Patient Classification Systems: A New Approach to Computing Reliability. *Applied Nursing Research* 5(1): 32-53.
- Blair, W. (2000) Australian, Industrial Relations Commission – Record of proceedings.
- Bostrum, J. and Mitchell, M. (1991). Relationship of Direct Nursing Care Hours to Severity of Illness. *Nursing Economic\$* 9(2): 105-111.
- Boyd, J. (1982). Prediction of Staff to Acuity. *Nurse Staffing Based on Patient Classification. An Examination of Case Studies*. Chicago, American Hospital Association: 109-114.
- Brown, B. J. and Ross, A. (1986). *Integration of Clinical and Financial Information Systems*. Salem, Aspen Publishers, Inc.
- Bryant, Y. M. and Heron K (1974) Monitoring patient-nurse dependency *Nursing Times* May 9:1-4.
- Buchanan, J. B., 2004, cited in editorial, *Australian Nurse Journal*, Vol 11, No.9:7.
- Buchanan, J. B., T. Bearfield, S. Jackson, S. (2004). Stable, But Critical - The working conditions of Victorian Public Sector nurses in 2003, University of Sydney.
- Buchan, J. (2004). A certain ratio? Royal College of Nursing: 3. United Kingdom.
- Buckle, J. M., Horn, S. D. Simpson, A. L. (1991). Nursing Care Classification: A Conceptual Model. *Applied Nursing Research* 4(3): 100-106.
- Burton, A. (1999). The Experience of women exploring intuition and leadership: a phenomenological investigation. Thesis, PhD, Walden University.

- Business Week, (1985). Editorial. Anonymous consultant
- Butler, A. (1980). Towards a Staffing Formula: A Staffing System for General and Obstetric Wards. *The New Zealand Nursing Journal* February: 33-38.
- California Nurses Association (2002) New era for hospital staffing. Retrived CNA 21/02/02. <http://www.calnurse.org>.
- California Nurses Association (2003) Letters to Governor Schwarzenegger. Retrieved from [www.calnurse.org/calnursedec03/letters](http://www.calnurse.org/calnursedec03/letters) 03/12/03.
- California, Nurses Association (2004a). Hospital industry at odds with nurses over answer to nursing shortage. California. Retrieved from <http://www.calnurse.org.can/10/12/04>.
- California, Nurses Association (2004b). Editorial Retrieved from <http://www.calnurse.org/calnursemarapr04/suttersystem> 6/8/04.
- California, Nurses Association (2004c). Emergency admissions. Retrieved from <http://www.revolutionmag.com/newrev2/engineering.htn> 28/5/04.
- California, Nurses Association (2004d). Nursing Staff Shortage. Retrieved from <http://www.fresnobee.com.local/story> 28/5/04.
- California, Nurses Association (2004e). Editorial. Retrieved from <http://www.calnurse.org/calnursejan04/suttersolano.html> 04/01/04.
- Campbell, S. Morey, S. (1998). Personal pronoun usage in Thai. Monash University, Clayton.
- Carr-Hill, R. A. and Jenkins-Clarke S. (1995). Measurement systems in principle and in practice: the example of nursing workload. *Journal of Advanced Nursing* 22(2): 221-225.

- Caterinicchio, R. P. (1983). A Debate: RIMS & the Cost of Nursing Care. *Nursing Management* 14(5): 36-39.
- Caterinicchio, R. P. (1984). Relative Intensity Measures: Pricing of In-patient Nursing Services Under Diagnosis-Related Group Prospective Hospital Payment. *Health Care Financing Review* 6(1): 61-70.
- Caterinicchio, R. P. and Davies, R. H. (1983). Developing a Client-Focused Allocation Statistic of In-patient Nursing Resource Use: An Alternative to the Patient Day. *Social Science Medicine* 17(5): 259-272.
- CCSAA (2001). *Clinical Costing Standards Version 5*. Frankston, Vic, Australia, Clinical Costing Standards Association of Australia.
- Cercone, R. (1978). Measuring activity by 'work sampling'. *Dimensions in Health Service* November: 34-36.
- Chagnon, M., Audette, L. LeBrun Tilquin C. (1978). A patient classification system by levels of nursing care requirements. *Nursing Research* 27(2): 107-113.
- Challinger, K. (1990). *Clinical Information Systems in Nursing*. The Nursing and Casemix Conference, Randwick.
- Chant, D. (2000). The Allocation of Hospital Costs to Type of Case. *Australian Studies in Health Administration*. J. Butler and D. D.P. St Lucia, QLD, University of Queensland, Dept of Mathematics. 56: 189-209.

- Charbonneau, C., Ostrowski, C. Thomas Poehner, E Lindsay, P Panniers, P. L. Houghton, P. Albright, J. (1988). Validity and Reliability Issues in Alternative Patient Classification Systems. *Medical Care* **26**(8): 800-812.
- Clark, L. (1970). Can the nursing workload be measured? *Supervisor Nurse* December: 14-21.
- Cockerill, R. and O'Brien-Pallas, L. (1990). Satisfaction with Nursing Workload Systems: Report of a Survey of Canadian Hospitals (Part A). *Canadian Journal of Nursing Administration* **3**(2): 17-22.
- Cockerill, R., O'Brien-Pallas, L. Bolley, H. Pink, G. (1993). Measuring Nursing Workload for Case Costing. *Nursing Economic\$* **11**(6): 342-349.
- Coles, J. and Jenkins, L. (1992). Computerised nursing-workload systems. *Senior Nurse* **12**(4): 5-7.
- Comi Mc Closky, J. (1989). Implications of Costing Out Nursing Services for Reimbursement. *Nursing Management* **20**(1): 44-49.
- Commonwealth, Department of Health and Aging (2003). Trends in hospital activity Australia, 1991-2 to 2000-2001. *Occasional papers*. Canberra.
- Commonwealth Department of Health and Ageing (2004) Rural, remote and metropolitan areas classification system. Canberra.
- Connor, R. J. (1961a). A work sampling study of variations in nursing workload. *Hospitals* **35**(May): 40-41.
- Connor, R. J. (1961b). Effective Use of Nursing Resources. *Hospitals, J.A.H.A.* **35**(May): 30-39.

- Conrick, M. (2001). Greater recognition of nursing's role. *Hospital & Healthcare* (April 2001): 28.
- Cooper, R. and Kaplan, R. (1992). Activity-based systems: Measuring the costs of resource usage. *Accounting Horizons*: 1-13.
- Cummings, J. and Martin, S. (2001). Thailand. Footscray, Lonely Planet Publications Pty Ltd.
- Curtin, L. L. (1985). Integrating Acuity: The Frugal Road to Safe Care. *Nursing Management* **16**(9): 7-8.
- Cuthbert, M. (1990). DRGs, length of stay and nursing resources. *The Nursing and Casemix Conference*, Randwick, NSW, The Australian Nursing Federation and The Department of Community Services and Health.
- Department of Human Services Victoria (2004). Victoria – public hospitals and mental health services, Policy and Funding guidelines 2004-2005.
- Diers, D. (1988). *Measurement of Nursing Intensity and Costs*. The Management and Financing of Hospital Services, Sydney.
- Diers, D. (1992). Diagnosis-Related Groups and the Measurement of Nursing. *Charting Nursing's Future, Agenda for the 1990's*. L. Aiken and C. Fagin. Philadelphia, J. B. Lippincott: 139-156.
- Diers, D. (1999). Casemix and Nursing, *Australian Health Review* 22 (2) 56-68.
- Diers, D. (2002). "personal communications."
- Diers, D. (2003). "personal communications."
- Diers, D. (2004). *Speaking of Nursing*. Sudbury, Massachusetts, Jones and Bartlett.

- Diers, D. (2005) personal communication.
- Diers, D. and Bozzo, J. (1999). Using Administrative Data for Practice and Management. *Nursing Economic\$* 17(4): 233-237.
- Diers, D., Bozzo, J. and RIMS/Nursing Acuity Project Group(1997). Nursing Resource Definition in DRGs. *Nursing Economic\$* 15(3): 124-131.
- Diers, D. and Heslop, L. (1999). Using standard hospital information for nursing management and practice. Melbourne, Monash University: 371-478.
- Diers, D., Karlsen, B. Bozzo, J. Allegretto, S. Heard, D.M. (1998). High Cost Users. Tenth Casemix Conference in Australia, Melbourne, Conference proceedings.
- Diers, D. and Pelletier, D. (2001). From I.T. to information management with casemix data. *Australian Health Review* 24(1): 62-67.
- Diers, D. and Pelletier, D. (2001). Seeding information management capacity to support operational management in hospitals. *Australian Health Review* 24(2): 74-82.
- Diers, D. and Potter, J. (1997). Understanding the Unmanageable Nursing Unit with Casemix Data: A Case Study. *The Journal of Nursing Administration* 27(11): 27-32.
- Diers, D., Torre, C. Heard, D. Bozzo, J. O'Brien, W (2000). Bringing Decision Support to Nurse Managers. *Computers In Nursing* 18(3): 137-144, 146.
- Diers, D., Weaver, D. Bozzo, J. Allegretto, S. Pollack, C. (1998). Building a Nursing Management Analysis Capacity in a Teaching Hospital. *Seminars for Nursing Managers* 6(3): 108-112.

- Dijkers, M. and Paradise, T. (1986). PCS: One System for Both Staffing and Costing. *Nursing Management* 17: 25-34.
- Dijkers, M., Paradise, T. Maxwell, M. (1986). Pitfalls of Using Patient Classification Systems for Costing Nursing care. Patients and Purse Strings. F. A. Shaffer. New York, National League for Nursing: 3-21.
- Doncliff, B. (2001). Making nursing visible and valueable. *KAI TIAKI nursing New Zealand* December/January.
- Doolin, B. (1999). Casemix Management in a New Zealand Hospital: Rationalisation and Resistance. *Financial Accountability & Management* 15(3 & 4): 397- 417.
- Duckett, S. J. (1993). Victoria: Casemix Activities. Keynote Address. Determining Costs and Budgets. Fifth National Casemix Conference, Canberra.
- Duckett, S. J. (1995). Hospital payment arrangements to encourage efficiency. The case of Victoria, Australia. *Health Policy* 34: 113-134.
- Duckett, S. J. (2000). Diagnosis Related Groups: Towards a Constructive Application for Victoria. *The Australian Health Review* Articles: 107-115.
- Dunigan, R. (2002) Personal communication
- Dunigan, R. (2003) Personal communication
- Dunigan, R. (2004) Personal communication
- Dunlop, N., Watson, J. Bryne, G. A. (1983). Measuring workload - a nursing WISH. *Dimensions in Health Service* October: 40.

- Edwardson, S. and Giovannetti, P. (1994). Nursing workload measurement systems. In J F Patrick and J S Stevenson. Annual review of nursing research. New York, Springer Publishing Co: 95-123.
- Ehnfors, M. Thorell-Ekstrand, I. Ehrenberg, A. (1991). "Towards Basic Nursing Information in Patient Records." *VARD I NORDEN* 21(11): 12-31.
- Endacott, R. (1996). Nursing Dependency Scoring: measuring the total workload. *Nursing Standard* 10(37): 39-42.
- Farley Pardue, S. and Dick, C. T. (1986). Patient Classification. Illness Acuity and Nursing Care Needs. *Journal of Psychosocial Nursing* 24(12): 23-30.
- Ferguson, L. (1994). Casemix Issues for Nursing. *Medical Journal of Australia* 161(5): S37-S39.
- Ferguson, L. and Picone, D. (1994). *Casemix and nursing management*, Department of Human Services and Health.
- Fetter, R. B. (1985). DRGs: Fact and Fiction. *Australian Health Review* 8 (2) 105-115.
- Fetter, R. B. (1991). Diagnosis Related Groups: Understanding Hospital Performances. *Interfaces* 21: 6-26.
- Fetter, R. B. (1999). Casemix classification systems. *Australian Health Review* 22: 16-34.
- Fetter, R. Brand, D. A. Gamache, D (1991). DRGs. Their Design and Development. Michigan, Health Administration Press.

- Finnigan, S. (1993). When Patient Classification Systems Fail? *Aspen's Advisor for Nurse Executives* 8(11): 1-3.
- Finnigan, S., Abel, M. Dobler, T Hudson, L. Terry, B. (1993). Automated Patient Acuity. Linking Nursing Systems and Quality Measurement with Patient Outcomes. *Journal of Nursing Administration* 23(5): 62-71.
- Finnigan, S. and Groves, B. (1994). Debate: Should Nurses Classify Patients. *Aspen's Advisor for Nurse Executives* 9(8): 6-8.
- Flarey, D. L. (1990). A methodology for costing nursing service. *Nursing Administration Quarterly* 14(3): 41-51.
- Forbes, C. (2004). Statistical consultant. Statsconsult Service, Monash University, Clayton.
- Forbes, C. (2005). Statistical consultant. Statsconsult Service, Monash University, Clayton.
- Fosbinder, D. (1986). Nursing costs/DRG: A Patient classification system and comparative study. *Journal of Nursing Administration* 16(11): 18-23.
- Francis, K. (2005). Monash University, Nursing and Midwifery news, Edition 9.
- Gaston, C. (1992). Nursing Dependency/Costing Study: Costing Methodology. Adelaide, South Australian Health Commission.
- Gillett, S. (2001). Nursing Intensity in Victorian Public Hospitals. Unpublished.
- Gillett, S. (2002). Personal communication.
- Giovannetti, P. (1978). Patient Classification Systems in Nursing: A description and analysis. Hyattsville,, Department of Health, Education, and Welfare Publication No. HRA 78-22. U. S. Government Printing Office.

- Giovannetti, P. and Mayer, G. (1984). Building confidence in patient classification systems. *Nursing Management* 15(8): 31-34.
- Giovannetti, P. (1985). DRGs and Nursing Workload Measures. *Computers in Nursing* March/April(88-91).
- Giovannetti, P. and Moore Johnson, J. (1990). A New Generation Patient Classification System. *Journal of Nursing Administration* 20(5): 33-40.
- Giovannetti, P. (1994). Measurement of Nursing Workload. In J.M. Hibberd & M. E. Kylie (Eds). *Nursing Management in Canada*. Toronto, Saunders, W. B. Co.
- Goossen, W. T. F. (2000). Towards strategic use of nursing information in the Netherlands. The Haag, Gegevens Koninklijke.
- Gordon, S. (2004). "Will we suffer a shortage of nurses too? On the record, ANF June 2004.
- Grimaldi, P. L. and Micheletti, J. A. (1982). RIMs and the cost of nursing care. *Nursing Management* 13(12): 12-23.
- Halliwell, M. (1985). Patient Dependency System, a way to fight nurse shortages. *Australian Hospital* August: 5.
- Halloran, E. J. (1985). Nursing Workload, Medical Diagnosis Related Group and Nursing Diagnoses. *Research in Nursing & Health* 8: 421-433.
- Halloran, E. J. and Halloran, D. C. (1985). Exploring the DRG/Nursing Equation. *American Journal of Nursing* 85(10): 1093-1095.
- Halloran, E. J. and Kiley, M. (1987). Nursing dependency, diagnosis-related groups and length of hospital stay. *Health Care Financing Review* 8(3): 27-36.

- Halloran, E. J., Patterson, C. Kiley, M. (1991). Case-mix: Matching Patient Need with Nursing Resource. *Issues in Nursing Administration*. M. J. Ward and S. A. Price. St Louis, Mosby-Year Book Pty Ltd.
- Hanson, R. L. (1976). Predicting Nurse Staffing Needs to Meet patient Needs. *Washington State Journal of Nursing* Summer-Fall: 7-11.
- Hearn, E. R. (1972). How many high care patients? *Nursing Times* 68: Part I 472-478.
- Hendricks, J. and Baume, P. (1997). The pricing of nursing care. *Journal of Advanced Nursing* 25(3): 454-462.
- Heslop, L (2001). Ethnography of patient and healthcare delivery systems: dialectics and (dis) continuity. Ph.D Thesis Monash University
- Heslop, L. (2003) Nursing in Thailand. Unpublished.
- Hickie, J. B. (1994) Clinical representation in the development of casemix: Measures and applications in Australia. *Medical Journal of Australia* 161 (5) 6-8.
- Hindle, D. (1995). The Private Sector Casemix Unit - Basic statistics for private hospitals and private insurers.
- Hlusko, D. L. and Nichols, B. S. (1996). Can you depend on your patient classification system? *Journal of Nursing Administration* 26(4): 39-44.
- Hovenga, E. J. S. (1983). Patient Dependency and Nurse Staffing for Victorian Hospitals. Victoria, Health Department.
- Hovenga, E. J. S. (1992). Using the Patient assessment and information system (PAIS) to cost nursing care by DRG. Fourth National Casemix Conference, Gold Coast, Queensland.
- Hovenga, E. J. S. (1994). Casemix, Hospital Nursing Resource Usage and Costs: The Basis for a Nurse Staffing and Costing System. Sydney, The University of New South Wales: 269.

- Hovenga, E. J. S. (1996). Patient assessment and information system (PAIS). Rockhampton, QLD, Faculty of Informatics and Communication, Central Queensland University: 1-32.
- Hovenga, E. J. S. (2003). Nurses, management, information and communication technologies. *Nursing Review* June: 21.
- Hovenga, E. J. S. and C. Hindmarsh (1996). Queensland Health - PAIS Validation study: Results and Issues for Nursing Capture. Proceedings of the Eighth Casemix Conference in Australia, Sydney, Australia.
- Hovenga, E. J. S. and G. Whymark (1997). Health Information Systems in a Casemix Environment. Sydney, MacLennan & Petty.
- Hovenga, E. J. S. and Plummer, A. A. (1998). Using Nursing Staffmix Data to Assess Performance and Outcomes: Challenges and Opportunities. HIC'98 proceedings on CD-ROM 1998.
- Hovenga, E. J. S. (1998a). Defining Nursing Needs. Health Informatics. An overview. E. J. S. Hovenga, M. Kidd and B. Cesnik. Marrickville, NSW, Churchill Livingstone: 40-57.
- Hovenga, E. J. S. (1998b). Casemix and information systems. Health informatics. An overview. E. J. S. Hovenga, M. Kidd and B. Cesnik. Marrickville, NSW, Churchill Livingstone: 313-347.
- Hovenga, E. J. S. (1999). Part 3. Types of applied research. Sydney, Addison Wesley.
- Huckabay, L. M. and Skoneczny, R. (1981). Patient Classifications Systems: The problems faced. *Nursing and Health Care* 2(2): 89-102.

- Jackson, B. S. and Resnik, J. (1982). Comparing Classification Systems. *Nursing Management* 13(11): 13-19.
- Jackson, T., Henderson, N. Tate, R. Scambler, D. (1993). Resource weights for AN-DRGs using patient level clinical costs: a study of five Victorian hospitals. Technical Report 3, Melbourne: National Health and Medical Research Council, National Centre for Health Program Evaluation.
- Jackson, T., Tate, R. Henderson, N. Carlin, J. Bayliss-McCulloch, J. (1994). Victorian cost weights: a study of fifteen hospitals' patient-level AN-DRG costs. Technical Report 4, Melbourne: National Health and Medical Research Council, National Centre for Health Program Evaluation.
- Jackson, T. Wilson, R. Watts, J. Lane, K. Bayliss-McCulloch, J. (1998). 1997 Cost Weights for Inpatient and Outpatient Care: Final Report to the Victorian Department of Human Services. Melbourne: Hospital Services Research Group, Monash Health Economics Unit and Acute Health Division, Department of Human Services.
- Jencks, S. F. and Dobson, A. (1987). Refining case mix adjustment: The research evidence. *New England Journal of Medicine* 317(11): 679 - 686.
- Joel, L. A. (1984a). DRGs and RIMs: Implications for Nursing. *Nursing Outlook* 32(1): 42-9.
- Joel, L. A. (1984b). Relative Intensity Measures and the State of the Art of Reimbursement for Nursing Services. DRGs: Changes and Challenges. F. A. Shaffer. New York, National League for Nursing: 57-64.
- Johnson, N. (2002). Australia's Nursing Crisis. 7:30 Report, ABC. Television, 8 October 2002.

- Kawczak Hagerty, B., Chang, R. S. Spengler, C. D. (1985). Work Sampling. Analyzing Nursing Staff Productivity. *Journal of Nursing Administration* 15(9): 9-14.
- Kelleher, C. (1992). Validated indexes: key to nursing acuity standardization. *Nursing Economic\$* 10(1): 31-7.
- Kerr, K. (2004). The development of a data quality framework and strategy for the New Zealand Ministry of Health. *Health Manager, ACHSE* Spring 2004: 23-27.
- Kreitzer, S. L., Loebner, E. S. Roveti, G. C. (1982). Severity of Illness: The DRGs' Missing Link? *Quality Review Bulletin* May: 21-36.
- Levine, E. (1985). Some Issues in Nursing Productivity. Costing Out Nursing: Pricing Our Product. F. A. Shaffer. USA, National League for Nursing: 237-247.
- Lowe, C. (1998). Evaluation of a Computerised Patient Nurse Dependency System - TREND\_PNDS 1. Brisbane.
- Lowe, C. (2003). Personal Interview. Brisbane.
- Lowe, C. (2004). Personal Interview. Brisbane.
- Lowe, C. and Dunigan, R. (2001). Introduction to the TrendCare Management System. Brisbane, TrendCare Systems Pty Ltd: 1-14.
- Maraldo, P. J. (1985). DRGs: Implications for Nursing Practice. Current Issues in Nursing. Second Edition. J. Comi McCloskey and H. Kennedy Grace. Boston, Blackwell Scientific Publications.

- McCarty, M. (2004). DHS policy and strategic planning presentation. Mercy Hospital, Werribee.
- McGuigan, L. (2000). Changes to the Health Care System. Sydney Teaching Hospitals Advocacy Group, Senate Community Affairs Reference Committee Public Health Funding, Committee Hansard. Sydney: 393.
- McPhaile, A (1975) The meaning of patient classification.
- Ministry of Health, New Zealand (2002). The Operational Standard of Ethics Committees.
- Ministry of Health, New Zealand (2004). Real answers for a very real problem. Retrieved from <http://www.healthnews.com.au.nz>. 1/3/04.
- Mitchell, M., Miller, J. Welches, L. Walker, D. (1984). Determining costs of direct nursing care by DRGs.15(4): 29-32.
- Monash University ((2002). Statistical Workshop notes. exPERT series.
- Monash University, (2004a) Draft Report, PND Pilot Evaluation Unpublished.
- Monash University, (2004b) PND Pilot Evaluation Report, Frankston, School of Nursing.
- Mordaunt, K. (1995). New Directions in Measuring Patient Acuity, Sir Charles Gairdner Hospital. Western Australia.
- Morieson, B. (2003). Personal Interview. South Melbourne.
- Mowry, M. and Korpman, R. A. (1985). Do DRG Reimbursement Rates Reflect Nursing Costs? *The Journal of Nursing Administration* 15(7,8): 29-35.

National Health and Medical Research Council of Australia (2001). The National Statement on Ethical Conduct in Research Involving Humans.

National Centre for Classifications in Health (2000). Tabular List of Diseases in ICD-10-AM, Vol 1-5. Sydney, National Centre for Classifications in Health 2000.

New Zealand Government (1993). The New Zealand Privacy Act.

New Zealand Government (2000) Public Health and Disability Act.

New Zealand Government (1993) New Zealand Human Rights Act.

New Zealand Government (1993) New Zealand Human Rights Reforms.

NewstalkZB (2004). Govt Lukewarm on Nurse Ratios. Scoop media <http://www.scoopmedia.co.nz/mason>.

Nightingale, F. (1863). Notes on Hospitals. London, Longman Green, Longman, Roberts and Green.

Nurse Policy Branch, DHS Victoria(2003) interview and personal communications

O'Brien-Pallas, L. and Cockerill, R. (1990). Satisfaction with current workload measurement systems report of a survey of Canadian hospitals (Part B). *Canadian Journal of Nursing Administration* 3(2): 23-26.

O'Brien-Pallas, L., Cockerill, R. Leatt, P. (1992). Different systems - different costs. *Journal of Nursing Administration* 22(12): 17-22.

O'Brien-Pallas, L. and P. Giovannetti, Eds. (1993). Nursing Intensity. The Nursing Minimum Set Conference. Ottawa, Canada.

- O'Brien-Pallas, L., Leatt, P. Deiber, R. Till, J. E. (1989). A comparison of workload estimates using three methods of patient classification. *Canadian Journal of Nursing Administration* 2(3): 16-23.
- O'Brien-Pallas, L., Trichler, D. Till, J. E. (1989). Variability in nursing workload associated with medical diagnostic group and patient classification method. *Health Management Forum* 2(3): 26-31.
- O'Connor, N. (1988). Integrating Patient Classification with Cost Accounting. *Nursing Management* 19(10): 27-29.
- Office of the Health Services Commissioner (2002). Statutory Guidelines on Research, Health Privacy Principles. Melbourne
- Oklahoma, Nurses Association. (2003). ANA and ONA applaud federal legislation to mandate safe nurse-to-patient ratios. *The Oklahoma Nurse* September-November 2003.
- O'Malley, J. (2003) Mandated nurse to patient ratios will bring nurses back to nursing. Retrieved from Scoopmedia on <http://www.scoopmedia.com.nz>. 24/9/03
- Ozbolt, J. G., Russo, M. Shultz, M. P. (1995). Validity and reliability of standard terms and codes for patient care data. The Annual Symposium on Computer Applications in Medical Care.
- Parker, J. M., Buckenham, J. E. Reid, B. Crosthwaite, B (1995). Pilot Project for Improving Nursing Clinical and Costing Information Systems. Phase 1. 2-77. Victorian Nurses Casemix Consortium.

- Parkes, R. (1990). Nursing issues related to changes in health financing and management - an overview. The Nursing and Casemix Conference, Randwick.
- Parkes, R., Picone, D. Challinger K. (1994). Nursing and Casemix 1993/94 - 1995/96 National Strategic Plan. Canberra, The Commonwealth Department of Human Services & Health and the Australian Nursing Federation: 3-14.
- Patera, N. (2004). Acute Inpatient Casemix Funding: The Status Quo in Victoria and Germany, Health Economics Unit, Monash University at the Austin Hospital.
- Phelan, P. D., Tate, R. Webster, R. Marshall, R. (1998). DRG cost weights-getting it right. *Medical Journal of Australia* 169 Supplement: S36-S38.
- Philibert, M. B. (1986). Patient Acuity Systems: Taking the Measure of Nursing Care. *Nursing Management* 17(11): 60-61.
- Phillips, C. Y., Castorr, A. Prescott, P.A. Soeken, K. L. (1992). Nursing Intensity. Going Beyond Patient Classification. *Journal of Nursing Administration* 22(4): 46-52.
- Picone, D. (1990). Management Information Systems: A nursing perspective and a user's perspective. The Nursing and Casemix Conference, Randwick.
- Picone, D. (1995). Casemix and Nursing Quality Project. Canberra, Commonwealth Department of Human Services and Health, Casemix Development Program.
- Picone, D., Ferguson, L. Hathaway, V. (1993). NSW Nursing Costing Study. Sydney, Metropolitan Teaching Hospitals Nursing Consortium.

- Picone, D., Phillips, K. Hathaway, V. Parkes, R. (1993). National Nursing Service Weight Study. Canberra, Commonwealth Department of Human Services and Health, Casemix Development Program.
- Polit, D. Beck, C. Hungler, B. (2001). Essentials of Nursing Research. 5<sup>th</sup> Edition New York, Lippincott.
- Powell, I. (2004) Nurses at the front line: Association of Salaried Medical Specialists, Retrieved from <http://www.scoopmedia.com.nz>. 10/3/04
- Prescott, P. A. (1986). DRG Prospective Reimbursement: The Nursing Intensity Factor. *Nursing Management* 17: 43-49.
- Prescott, P. A. and Phillips, C. Y. (1988). Gauging nursing intensity to bring costs to light. *Nursing and Health Care* 9(1): 17-22.
- Private Hospital Amendment Regulations (WA) 1984 Western Australian State Health Department.
- Private Hospital Regulations (NSW) 1996. NSW State Health Department.
- Private Sector Casemix Unit, 1997. A glossary of Casemix terms.
- Reschak, G. L. C., Biordi, D. Holm, K. Santucci, N. (1985). Accounting for Nursing Costs by DRG. *Journal of Advanced Nursing* 15(9): 15-20.
- Roy, H (2004) Lukewarm on ratios, Ministry of Health, New Zealand, retrieved from <http://www.scoopmedia.com.nz>. 1/3/04
- Rural, Remote and Metropolitan Areas (2004). Classification for Australian Hospitals. Commonwealth Department of Health and Ageing, Canberra.

- Schaefers, V. (1985). A Cost Allocation Method for Nursing. *Costing Out Nursing: Pricing Our Product*. F. A. Shaffer. USA, National League for Nursing: 69-84.
- Shaffer, F (1988) DRGs: a new era for health care. *Nursing Clinics of North America*. 1988 Sep; 23(3): 453-63
- Scotton, R. B. and Owens, H. J. (1990). *Case Payment in Australian Hospitals: Issues and Options*. Melbourne, Public Sector Management Institute: 27-294.
- Senate Committee, (2001). *Inquiry into Nursing, Terms of Reference*. Canberra, Commonwealth of Australia.
- Senate Select Committee, (1985). *Report on Private Hospitals and Nursing Homes*. Victorian State Health Department.
- Sharkey, M. (2004) Cited in the Age Editorial 06/05/04.
- Simpson, R. L. (1995). Technology, nursing the system. Ammunition in the boardroom, the clinical nursing data set. *Nursing Management* 26(6): 16-17.
- Siriprasert, N. Thongpuy, D. and Chatrikul Na Ayuddhaya, S. (2002) *Implementing TrendCare in Thailand*. Poster presentation Nursing in a Technological World Conference, Brisbane 2003.
- Sovie, M. D., Tarcunale, M. A. Vanputte, A.W. Stunden, A. E. (1985). Amalgam of Nursing Acuity, DRGs and costs. *Nursing Management* 16(3): 22-42.
- Sovie, M. (1988). *Establishing the Nursing Minimum Data Set as a Part of the data Requirements for DRG's*. Identification of the Nursing Minimum Data Set. H. Werley and N. Lang. New York, Springer: 301-311.

- Sovie, M. and Smith, T. (1986). Pricing the Nursing Product: Charging For Nursing Care. *Nursing Economics* 4(5): 216-226.
- Sovie, M. D. (1988). Variable costs of nursing care in hospitals. Annual review of nursing research. 6: 131-150.
- Sovie, M. D. and Smith, T. C. (1991). Pricing the nursing product: Charging for nursing care. *Issues in Nursing Administration*. M. J. Ward and S. A. Price. St Louis, Mosby: 289-303.
- Stanford, C. A. (1984). How much does nursing care really cost? Stanford DRG Study Reveals Dramatic Differences. *American Journal of Nursing* July: 942-943.
- Staley, M. and Luciano, K. (1984). Eight Steps to Costing Nursing Services. *Nursing Management* 15(10): 35-38.
- Talerico, L. and Diers, D. (1988). Nursing Intensity outliers. *Nursing Management* 19(6): 27-35.
- Tamplin Ulrich, B. (2002). Still So Much to Do: The Legacy of Florence Nightingale, <http://www.nurseweek.com.html>. Retrieved on 24/4/02.
- Tarling, M. and Crofts, L. (2002). The Essential Researchers Handbook, Bailliere Tindall.
- Te Kete Hauora (1998). Maori Health, Ministry of Health, New Zealand.
- Thompson, J. D. and Diers, D. (1991). Nursing Resources. DRGs their Design and Development. R. B. Fetter. Michigan, Ann Arbor. Health Administration Press: 121-83.

- Thompson, J. D. (1984). The Measurement of Nursing Intensity. *Health Care Financing Review* 6(2): 51-8.
- Thompson, J. D. and Diers, D. (1988). Management of nursing intensity. *Nursing Clinics in North America* 23(3): 473-492.
- Thongpuy, D (2003) Personal interview
- TrendCare (2001). Advanced Technical notes. TrendCare Systems Pty Ltd., Brisbane.
- TrendCare (2001). Introduction to TrendCare Management Systems. TrendCare Systems Pty Ltd., Brisbane.
- TrendCare (2002). Training Booklet, TrendCare Systems Pty Ltd., Brisbane.
- TrendCare (2003). Training Booklet – Clinical. TrendCare Systems Pty Ltd., Brisbane.
- TrendCare (2004). User Handbook - TrendCare Systems Pty Ltd., Brisbane.
- TrendCare (2005). [www.trendcare.com.au](http://www.trendcare.com.au). Retrieved 2<sup>nd</sup> January 2005.
- TrendCare User Group (2004). Melbourne meeting, December 2004, Werribee Mercy Hospital.
- Trofino, J. (1986). A Reality Based System for Pricing Nursing Service. *Nursing Management* 17: 19-24.
- Victoria, State Government (1985). Report of the Committee of Enquiry into Nursing in Victoria, Volumes 1 and 2. Melbourne, Ministry of Health.
- Victorian Nurses Casemix Consortium (1995). see Parker, J. M., Buckenham, J. E. Reid, B. Crosthwaite, B (1995).
- Victorian State Government, (2001). Health Records Act.

Victorian State Government (2000). Privacy Act.

Werley, H. H. and Zorn, C. R. (1989). The nursing minimum data set and its relationship to classifications to nursing practice. Kansas City, The American Nurses Association: 50-51.

Whitney, J. and Killien, M. (1987). Establishing Predictive Validity of a Patient Classification System. *Nursing Management* 18(5):80-2, 84-6, May.

Wojner, A. W. (2001). Outcomes Management, Applications to Clinical Practice. St Louis, USA, Mosby.

Wood, S. (2001). National Nursing Workload Measurement. Wellington, Ministry of Health, New Zealand.

Zondagh, C. (2004). Personal Communication on behalf of Democratic Nurses Association of South Africa.

## Appendix A

AG822685 PR929172

**AUSTRALIAN INDUSTRIAL RELATIONS COMMISSION***Workplace Relations Act 1996*

s.170LC Multiple business agreement (Division 2)

**Victorian Hospitals' Industrial Association****and****Australian Nursing Federation****and****Health Services Union of Australia****(AG2003/1859)****NURSES (VICTORIAN PUBLIC SECTOR) MULTI-EMPLOYER  
AGREEMENT****2000-2004**

Various employees Health and welfare services

SENIOR DEPUTY PRESIDENT ACTON

SENIOR DEPUTY PRESIDENT O'CALLAGHAN

COMMISSIONER FOGGO MELBOURNE, 7 APRIL 2003

*Certification of a multiple business agreement***CERTIFICATION OF AGREEMENT**

In accordance with the provisions of the Workplace Relations Act 1996, the Commission hereby certifies the attached agreement between the Australian Nursing Federation (ANF) and the Health Services Union of Australia (HSUA) of the one part and the various employers who provide health services listed in Schedule A to the agreement of the other part in this matter.

This agreement shall come into force from the date of certification, being 25 March 2003, and shall remain in force until 31 March 2004.

BY THE COMMISSION:

SENIOR DEPUTY PRESIDENT

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PR929171

AUSTRALIAN INDUSTRIAL RELATIONS COMMISSION

Workplace Relations Act 1996  
 s.170LC certification of agreement (multi business)  
 Victorian Hospitals' Industrial Association  
 and  
 Australian Nursing Federation  
 and  
 Health Services Union of Australia  
 (AG2003/1859)  
 NURSES (VICTORIAN PUBLIC SECTOR) MULTI-EMPLOYER AGREEMENT  
 2000-2004  
 Various employees Health and welfare services  
 SENIOR DEPUTY PRESIDENT ACTON  
 SENIOR DEPUTY PRESIDENT O'CALLAGHAN  
 COMMISSIONER FOGGO MELBOURNE, 7 APRIL 2003  
 Certification of a multiple business agreement  
 DECISION

The following decision, now edited, was given in transcript on 25 March 2003:

[1] This is an application under Part VIB of the Workplace Relations Act 1996 (the Act) for the certification of an agreement to be known as the Nurses (Victorian Public Sector) Multi-Employer Agreement 2000-2004 (the Agreement).

[2] The parties to the Agreement are:

- \* Australian Nurses Federation (ANF);
- \* Health Services Union of Australia (HSUA); and
- \* various employers who provide health services.

[3] As the Agreement applies to businesses carried on by more than one employer, it is a 'multi-business agreement' within the meaning of s.170LC. Multi-business agreements can only be certified by a Full Bench of the Commission (s.170LC(3)).

[4] Section 170LC(4) provides:

"A Full Bench ... must not certify a multiple-business agreement unless it is satisfied that it is in the public interest to certify the agreement, having regard to:

- (a) whether the matters dealt with by the agreement could be more appropriately dealt with by an agreement, other than a multiple-business agreement, under this Part, and
- (b) any other matter that the Full Bench considers relevant

[5] It was submitted by the parties that it was in the public interest to certify the Agreement because:

"(a) The Agreement directly derives substantially from recommendations made by the [sic] Commissioner Blair on 31 August 2000 (Print No S9958) pursuant to Section 111AA proceedings which addressed the enterprise bargaining claims

advanced by the ANF and the HSUA in 2000.

(b) An essential element of undertakings given by the parties to the Commission in respect of those proceedings was to accept the recommendations of Commissioner Blair and embody them in a MECA.

(c) The proceedings dealt with claims equally relevant and applicable to all employers in an environment where all the parties, the Government represented by Department of Human Services and the Commission itself accepted that there were major workload, recruitment and retention issues affecting the employment of nurses in the entire public health sector.

(d) The implementation of the Blair recommendations (which involved substantial negotiations regarding distribution of additional nursing resources to comply with the new nurse /patient ratios) subsequently led to disputation and further conciliation proceedings chaired by Senior Deputy President Watson resulting in a Heads of Agreement in September 2001. The terms of that Agreement are incorporated into this MECA.

The Heads of Agreement, among other things, created a central dispute resolution process entitled the Implementation Monitoring Committee chaired by SDP Watson (or his nominee).

The Committee was charged with the task of ensuring industry wide compliance with the terms and provisions of both the Blair 'decision' and the Heads of Agreement of September 2001. Unresolved matters were to be ultimately determined by SDP Watson if conciliation failed.

(e) The employers listed at Schedule A are legally independent bodies but are profoundly and commonly linked to the Government, its policy setting powers, the funding arrangements reflected in Health Service Agreements and other compliance measures through the provisions of the Health Services Act. The Act vests in the Secretary of the Department of Human Services substantial powers of direction pertaining to the nature, volume and quality of services which are directly related to the employment of relevant staff to deliver these services in accordance with the employers obligations pursuant to the Health Service Act and the service agreements made under its provisions.

(f) There is a high incidence of part time employment in this sector with employees being engaged by more than one employer thus making it highly desirable that common terms and conditions be available to maximize staff retention and minimize casualisation of this important profession." (Statutory declarations.)

[6] We are satisfied, having regard to the arguments advanced by the parties, that it is in the public interest to certify the Agreement, including the Erratum to it tendered during the course of the proceedings in this matter (Exhibit VHIA 1) and its updated list of respondents filed in the Commission on 24 March 2003.

[7] Further, we are satisfied that the matters dealt with in the Agreement

could not be more appropriately dealt with by an agreement, other than a multiple-business agreement, under Part VIB of the Act.

[8] We are also satisfied that the other relevant requirements of the Act and Rules have been met.

[9] For these reasons, we certify the Agreement.

BY THE COMMISSION:

SENIOR DEPUTY PRESIDENT

Appearances:

Mr A. Djoneff for the Victorian Hospitals' Industrial Association.

Mr R. Burrows with Ms L. Fitzpatrick for the Australian Nursing Federation.

Ms M. Chambers for the Health Services Union of Australia.

Mr T. Lee with Mr B. Sullivan for the Department of Human Services (Victoria).

Hearing details:

2003.

Melbourne:

March 25.

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NURSES (VICTORIAN PUBLIC HEALTH SECTOR)

MULTI-BUSINESS AGREEMENT 2000v-2004

## **PART A - PRELIMINARY**

### **1 TITLE**

This Agreement shall be known as the Nurses (Victorian Public Sector) Multi-Employer Agreement 2000-2004.

### **3 DIVISION INTO PARTS**

This Agreement is divided into the following parts:

Parts:

A Preliminary

B Aims and Communication

C Piloting of Patient Dependency Systems

D Conditions and Wages

### **3 ARRANGEMENT**

PART A - PRELIMINARY 2

1 TITLE 2

2 DIVISION INTO PARTS 2

3 ARRANGEMENT 2

4 DEFINITIONS 4

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**4 DEFINITIONS**

In this Agreement except where the context requires otherwise:

- (a) accredited official of the Union means an officer or employee of the Australian Nursing Federation or of the Health Services Union of Australia (with respect to Registered Nurses Division 2 only).
- (b) allowance rate in relation to a Registered Nurse Division 2 means allowance rate as defined by the Award, and calculated by reference to the rates of pay set out in Schedule B of this Agreement. For convenience relevant allowances calculated by applying the allowance rate are set out in Schedule B to this Agreement.
- (c) Award means the Nurses (Victorian Health Services) Award 2000.
- (d) base rate in relation to a Registered Nurse Division 1 means the rate for a Registered Nurse Division 1 Grade 2, 2nd year of experience, calculated by reference to the rates of pay set out in Schedule B of this Agreement. For convenience relevant allowances calculated by applying the base rate are set out in Schedule B to this Agreement.
- (e) EFT shall mean equivalent full time employee.
- (f) employee means a Registered Nurse Division 1, Registered Nurse Division 2, and Registered Nurse Division 5 employed by an employer bound by this Agreement.
- (g) employer means any of the health sector agencies listed in Schedule A or on any site, campus or other workplace operated by any of the named health sector agencies listed in Schedule A.
- (h) experience means service and experience following registration in a grade or sub-grade at least equal to that in which the employee is employed (or to be employed). Where an employee has previously been employed in a higher grade or sub-grade, service and experience in that higher grade or sub-grade will count as service and experience in the lower grade or sub-grade for the purposes of determining an employee's experience.
- (i) a year of experience means experience (as defined) gained from working an average of 3 shifts or more per week in a year. If the employee averages less than three shifts per week or 48 hours per fortnight (whichever is the lesser) the employee will need to complete an additional year to advance. Where in this Agreement there is a reference to a number of years of experience greater than one then each such year of experience must be calculated by reference to the definition of one year of experience in order to determine whether an

employee has attained the requisite number of years of experience.

(j) extended leave includes long service leave, parental leave and long-term WorkCover absences.

(k) Hospital Certificate does not include an employee's base qualification.

(l) nurse/patient ratio means the nurse/patient ratio set out in Schedule C of this Agreement.

(m) Public Sector shall refer to employment under this Agreement in respect of an employer or place of work identified in Schedule A of this Agreement.

(n) Registered Nurse Division 1 means a person registered in division 1 of the Register of the Nurses Board of Victoria Registered as defined in the Nurses Act 1993 (Vic) but does not include a Registered Nurse Division 1 who is employed solely or predominantly in the provision of psychiatric nursing services. A reference in the Award to Registered Nurse is, for the purposes of this Agreement, a reference to a Registered Nurse Division 1.

(o) Registered Nurse Division 2 means a person registered in division 2 of the Register of the Nurses Board of Victoria Registered as defined in the Nurses Act 1993 (Vic) ) but does not include a Registered Nurse Division 2 who is employed solely or predominantly in the provision of psychiatric nursing services. A reference in the Award to a State Enrolled Nurse or an Enrolled Nurse is, for purposes of this Agreement, a reference to a Registered Nurse Division 2.

(p) Registered Nurse Division 5 means a person registered in division 5 of the Register of the Nurses Board of Victoria Registered as defined in the Nurses Act 1993 (Vic). A reference in the Award to a Mothercraft Nurse is, for purposes of this Agreement, a reference to a Registered Nurse Division 5.

(q) 24 hours a day, 7 days per week areas means wards/units/divisions of a hospital campus/facility that have a staffing roster that operates over 24 hours a day for 7 days a week.

Any term, expression or phrase not defined in this Agreement has, unless the context otherwise requires, the same meaning as is given to that term, expression or phrase by the Award.

A reference in this Agreement to "hospital" or "health care facility" "public health sector agency" or similar term is a reference to the hospital, health care facility, public health sector agency operated by an employer listed in Schedule A to this Agreement.

## **5 PARTIES BOUND**

5.1 The parties to this agreement are the employers referred to in Schedule A, the Australian Nursing Federation ("ANF"), and the Health Services Union of Australia ("HSUA") in respect of the employment of Registered Nurses Division 2 and Registered Nurses Division 5.

5.2 This Agreement is binding upon:

- (a) The employers referred to in Schedule A hereto in respect of all their employees for whom provision is made herein;
- (b) Employees employed by an employer referred to in Schedule A as a Registered Nurse Division 1, Registered Nurse Division 2, or Registered Nurse Division 5;
- (c) The ANF; and
- (d) The HSUA, to the extent that it applies to the employment of Registered Nurses Division 2 and Registered Nurses Division 5.

## **6 INCIDENCE AND APPLICATION**

This Agreement applies to the employment of Registered Nurses Division 1, Registered Nurses Division 2, and Registered Nurses Division 5 who are employed by the employers to whom this Agreement applies, unless specifically noted otherwise.

## **7 DATE AND PERIOD OF OPERATION**

This Agreement shall come into operation on the day on which it is certified. The nominal expiry date of this Agreement is 31 March 2004.

## **8 RELATIONSHIP WITH AWARD**

8.1 This Agreement is to be read in conjunction with the Award. Where there is any inconsistency between this Agreement and the Award, this Agreement will prevail. In all other respects Award provisions shall be applied as terms of this Agreement.

8.2 Where this Agreement makes provision for a varied or additional operation of a term of the Award, that term will apply subject to, or as varied by, this Agreement.

8.3 The Schedules and Appendices attached to this Agreement form part of this Agreement and are to be read in conjunction with the Agreement and the Award.

8.4 This Agreement wholly replaces any certified agreement that does: not solely pertain to salary packaging, organisational change (redundancy) or twelve (12) hour shifts and that:

- (a) binds an employer party referred to in Schedule A; and
- (b) applies to the employment of persons to whom this Agreement applies; and
- (c) has a nominal expiry date which has passed.

## **PART B - STAFFING, DISPUTES, NO EXTRA CLAIMS**

## 9 STAFFING

### 9.1 Skill/Mix

The minimum skill mix that each employer aims to achieve during the life of this Agreement, in all acute general surgical and medical wards is:

- (a) 1/3 Registered Nurse Division 1 with more than 3 years' experience;
- (b) 1/3 Registered Nurse Division 1 with 1 to 3 years' experience;
- (c) 1/3 Registered Nurse Division 1 with graduate nurse/Registered Nurse

### Division 2

#### 9.2 Annual Leave, Long Service Leave and Extended Leave Relief

- (a) In all ward/unit/department budgets,, provision will be made for the payment of salaries to persons employed to replace employees who are absent due to annual leave.
- (b) In order to maintain nurse/patient ratios, the rostered hours of all employees who are on extended leave will be fully replaced.

#### 9.3 Agency and Nurse Bank Staff

- (a) Each employer will endeavour to meet nurse/patient ratios through the employment of permanent employees. If this is not possible, an employer should use nurse bank employees as an interim measure. Agency staff should only be used for unexpected absences, such as sick leave.
- (b) A nurse bank employee:
  - (i) is a direct employee of an employer party to this agreement who is engaged in relieving work or work of a casual nature and whose engagement is terminable by an employer in accordance with the employer's requirements without the requirement of prior notice by either party; and
  - (ii) is to be paid per hour worked an amount equal to 1/38th of the weekly salary as set out in this Agreement appropriate to the class of work performed plus 25%; and
  - (iii) is not entitled to the provisions of the Award relating to Annual leave, Long Service Leave, Sick Leave, Bereavement Leave or Termination of Employment with the exception of clause 47 of the Award for Division 2 nurse bank employees.

#### 9.4 Deputy Director of Nursing

During the life of this Agreement employers which operate a hospital of over

30 beds across more than one site or campus may give consideration to the appointment of a Deputy Director of Nursing on each campus.

#### 9.5 Consumer Price Index (CPI) and Goods and Services Tax (GST)

If increases in the CPI are greater than the compensation contained in the GST offset package available to all employees, the parties will confer to seek to address this matter.

## 10 DISPUTE RESOLUTION

### 10.1 Grievances

(a) An employee will have the right for grievances to be heard through all levels of line management.

(b) In the first instance the employee will attempt to resolve the grievance with her or his immediate supervisor. The local ANF or HSUA or other representative will be present if desired by either party.

(c) If the employee still feels aggrieved, then the matter will be referred to her or his Department Head. The local union or other representative will be present if desired by either party.

(d) If the grievance is still unresolved, the matter shall be referred to senior management and the senior local or state branch union or other representative.

(e) If the grievance is still unresolved, then the state branch of the ANF or HSUA or other representative shall be advised and a meeting arranged. At this stage the employer's representative shall be advised and shall be present at the request of either party.

(f) It is agreed that the above steps in sub-clauses 10.1(a) to (e) shall take place within seven days (or such longer period as may be mutually agreed).

(g) If the grievance has not been resolved to the satisfaction of the employee or the employer, either party to the grievance may refer the grievance to the Australian Industrial Relations Commission ("the Commission") for resolution by conciliation, and if necessary by arbitration. Despite this paragraph, a dispute over the application of this Agreement shall be dealt with in accordance with subclause 10.2(a).

(h) Until the grievance is determined, work shall continue normally in accordance with custom and practice existing before the grievance arose while discussions take place. No party shall be prejudiced as to the final settlement by the continuance of work. Health and safety matters are exempted from this subclause.

## 10.2 Disputes over the Application of this Agreement

(a) In accordance with Section 170LW(a) of the Workplace Relations Act 1996, the Commission is empowered to settle by conciliation, any dispute over the application of this Agreement between parties to this Agreement which is referred to it by a party to this Agreement. If a dispute over the application of this Agreement cannot be resolved by conciliation, the Commission may, where the parties directly affected by such a dispute first agree, exercise arbitration power to settle that dispute.

(b) For the avoidance of doubt, a dispute concerning the application of this agreement to a newly created classification or to work under a new position title is to be dealt with in accordance with sub-clause 10.2(a).

## 10.3 Discipline

(a) Where disciplinary action is necessary, the management representative shall notify the employee of the reason. The first warning shall be verbal and will be recorded on the employee's personal file. With respect to Division 2 and Division 5 employees a union representative shall be present if desired by either party.

(b) If the problem continues the matter will be discussed with the employee and a second warning in writing will be given to the employee and recorded on the employee's personal file. The local union representative shall be present if desired by either party.

(c) If the problem continues the employee will again be notified by the management representative. If a final warning is to be given then it shall be issued in writing and if required by either party, a copy sent to the relevant union. The employee has the right to union representation.

(d) If the problem re-occurs, the employee's employment may be terminated. However, an employee's employment may not be terminated without the authority of senior management.

(e) Despite sub-clauses 10.3(a) to (d), an employee may still be summarily dismissed for acts of serious and wilful misconduct.

(f) If a dispute arises over any disciplinary action instigated against an employee by a management representative, the course of action to be followed shall be in accordance with sub-clause 10.1(g).

(g) If after any warning, a period of twelve months elapses without any further warning or action being required, all adverse reports relating to the warning must be removed from the employee's personal file.

(h) All new employees shall be handed a copy of these procedures on commencement of employment.

## **11 NO EXTRA CLAIMS**

11.1 The ANF, HSUA employees and employers bound by this Agreement acknowledge that this Agreement settles all claims in relation to the terms and conditions of employment of the employees to whom it applies and agree that they will not pursue any extra claims during the term of this Agreement.

11.2 Subject to an employer meeting its obligations to consult arising under the Award, this Agreement or a contract of employment binding on that employer, it is not the intent of this provision to inhibit, limit or restrict an employer's right or ability to introduce change at the workplace.

11.3 The parties agree to commence discussions no later than six months prior to the nominal expiry date of this Agreement. Provided that any claim made by a party during this period is not supported by industrial action, sub-clause

11.1 does not prevent a party from making a claim during the six month period prior to the nominal expiry date of this Agreement.

## **PART C - PILOTING OF PATIENT DEPENDENCY SYSTEMS**

### **12 PATIENT DEPENDENCY SYSTEMS**

12.1 During the life of this Agreement the parties will review patient dependency systems and a preferred patient dependency system will be piloted in public health sector agencies.

12.2 The parties will jointly participate in the patient dependency systems review with a view to identifying a preferred patient dependency system.

12.3 The piloting of the preferred patient dependency system will occur in 20 public health sector agencies.

12.4 Notwithstanding the results of the piloting program, the nurse/patient ratios set out in Schedule C of this Agreement will remain in place for the life of this Agreement, unless a subsequent agreement is reached between the parties to alter the nurse/patient ratios set out in Schedule C, prior to the nominal expiry date of this Agreement.

## **PART D - CONDITIONS AND WAGES**

### **13 CLASSIFICATIONS AND SALARY INCREASES**

13.1 Amendments to the operation of Award classifications and classifications in grades are set out in Schedule B.

13.2 The salary increases are set out in Schedule B. The first three salary increases, and the incremental salary increases described therein, will have retrospective operation from the dates set out in Schedule B.

13.3 Except as altered by Schedule B, classifications and classifications in grades contained in clauses 29, 31 and 50 of the Award continue to apply.

13.4 Arrangements for transition through grades provided for by the Award, continue to apply, except where amended as follows or by Schedule B:

(a) An employee will translate to the increment which reflects her or his experience including experience prior to 1 October 2000.

(b) For a Grade 3A Registered Nurse Division 1 appointed as an Associate Charge Nurse in a non-major hospital and paid as such, transition to Grade 3B shall be automatic upon the completion of two years of experience as an Associate Charge Nurse with that non-major hospital.

(c) A Grade 3A Registered Nurse Division 1 appointed as an Associate Charge Nurse in a non-major hospital and paid as such, who, at 1 October 2000 has two years of experience or more as an Associate Charge Nurse with that non-major hospital, shall move to the first increment of Grade 3B on 1 October 2000, and to the second increment of Grade 3B upon the completion of another year of experience.

(d) For a Grade 4A Registered Nurse Division 1 appointed as a Charge Nurse in a non-major hospital and paid as such, transition to Grade 4B shall be automatic upon the completion of two years of experience as a Charge Nurse with that non-major hospital.

(e) A Grade 4A Registered Nurse Division 1 appointed as a Charge Nurse in a non-major hospital and paid as such, who, at 1 October 2000 has two years of experience or more as a Charge Nurse with that non-major hospital, shall move to the first increment of Grade 4B on 1 October 2000, and to the second increment of Grade 4B upon the completion of another year of experience.

(f) For a Grade 4A Registered Nurse Division 1 appointed as a Teacher in a non-major hospital and paid as such, transition to Grade 4B shall be automatic upon the completion of two years of experience as a Teacher with that nonmajor hospital.

(g) A Grade 4A Registered Nurse Division 1 appointed as a Teacher in a nonmajor hospital and paid as such, who, at 1 October 2000 has two years of experience or more as a Teacher with that non-major hospital, shall move to the first increment of Grade 4B on 1 October 2000, and to the second increment of Grade 4B upon the completion of another year of experience.

## **14 SUPERANNUATION**

14.1 An employee employed by an employer prior to the commencement of this Agreement may remain a member of her or his current superannuation fund, but will be offered the option of becoming a member of the Health Employees

Superannuation Trust of Australia superannuation fund ("HESTA") or the HealthSuper superannuation fund.

14.2 An employee who begins employment with an employer after the commencement of this Agreement will have access to either HESTA or HealthSuper superannuation funds.

14.3 The default fund on commencement of the Agreement will be the HealthSuper superannuation fund.

14.4 At 12 monthly intervals throughout the life of this Agreement, the parties will have regard to the membership numbers in each of HESTA and Health Super Superannuation Funds. The default fund, at each 12 monthly interval, will be the fund with the most employees as members at each hospital.

## **15 NURSE/PATIENT RATIO**

15.1 The appropriate nurse/patient ratios which apply at the various public health sector agencies listed in Schedule A are attached to this Agreement at Schedule C.

15.2 Nurse/patient ratios will not apply in respect of Chemotherapy, dialysis, admission centres and day procedure centres or day surgery wards or units.

15.3 (a) The parties recognise that the nurse/patient ratios set out in Schedule C to this Agreement apply and are important for the regulation of reasonable nursing workload and the maintenance of high quality patient care. The Parties recognise that circumstances peculiar to a hospital or a ward or unit within a hospital may result in the nurse/patient ratios set out in Schedule C to this Agreement becoming inappropriate or difficult to apply. In such circumstances variations to the application of the ratios set out in Schedule C to this Agreement may be made in accordance with sub-clause 15.3(b).

(b) The nurse/patient ratios as they apply to a particular Hospital, ward or unit may be varied by agreement between the employer, the ANF and the employees of the affected ward or unit.

## **16 STAFFING**

16.1 Registered Nurse Division 1 - Charge Nurse  
Subject to Part II of Schedule C of this Agreement:

(a) there must be one EFT Charge Nurse appointed in each ward/unit of each campus/facility of each hospital/network; or

(b) two or more part-time Charge Nurses may be appointed so long as one EFT of Charge Nurse hours are worked in the shared position.

## 16.2 Registered Nurse Division 1 - Associate Charge Nurses

Subject to Part III of Schedule C of this Agreement:

- (a) Associate Charge Nurses ("ACNs") are appointed to undertake in-charge functions during the off duty periods of the Charge Nurse. Subject to the exceptions below, this rate shall be deemed to include the performance of the in-charge function during the off duty periods of the Charge Nurse.
- (b) When the Charge Nurse is absent for in excess of five days, the relieving ACN(s) shall be paid at the minimum rate for the Charge Nurse for the entire period of relief and another Registered Nurse Division 1 who consequently acts in a higher rate of that higher position for the position shall be similarly paid at the entire period of relief.
- (c) In all 24 hours a day, 7 days per week areas, there must be 5 EFT ACN shift positions available for appointment, and 4 out of the 5 of the positions must be permanently appointed.
- (d) Nothing in any of these provisions prevents ACN positions being either full-time or part-time.
- (e) The 5th EFT of ACN may be permanently appointed to, or may be utilised to provide non-appointed nurses with experience as an ACN.
- (f) Where a minimum of 4 EFT of ACNs is permanently appointed, and a Registered Nurse Division 1 other than an ACN is required to act in charge during the off duty period of a Charge Nurse (which event shall be the exception to the rule), such Registered Nurse Division 1 shall be paid at the minimum rate applicable to the ACN position which would normally be in charge on that shift.
- (g) Where due to recruitment difficulties or delays or to circumstances beyond an employer's control less than 4 EFT of ACNs are permanently appointed and a Registered Nurse Division 1, other than an ACN, is required to act in charge during the off duty period of a Charge Nurse (which event shall be the exception to the rule) the Registered Nurse Division 1 shall be paid at the minimum rate for the Charge Nurse for the entire shift.
- (h) Sub-clause 16.2(g) does not apply to a Registered Nurse Division 1 who is required to act in charge in the following circumstances:
  - (i) where an ACN in whose place the Registered Nurse Division 1 acts, is on any form of leave; or
  - (ii) for a reasonable period during which a replacement ACN is sought to be employed to fill a vacancy created by the termination of employment of an ACN in whose place the Registered Nurse Division 1 acts.
- (i) In the circumstances set out in sub-clause 16.2(h)(i) or (H) the

Registered Nurse Division 1 acting in charge shall be paid at the minimum rate applicable to the ACN position which would normally be in charge of that shift.

(j) Where an employer experiences difficulties in recruiting employees to permanent ACN positions despite having taken reasonable and practical steps to fill the position(s), the employer shall contact the ANF at the earliest opportunity. The ANF and the employer may then discuss and agree on alternative arrangements. Any agreement reached will be recorded in writing. Units that operate less than 24 hours per day/7 days per week

(k) The Employer is to appoint an ACN to cover all off duty periods of the Charge Nurse and, if a Registered Nurse Division 1 who is not an appointed ACN is required to act in charge during the off duty period of a Charge Nurse (which event shall be the exception to the rule) the Registered Nurse Division 1 shall be remunerated at the minimum rate for the Charge Nurse for the entire shift.

#### 16.3 Registered Nurse Division 1 - Director of Nursing

Despite any other provisions of this Agreement or the Award, each hospital/network must employ a full-time Director of Nursing ("DON "), classified in accordance with the Award, on each campus of the hospital.

#### 16.4 Registered Nurse Division 1 - Night Nurse in Charge/Supervisor

(a) A Registered Nurse Division 1 classified at Grade 5 shall be appointed to be in charge of each campus in all off duty periods of the DON.

(b) The indicative position description is attached at Appendix 3 to this Agreement.

(c) Pending appointment of a Grade 5 at each campus at 1 October 2000 "acting up" payments will apply in the off duty periods of a DON.

#### 16.5 Registered Nurse Division 1 - Clinical Nurse Specialist

The Clinical Nurse Specialist ("CNS") classification shall be available to all Registered Nurses Division 1 whether employed full time or part time who meet the criteria below:

(a) A CNS is defined as a Registered Nurse Division 1 appointed to the grade with either specific post basic qualifications and 12 months' experience working in the clinical area of her/his specified post basic qualification, and is responsible for clinical nursing duties, or minimum of four years' post registration experience, including three years' experience in the relevant specialist field.

(b) Applicants must meet the above definition, be employed either full time or part time and demonstrate one criterion in each of paragraphs 1, 2 and 3 of Appendix 2.

(c) Process for application for CNS

- \* Each employer will arrange for quarterly applications. This information to be permanently available for nursing staff.
- \* Written application to be made to the Charge Nurse.
- \* Interview if required will be by Charge Nurse, ACN or Educator and one other.
- \* Some health agencies (for example, where service delivery is similar across the facility) may wish to operate with an "umbrella " committee for the purpose of interviews.
- \* The successful applicant will be notified in writing within 7 days. The pay office will be informed of the new classification at the same time, with implementation to occur from the next pay period.
- \* If the applicant is unsuccessful they are to be notified of the outcome within 7 days. An explanation will be given to the applicant as to the reasons for the decision.
- \* Each employer will implement an appeal process. The appeal to be lodged by the applicant within 2 weeks of receiving the rejection letter and heard by the Appeal Committee within 4 weeks. The applicant may at this stage seek advice and assistance from the ANF.
- \* Appeals will be directed to the DON or nominee. An independent panel will be convened, consisting of a DON or nominee, Charge Nurse, CNS or other nominee as appropriate, other than those involved in the original decision.

**17 HOURS OF WORK**

17.1 A day off is to accrue for all full-time employees from 1 October 2000. A full-time employee will work 152 hours per 4 week period to be worked as 19 days each of 8 hours, save for a full-time employee working night shifts which will be worked as 10 hour shifts with an accrued day off in each 5 week cycle.

17.2 Employers will reintroduce, where not already in place, a roster for full-time employees comprising an 8 hour day shift, 8 hour evening shift and a 10 hour night shift, plus meal breaks, from 1 October 2000. Discussions may occur locally between the ANF and the employer to consider application of this roster configuration for part-time employees.

17.3 The obligations as they apply to a particular employer, ward or unit under sub-clauses 17.1 and 17.2 may be varied by agreement between the employer, the ANF and the affected employees for the following reasons:

- (a) the majority of employees seek shifts that are contrary to the 8:8:10

roster described in sub-clause 17.2 above; or

(b) to allow for the continuation of current arrangements with respect to "hours of work " and "short shifts". Current arrangements means arrangements that were in place prior to 31 August 2000.

17.4 If a variation to the obligations of a particular employer, ward or unit under sub-clauses 17.1 and 17.2 is sought for a reason described in subclause

17.3(a), the ANF will conduct a secret ballot of the affected employees. If the employees genuinely prefer an alternative roster then a written agreement between the ANF and the employer shall facilitate the outcome of that ballot.

17.5 Arrangements adopted in accordance with sub-clause 17.3:

(a) must not result, on balance, in a reduction in the overall terms and conditions of employment of the employee to whom the proposed arrangements would apply; and

(b) shall be recorded in writing and copies shall be provided to employees to whom the arrangements apply.

17.6 (a) For the purposes of sub-clause 17.3(b) a "short shift" is a shift of 6 hours duration in addition to a 30 minute meal break.

(b) Where short shifts are currently rostered they shall not exceed 1 short shift per "am" shift and 1 short shift per "pm" shift per ward or unit, or 2 short shifts per ward or unit per day in total.

(c) Despite the provisions of sub-clauses 17.6(a) and (b) in aged care and rehabilitation wards or units, the rostered short shifts shall be applied as follows:

\* in aged care and rehabilitation wards/units that currently roster no more than 2 short shifts - such shifts shall not exceed 2 per day per ward/unit;

\* in aged care and rehabilitation wards/units that currently roster more than 2 short shifts, then up to 3 short shifts in total can be rostered per ward/unit in any configuration over "am" and "pm" shifts.

## **18 OVERTIME**

### **18.1 General**

(a) Overtime will be paid to an employee where the employee is requested or directed by the employer to perform work that is performed in addition to the full time rostered shift length for that ward or unit. Except in the case of a DON in an institution where a Deputy or Assistant Director of Nursing is also employed, the following overtime rates will be paid for all work

performed, including for all recall to duty:

(i) All work performed by an employee in excess of full-time, ordinary hours of work prescribed for that ward or unit will be paid at the rate of time and a half for the first two hours and double time thereafter.

(ii) For the purposes of this clause "full time ordinary hours" is 8 hours for employees working day shift and afternoon shift and 10 hours in the case of employees rostered on night shift. Each day or shift will stand alone.

(iii) Despite sub-clause 18,1(a)(ii):

(A) 12 hour shift arrangements established by the Western Hospital Sunshine Maternity A Roster Trial Agreement 1995 (W0399), the -Western Hospital ICU Roster Trial Agreement 1995 (W0398) and the Peninsula Health Care Network (ICU - 12 hour shift) Agreement 1999 (P1749) continue to apply; and

(B) trials for 12 hour shifts which by agreement with ANF are presently being conducted in a number of Public Hospitals will continue and any agreed outcome relating to the length of shifts may be implemented in accordance with subclauses 17.3, 17.4 and 17.5 of this Agreement so as to regulate full time ordinary hours for employees working day shift, afternoon shift and night shift; and

(C) any new trials for 12 hour shifts which by agreement with ANF are to be conducted in any Public Hospital may proceed and any agreed outcome relating to the length of shifts may be implemented in accordance with sub-clauses 17.3, 17.4 and 17.5 of this Agreement so as to regulate full time ordinary hours for employees working day shift, afternoon shift and night shift.

(b) If due to organisational or institutional circumstances, difficulties arise from the requirement in sub-clause 18.1(a) that overtime will only be paid if the employee is requested or directed by the employer to perform overtime work, the ANF and/or the employer affected may refer the matter to the Australian Industrial Relations Commission for resolution in accordance with sub-clause 10.1(g) of this Agreement.

(C) In addition to sub-clause 18.1 (a) , for Registered Nurse Division 2:

(i) any overtime worked outside a spread of twelve hours from the commencement of the last previous rostered period of duty provided that the overtime is not continuous with the next succeeding period of duty will be paid at the rate of double time; and

(ii) any overtime worked outside a spread of nine hours from the time of commencing work by an employee rostered to work broken-shifts will be paid at the rate of time and a half; and

(iii) any overtime worked outside a spread of twelve hours from the time

of commencing work will be paid at the rate of double time.

#### 18.2 Part-time Employee Hours

A part-time employee working 38 hours or more in any week will be regarded as a fulltime employee for the period so worked. The parties also acknowledge that some part-time employees who are employed for 5 shifts per week would in some cases be more properly classified as full-time employees. Consequently, the parties agree to address the issue as follows:

(a) the ANF will provide a list of instances and details where the above practices occur; and

(b) the ANF, the VHIA and the relevant employer will meet to attempt to resolve the issue.

#### 18.3 Recall - Overtime

(a) An employee who is recalled to work during an off duty period where that work is not continuous with the next succeeding rostered period of duty will be paid overtime for a minimum of 3 hours pay at the appropriate overtime rate.

(b) An employee recalled to work will not be required to work the full three hours if the work to be performed is completed in a shorter period.

(c) Sub-clause 18.3(b) will not apply when overtime is continuous with completion or commencement of ordinary working time.

18.4 Subject to sub-clause 18.6 an employee will receive pay in respect of overtime worked and an employee shall not be allowed or required to take time off in lieu thereof.

18.5 An employer may require an employee to work reasonable overtime at overtime rates and such an employee will work overtime in accordance with such a requirement.

#### 18.6 Rest Period after Recall - Overtime (including Saturday and Sunday)

(a) When overtime work including recall work (but excluding telephone recall work) is necessary it should be arranged so that employees have at least 10 consecutive hours off duty between that work and the next successive shift.

(b) An employee who works so much overtime or recall work (excluding telephone recall work) between the termination of her/his last previous rostered ordinary hours of duty and the commencement of her/his next succeeding rostered period of duty that she/he would not have had at least 10 consecutive hours off duty between the completion of overtime/recall and the commencement of the next rostered shifts, then subject to this clause, she/he shall be released after completion of such overtime or recall work until she/he has had 10 consecutive hours off duty without loss of pay for rostered

ordinary hours occurring during such absence.

(c) If an employee is required by the employer to resume or to continue to work without having had 10 consecutive hours off duty she or he Will be paid at the rate of double time until they have been released from duty for such rest period and she/he shall then be entitled to 10 consecutive hours off duty without loss of pay for rostered ordinary hours occurring during such absence.

## **19 ONCALL/RECALL**

### 19.1 On Call Allowance

(a) An employee may be rostered to be "on call" (that is to be available to be recalled to duty in that period of time beyond the employee's rostered hours of duty).

(b) An employee is entitled to 4 clear days per fortnight free of duty, including oncall/recall work.

(c) Despite sub-clause 19.1(b):

(i) An employee who is regularly rostered to be on-call will receive an extra 5 days' leave per anniversary year subject to that employee:

(A) being rostered to be on call during weekend days or public holidays; or

(B) being rostered to be on call on days that the employee is not rostered for duty; and

(C) being rostered to be on call on a minimum of 2 days in every 4 week cycle over 12 cycles in an anniversary year.

(ii) An employee who is regularly rostered to be on call can accrue such leave on a pro rata basis at the rates as follows:

Number of 4 week Cycles on call Number of Additional days

4 1

6 2

8 3

10 4

12 5

(iii) Within the accrual year a window period of any 3 consecutive months, determined by the employer, which excludes any leave, shall be used to calculate the number of additional days leave to which the employee is entitled. If the employee is rostered to be on call for a minimum of 2 days on either Weekend Days, Public Holidays or Rostered Days off, in each 4 week roster during each of the 3 consecutive months, the employee will be entitled to the 5 full days additional leave. An Employee rostered to be on call, who does not meet these criteria, will have her or his additional leave

entitlement calculated in accordance with sub-clause 19.1(c)(ii) above.

(iv) Leave, which accrues in accordance with sub-clause 19.1(c), is to be taken by agreement between the employer and the employee within the operational needs of the hospital.

(d) (i) The obligations as they apply to a particular Hospital, ward or unit under sub-clause 19.1(a) to (c) may be varied by agreement between the employer, the ANF, and the employees of the affected ward or unit.

(ii) Hospital, ward or unit arrangements may be made to improve operational arrangements for both management and employees.

(iii) Arrangements agreed at the Hospital, ward or unit level in accordance with this clause must not result, on balance, in a reduction in the overall terms and conditions of employment of the employee to whom the proposed arrangements would apply.

(iv) Any arrangements adopted in accordance with this clause shall be recorded in writing and copies shall be provided to employees to whom the arrangements apply.

(e) If an employer requires an employee to be on call when off duty, the employee shall be paid in addition to any other amount payable, a sum equal to 2.5 per cent:

(i) of the allowance rate in the case of an employee employed as a Registered Nurse Division 2; or

(ii) of the base rate in the case of an employee employed as a Registered Nurse Division 1, calculated to the nearest 5 cents, portion of a cent being disregarded, per period of 12 hours or part thereof.

#### 19.2 Recall - Telephone Allowance

Where recall to duty can be managed without the employee having to return to their workplace, such as by telephone, such employee will be paid a minimum of one hour's overtime, provided that multiple recalls within a discrete hour will not attract additional payment-

## **20 ALLOWANCES**

### 20.1 Night Duty Allowance

(a) On and from 1 October 2000, employees will be paid an allowance as follows:

(i) Registered Nurse Division 1 - \$38.90 per shift;

(ii) Registered Nurse Division 2 or 5 - \$36.90 per shift.

(b) On and from 1 October 2000 an employee permanently working night duty will be paid an allowance as follows:

(i) Registered Nurse Division 1 - \$44.90 per shift; and

(ii) Registered Nurse Division 2 or 5 - \$42.35 per shift.

20.2 Qualification Allowance - Registered Nurses Division 1/Registered Nurse Division 5

On and from 1 October 2000, a Registered Nurse Division 1 or a Registered Nurse Division 5 will be entitled to a qualification allowance set out below, subject to the following:

(a) a Registered Nurse Division 1 or 5 holding more than one qualification is only entitled to one qualification allowance, being the allowance for the highest qualification held having regard to sub-clause 20.2. (b).

(b) it must be demonstrated that a component (at least) is applicable to the relevant employee's current area of practice. In situations where a component of a postgraduate qualification is relevant to that employee's current area of practice an allowance is payable. In considering whether a component of the qualification is relevant, the nature of the qualification and the current area of practice of the qualification holder are the main criteria. Other considerations may include:

(i) the clinical or other area of work of the Registered Nurse Division I or 5;

(ii) the classification and position description of the Registered Nurse Division 1 or 5 ;

(iii) whether the qualification would assist the Registered Nurse Division 1 or 5 in performing her or his role and/or assist in maintaining quality patient care and/or assist in the administration of the ward/unit/area in which the Registered Nurse Division 1 or 5 is employed.

(c) A Registered Nurse Division 1 or 5 claiming entitlement to a qualification allowance must provide to the employer evidence of that Registered Nurse Division 1 or 5 holding the qualification for which the entitlement is claimed.

(d) For the avoidance of doubt, a qualification allowance cannot be claimed by a Registered Nurse Division 1 or 5 in respect of that employee's base qualification leading to registration as a Registered Nurse Division 1/Registered Nurse Division 5.

(e) Certificates obtained from training or education facilities (eg.

infection control certificates from the Mayfield Centre) shall be recognised provided that the programmes are equivalent to a University/Graduation certificate and the training/education facility verifies that in writing.

(f) A Registered Nurse Division 1 or 5 who holds a Hospital Certificate or Graduate Certificate shall be paid in addition to their salary, the following amount:

(i) Hospital/Graduate Certificate (or equivalent) - 4.0% of base rate.

(g) A Registered Nurse Division 1 or 5 who holds a Post-Graduate Diploma or a Degree (other than a nursing undergraduate degree) shall be paid, in addition to her or his salary, the following amount:

(i) Post Graduate Diploma or Degree (or equivalent) - 6.5% of base rate.

(h) A Registered Nurse Division 1 or 5 who holds a Masters or Doctorate, shall be paid, in addition to their salary, the following amount:

(i) Masters or Doctorate - 7.5% of base rate.

(i) The above allowances are to be paid during all periods of leave except sick leave beyond 21 days and long service leave.

(j) The allowance is to be paid on a pro-rata basis for non-fulltime employees.

### 20.3 Qualification Allowance - Registered Nurses Division 2

On and from 1 October 2000, a Registered Nurse Division 2 will be entitled to a qualification allowance set out below:

(a) a Registered Nurse Division 2 who holds a certificate or qualification (which is in addition to the minimum qualification held by the nurse for registration by the Nurses' Board of Victoria) in which it is demonstrated that a component (at least) is applicable to her/his area of practice and/or work shall be paid the following allowance:

(i) a certificate or qualification for a course of six months duration - 4% of the wage rate for that Registered Nurse Division 2 as per Schedule B;

(ii) a certificate or qualification for a course of twelve months duration 7.5% of the wage rate for that Registered Nurse Division 2 as per Schedule B.

(b) Provided that only one allowance is payable to each eligible Registered Nurse Division 2, being the allowance for the highest qualification held, and provided that the certificate or qualification is relevant to the work performed.

(c) The course undertaken must result in a certificate or qualification being awarded, and not simply completion of certain subjects.

(d) A Registered Nurse Division 2 claiming entitlements to a qualification allowance must provide the employer with evidence of that Registered Nurse Division 2 holding the qualification for which the entitlement is claimed.

(e) For the avoidance of doubt, a qualification allowance cannot be claimed by a Registered Nurse Division 2 in respect of that person's base qualification leading to registration as a Registered Nurse Division 2.

#### 20.4 Senior Allowance - Registered Nurse Division 2

(a) A Registered Nurse Division 2 who is appointed as a "Senior" will have his/her classification preceded by the word "senior" and in addition will be paid an allowance of 10% to be calculated upon the base rate payable in Schedule B.

(b) Appointment of a Registered Nurse Division 2, to a classification preceded by the word "senior" will only be made where the work performed by such person represents a net addition to the work value of the substantive role required of a Registered Nurse Division 2 employed in a similar area or area. Indicia of a net addition to work value may include the performance of additional duties or functions, the assignment of a special project or an increase emphasis on the performance of core functions already undertaken by a Registered Nurse Division 2.

(c) A net addition to the work value of the substantive role required of a Registered Nurse Division 2 would be characterised by:

(i) the additional functions or duties are a regular and on-going requirement; and

(ii) experience in the role commensurate with this clause, coupled with on the job training where provided by the employer; and

(iii) the necessity for additional training in a particular aspect of the role above that required to fulfil the role of a Registered Nurse Division 2 employed in a similar area or areas; and

(iv) a greater level of judgement is required from the Registered Nurse Division 2 whereby the nurse is capable of making independent decisions to a degree not generally expected of a Registered Nurse Division 2 employed in a similar area or areas; and

(v) a higher degree of accountability is expected for work undertaken, such that the Registered Nurse Division 2 is clearly performing at a level above that of her or his peers employed in a similar area or areas with the employer's hospital.

(d) The Senior Allowance provided for in sub-clause 20.4(a) would normally

only apply to a Registered Nurse Division 2 who is classified at pay point 5 or above.

#### 20.5 Nauseous Work Allowance - Registered Nurse Division 2

On and from 1 October 2000 nauseous allowances will not be payable.

#### 20.6 Uniform Allowance

Where an employer requires an employee to wear a particular type or style of uniform then the employer shall provide this at no cost to the employee.

#### 20.7 Meal Breaks

(a) All employees are entitled to meal breaks as per the Award and are entitled to leave the ward/unit area for such breaks.

(b) Where employees are regularly unable to take meal breaks in accordance with sub-clause 20.7(a) then a "crib time" arrangement should operate as per clause 39 of the Award - Hours of Work (Private Sector). Following discussion at the Workplace implementation Committee level there should be an agreement entered into between the employer and the ANF.

(c) Subject to arrangements contained in any local agreement entered into between the employer and the ANF in accordance with sub-clause 20.7(b), any employee who is unable to take a meal break shall be paid for the meal break as time worked at the ordinary rate plus 50%.

### **21 ANNUAL LEAVE**

#### 21.1 Registered Nurses Division 1 - Full Time Employees

(a) Except for a Registered Nurse Division 1 employed by a Community Health Centre all Registered Nurses Division 1 shall be granted 190 hours of annual leave with ordinary pay on completion of 12 months service with her or his employer.

(b) Where an employee referred to above is required to work, and works, any public holiday he or she shall be entitled to an additional day's annual leave for each such public holiday worked up to a combined maximum of 190 hours.

(c) A full-time employee employed as a Registered Nurse Division 1 who is required to work and who worked ordinary hours on week days and on weekends throughout the qualifying twelve months period of service shall be allowed an additional seven consecutive days leave including non-working days. A fulltime employee employed as a Registered Nurse Division 1 with twelve months continuous service so engaged for part of the qualifying twelve month period shall have the leave prescribed in this paragraph increased by half a day for each month during which engaged as aforesaid.

(d) A Registered Nurse Division 1 employed by a Community Health Centre shall

be granted 152 hours of annual leave with ordinary pay on completion of 12 months service with her or his employer.

(e) For the purposes of calculating annual leave loading in clause

17.8.2(a)(i) of the Award, the excess salary amount and the amount in respect of a period of 152 hours, are as follows:

(i) Excess Salary

The rate provided for in this Agreement for a Registered Nurse Division 1 Grade 5 51-200 beds.

(ii) Amount in Lieu of Loading

Multiplying the amount in 21.1(f)(i) of this clause by 17.5% then by 4 (weeks) respectively.

(f) Sub-clause 21.1 only regulates the period of leave which is to be granted and the quantum of annual leave loading which is to be paid to a Registered Nurse Division 1. Other aspects of annual leave continue to be regulated by the Award.

21.2 All Registered Nurses- Part Time Employees

Annual leave will accrue to a part time employee on a pro rata basis.

## **22 LONG SERVICE LEAVE**

22.1 An employer may approve an application by an employee to take double the period of long service leave at half pay.

22.2 The employers and the ANF agree to establish, a process for the consideration of a statewide long service leave fund.

## **23 PARENTAL LEAVE**

23.1 An employee is entitled to parental leave in accordance with clause 21 of the Award.

23.2 An employee will be entitled to payment of six weeks' salary upon commencement of maternity leave. Previous service within the public health sector is to be regarded for the purposes of accessing the entitlement to paid maternity leave for employees with less than 12 months service with an employer.

23.3 An employee who will be the primary care giver of an adopted child is entitled to the payment of six weeks' salary from the date that the child is placed with the employee.

23.4 An employee, whose spouse or de facto spouse (including same sex couples) is giving birth or will be the primary care giver of an adopted child, is

entitled -to payment of one week's salary upon the commencement of parental leave.

23.5 A female employee shall be entitled to work until their estimated date of confinement except where this would present a risk to the employee or the unborn child.

23.6 If requested by the employer, the employee shall provide a statement confirming or otherwise, that their medical practitioner or midwife believes that continuation in their position is not a risk to the employee or the unborn child. Such requested certificate must be provided not less than 8 weeks prior to the employees presumed date of confinement.

23.7 If there is no confirmation that continuation of present position does not pose a risk to the employee or the unborn child then the employer will make all practical efforts to remedy an unsafe situation to allow the employee to work until their estimated date of confinement. If this is not possible, the employee will be offered a safe, alternate position in accordance with clause 21.9 of the Award.

23.8 Employees who already receive maternity/parental leave payments in excess of those above shall not suffer any disadvantage.

#### **24 BLOOD DONORS LEAVE**

Employers will release staff upon request to donate blood where a collection unit is on site or by arrangement at the local level.

#### **25 PUBLIC HOLIDAYS - PART TIME EMPLOYEES**

25.1 The entitlement to public holiday benefits for full-time employees are determined by the Award.

25.2 The entitlement to public holiday benefits under the Award for a parttime employee who is rostered off duty on the day on which a public holiday occurs is to be determined as follows:

(a) Where a public holiday occurs on a day that a part-time employee would normally work, but the employee is not required by the employer to work, the part-time employee is entitled to receive the public holiday benefit prescribed by the Award.

(b) Where a public holiday occurs on a day a part-time employee is not rostered to work, the part-time employee's entitlement will be determined by application of the following formula:

(i) average weekly hours worked by the part-time employee over the previous six months are to be determined; and

(ii) a pro-rata payment made, regardless of whether the employee would ever

work on that day of the week:

Example for hospital based Division 1 and Division 2 employees:

Average Hours Shift Length Base Payment Penalty Payment

24 hours x 8 hours 5.05 hours T1.5 7.575 hrs

38 hours (Div 2)

T1 5.05 hrs

(Div 1)

(Where employees have not worked a six (6) month period for the purposes of determining average hours, an employer will have regard to the average hours worked for the period preceding the public holiday.)

25.3 A part-time employee who is only ever employed between a Monday to Friday, shall not receive any entitlement to Easter Saturday.

25.4 In respect to a part-time night duty employee who is required to be on duty on the public holiday, the public holiday benefit shall apply to all of the hours of the shift worked.

25.5 A casual employee employed on prescribed public holidays shall be paid the relevant holiday rate further to any casual loading.

25.6 Clause 25 of this Agreement is to be read in conjunction with clause 9 of the attached Appendix 5.

## **26 PROFESSIONAL DEVELOPMENT & ASSOCIATED ENTITLEMENTS**

### **26.1 Professional Development Leave - Full-Time Employees**

(a) From 1 January 2001, all full-time employees will be entitled to three day's paid professional development leave per year (in addition to other leave entitlements in the Award and the Agreement).

(b) Professional development leave may be utilised for but not limited:

(i) to attend conferences, seminars or workshops; or

(ii) for research or home study.

(c) Professional development leave shall be granted without conditions such as a requirement to report on the seminar or the conference.

(d) An employee wishing to take professional development leave must apply in writing to the Charge Nurse at least 6 weeks' prior to the proposed leave, date.

(e) The application for professional development leave shall be approved by the Charge Nurse unless there are exceptional circumstances that justify nonapproval.

(f) The employer must notify the employee in writing if the leave is approved or not within 7 days of the request being made. If the leave is not granted the reasons will be included in the notification to the applicant.

(g) If an application is made for the 3 days or any portion thereof but is not granted during the calendar year it shall be added to accrued leave, or taken in another manner as mutually agreed between the employer and the employee.

(h) Otherwise than in accordance with sub-clause 26.1(g), accrued professional development leave will not accumulate from year to year.

## 26.2 Study Leave - All Employees

(a) Except as provided for in Appendix 5, paid study leave will be available to all full-time and part-time employees at the employer's discretion.

(b) Paid study leave may be taken as mutually agreed by, for example, 4 hours per week, 8 hours per fortnight or blocks of 38 hours at a residential school.

(c) A part-time employee will be entitled to paid study leave on a pro-rata basis.

(d) An employee wishing to take study leave in accordance with sub-clause

26.2(b) must apply in writing to the employer as early as possible prior to the proposed leave date. The employee's request should include:

(i) details of the course and institution in which the employee is enrolled or proposes to enrol; and

(ii) details of the relevance of the course to the employee's employment.

(e) The employer will notify the employee of whether her or his request for study leave has been approved within 7 days of the application being made. Leave pursuant to this clause does not accumulate from year to year.

## 26.3 Study/Conference/Seminar Leave - All Employees

(a) From 1 January 2001 all full-time and part-time employees are entitled to two days' paid study/conference/seminar leave per annum. "Days pay" will be based on the individual employee's usual shift length.

(b) Leave pursuant to this clause does not accumulate from year to year.

(c) Study/conference/seminar leave may be taken:

(i) to attend a nursing or health related conference or seminar; or

(ii) for undertaking study.

(d) An employee seeking leave in accordance with this clause can be requested to provide details of the conference/seminar name, venue and date/time. An employee is not required to report back in any way or provide in-services following conference/seminar attendance.

(e) Where possible the leave should be requested in writing 6 weeks in advance of the proposed leave date.

(f) The approval of leave will not be unreasonably withheld provided the leave is for a nursing or health related conference/seminar or for undertaking study.

(g) The employer must, wherever possible, notify the employee whether leave will be granted within 7 days of the application being made.

## **27 NOTICE PERIOD**

27.1 An employer may terminate the employment of an employee by providing 4 weeks notice in writing.

27.2 The notice required by sub-clause 27.1 will be increased by 1 week if the employee is over 45 years of age and has completed more than 2 years continuous service.

27.3 An employer may make payment in lieu of notice for part or all of the notice period.

27.4 An employee may terminate his or her employment by providing 4 weeks notice to the employer in writing.

27.5 Sub-clauses 27.1 to 27.3 do not effect an employer's right to terminate an employee's employment without notice for serious misconduct.

27.6 Sub-clauses 27.1 to 27.4 do not apply to an employee under a fixed term contract.

27.7 The employer shall ensure that new and existing employees are made aware of the change to the notice period and ensure that where an employee proposes to give less than four weeks notice that they are afforded an opportunity to provide the proper notice.

## **28 APPOINTMENT AND FIXED TERM EMPLOYMENT - ALL EMPLOYEES**

28.1 Fixed term employment will only be used for "true fixed term arrangements".

28.2 "True fixed term arrangements" include, but are not limited to, employment in graduate nurse positions, replacement of employees on maternity leave, long term WorkCover, parental leave or long service leave, employment in special projects, and post-graduate training.

28.3 Each employer shall provide each employee with a letter of appointment containing the information set out in Appendix 1.

28.4 The process for advertising and filling of vacancies shall be as follows:

(a) Each ward/clinical unit shall immediately establish a nurse staffing profile based on EFT employees.

(b) Where a vacancy arises within that nurse staffing profile, the responsible manager/nurse-in-charge will initiate action to advertise the vacant position internally and/or externally immediately after receiving notice of resignation or termination.

(c) The employer shall advertise all ward based vacancies that arise where the vacancy relates to a position that but for the vacancy occurring would have been ongoing, as soon as practicable (ordinarily within 8 working days).

## **29 CHANGE OF ROSTER**

29.1 Except in emergency situations seven days notice shall be given of a change of roster.

29.2 To promote forward Fostering, to encourage part-time employees to perform extra shifts and clarify the circumstances around employees working additional shifts on a voluntary basis, each employer shall, in addition to the normal nursing roster(s), develop and maintain a supplementary roster specifically to record all employees willing to work additional/changed shifts.

29.3 The supplementary roster is to display vacant shifts and employees can nominate to work those shifts. The supplementary roster would also provide a stand-by facility, where employees wishing to work extra shifts can nominate the days/shifts that they wish to work, should such vacancies in the normal roster occur.

29.4 All vacancies that arise in the normal nursing roster shall as far as possible be filled by employees who have voluntarily self-nominated to work additional shifts as per the supplementary roster.

29.5 Where vacancies in the normal nursing roster cannot be filled from the supplementary roster, employees may be requested to work additional shift(s) (subject to the provisions of this Agreement) and will automatically receive the award "change of roster allowance", in addition to any other entitlement.

29.6 For the purposes of this clause, it is agreed that hospitals will not

seek to override the arrangements herein, by attempting to include in an employee's contract of employment a requirement that an employee be available for extra shifts, other than as provided for in this Agreement.

29.7 Overtime payments are not affected by these changes. Overtime remains payable where it would otherwise apply, for example, double shifts.

29.8 Nothing in the above is intended to inhibit nurses swapping shifts amongst themselves, in which case no change of roster allowance is payable.

### **30 CHANGE OF SHIFT ALLOWANCE**

The change of shift allowance is payable to a Registered Nurse Division 2 is follows:

30.1 Where a roster for a Registered Nurse Division 2 is fixed in advance by the Employer the change of shift allowance is payable whenever an employee changes from working on one shift to working on another shift the time of commencement of which differs by four hours or more than from that of the first.

(a) Notwithstanding the provisions of sub-clause 30.1, the change of shift allowance is not payable where an employee chooses and works additional shifts from the supplementary roster (as defined).

(b) Notwithstanding the provisions of sub-clause 30.1, the change of shift allowance is not payable where an absence of four or more weeks of continuous approved leave intervenes between the relevant shifts.

(c) Notwithstanding the provisions of sub-clause 30.1, the change of shift allowance is not payable where one or more employees swap shifts between themselves on an ad hoc basis, and the swap(s) is approved by the employer in writing.

30.2 Where a ward or unit has established a self-rostering system, and an employee chooses his or her own shifts from a genuine choice of shifts, the employee will receive a fixed payment of two (2) change of shift allowances per pay period (fortnight) and sub-clause 30.1 shall not apply.

30.3 A Registered Nurse Division 2 who was employed by his or her employer as at 11 June 2002, and who receives change of shift allowances per pay period (fortnight) on the basis of an historical agreement between the employer and the employee that exceeds the entitlement arising from these provisions, such employee shall be maintained at that entitlement for the duration of this Agreement.

30.4 Where an Employer and the majority of employees ( who are Registered Nurses Division 2) in a ward or unit genuinely desire an alternative system to that above, the Employer is to contact the relevant Union and any agreement reached will be determined in accordance with the facilitative provisions of

this Agreement.

### **31 SALARY PACKAGING**

All employees covered by this Agreement will have access to salary packaging arrangements as follows:

(a) By agreement with the employee, the current rate of pay specified in the Award (as adjusted by this Agreement), may be salary packaged in accordance with the hospital policy on salary packaging.

(b) The employee shall compensate the hospital from within their base remuneration, for any FBT incurred as a consequence of any salary packaging arrangement the employee has entered into. Where the employee chooses not to pay any of the costs associated with their salary packaging, the hospital may cease the employee's salary packaging arrangements.

(c) The parties agree that in the event that salary packaging ceases to be an advantage to the employee (including as a result of subsequent changes to FBT legislation), the employee may elect to convert the amount packaged to salary. Any costs associated with the conversion to salary shall be borne by the employee and the employer shall not be liable to make up any benefit lost as a consequence of an employee's decision to convert to salary.

(d) The employee shall be responsible for all costs associated with the administration of their salary packaging arrangements, provided that such costs shall be confined to reasonable commercial charges as levied directly by the external salary packaging provider and/or in-house payroll service (as applicable), as varied from time to time.

(e) The parties recommend to employees who are considering salary packaging that they seek independent financial advice. The employer shall not be held responsible in any way for the cost or outcome of any such advice and furthermore, the parties agree that the employee shall pay for any costs associated with salary packaging.

(f) Superannuation contributions paid by the hospital into an approved Fund will be calculated on the Award rate for the applicable classification as varied by this Agreement.

### **32 RESOURCES AND FACILITIES**

#### **32.1 Occupational Health and Safety Representatives**

(a) In addition to other leave entitlements, Job Representatives and Occupational Health and Safety Representatives are to have reasonable time release from duty to attend to matters relating to industrial, occupational health and safety or other relevant matters such as attending Workplace Implementation Meetings, assisting with grievance procedures, attending

hospital committees, etc.

(b) Where representatives are required to attend management meetings outside of paid time they will be paid to attend.

### 32.2 Access to New Employees

(a) For the purposes of facilitating the orientation of new employees and in particular to familiarise such employees with the operation of this Agreement, the ANF shall be provided, in writing on a quarterly basis, with the dates, times and venues of any orientation/induction programs involving nurses and be permitted to attend. If the dates of these programs are fixed in advance for a regular day and time then a list should be sent to the ANF forthwith.

(b) Where the dates of orientation/induction programs involving nurses are not fixed in advance, the ANF should receive reasonable notification of at least 14 days to enable an ANF representative to attend.

### 32.3 Access to Employees and Facilities

(a) The ANF is to be given access to employees.

(b) The ANF Job Representatives and Occupational Health and Safety Representatives should be provided with access to facilities such as telephones, computers, e-mail, notice board and meeting rooms in a manner that does not adversely affect service delivery and work requirements.

### 32.4 Notice Boards

A noticeboard for the ANF's use should be established in each ward/unit, unless otherwise agreed at the local Workplace implementation Committee at each health facility.

### 32.5 Employee Facilities

Each employer is to provide private and comfortable areas at each worksite for employees who are breastfeeding to enable them to express or feed children while at work.

## **33 CAPABILITY TO VARY AGREEMENT**

33.1 Subject to the requirements of the Workplace Relations Act 1996, an application to vary any terms of this Agreement may be made under section 170MD of the Workplace Relations Act 1996.

33.2 Such application must be in writing and agreed to by the parties.

33.3 The parties agree that through the life of this Agreement this Agreement may be consolidated to include the Award.

SIGNED for and on behalf of EMPLOYERS  
referred to in Schedule A by the  
authorised representatives in the presence of: Signature  
Name (print)

Witness

Name of Witness (print)

SIGNED for and on behalf of AUSTRALIAN  
NURSING FEDERATION by its authorised  
officers in the presence of: Signature

Name (print)

Witness

Name of Witness (print)

SIGNED for and on behalf of HEALTH  
SERVICES UNION OF AUSTRALIA by its  
authorised officers in the presence of: Signature

Name (print)

Witness

Name of Witness (print)

#### **SCHEDULE A - LIST OF EMPLOYERS**

Alexandra District Hospital Mallee Track Health & Community Service  
Alpine Health Manangatang & District Hospital  
Austin & Repatriation Medical Centre Manningham Community Health Service  
Bairnsdale Regional Health Service Mansfield District Hospital  
Ballarat Community Health Centre Maryborough District Hospital  
Ballarat Health Services McIvor Health & Community Services  
Banyule Community Health Melbourne Health  
Barwon Health Mercy Health and Aged Care  
Bayside Health Mildura Base Hospital  
Beaufort & Skipton Mitchell Community Health Service  
Beechworth Health Service Moreland Community Health Centre  
Bellarine Community Health Centre Moyne Health Services  
Benalla & District Memorial Hospital Mt Alexander Hospital  
Bendigo Healthcare Group Inc Murrindindi Community Health Service  
Bentleigh Bayside Community Health North Richmond Community Health Centre  
Bethlehem Health Care North Yarra Community Health Inc.  
Boort District Hospital Northern District Community Health  
Service Inc.  
Casterton Memorial Hospital Northern Health  
Castlemaine District Community Health  
Centre  
Nowa Nowa Community Health Centre  
Central Bayside Community Health Numurkah & District Health Service  
Central Gippsland Health Service Omeo District Hospital  
Cobaw Community Health Service Otway Health & Community Services  
Cobram District Hospital Ovens and King Community Health Centre  
Cohuna District Hospital Peninsula Community Health Centre  
Colac Community Health Service Peninsula Health

Coleraine & District Hospital Peter MacCallum Cancer Institute  
 Community Health Bendigo Plenty Valley Community Health Services  
 Inc.  
 Darebin Health Service Portland & District Hospital  
 Darlingford Upper Goulburn Nursing Home  
 Inc.  
 Queen Elizabeth Centre  
 Dental Health Services Ranges Community Health Service  
 Dianella Community Health Incorporated Red Cliffs Community & Aged Care  
 Djerriwarrh Health Service Red Cross Blood Bank  
 Doutta, Galla Community Health Service Robinvale District Hospital & Health  
 Service  
 East Grampians Royal District Nursing Service  
 East Wimmera Health Service Royal Victorian Eye & Ear Hospital  
 Eastern Access Community Health Rural NorthWest Health  
 Eastern Health San Remo & District Community Health  
 Centre  
 Echuca Regional Health Seymour District Memorial Hospital  
 Edenhope & District Memorial Hospital South East Palliative Care Service Inc  
 Eltham Community Health Centre South Gippsland Hospital  
 Ensay Community Health South West Healthcare  
 Gippsland Southern Health Service Southern Health  
 Glenview Community Health St Vincent's Health  
 Goulburn Valley Community Health  
 Service  
 Stawell Regional Health  
 Goulburn Valley Health Sunraysia Community Health Service  
 Grampians Community Health Centre Swan Hill District Hospital  
 Hepburn Health Service Inc Tallangatta, Health Service  
 Hesse Rural Health Service Terang & Mortlake Health Service  
 Heywood Rural Health Timboon & District Healthcare Service  
 Inglewood & District Health Service Tweddle Child & Family Health Service  
 Inner South Community Health Service Upper Murray Health & Community Service  
 ISIS Primary Care Inc Wangaratta District Base Hospital  
 Kerang District Health West Gippsland Health Care Group  
 Kilmore & District Hospital West Wimmera Health Service  
 Knox Community Health Centre Western District Health Service  
 Koo Wee Rup Regional Health Service Western Health  
 Kyabram & District Memorial Community  
 Hospital  
 Western Region Health Centre  
 Kyneton District Health Service Whitehorse Community Health Centre  
 Lakes Entrance Community Health Centra Wimmera Health Care Group  
 Latrobe Community Health Service Wodonga, Regional Health  
 Latrobe Regional Hospital Women's & Children's Health  
 Lyndoch Warrnambool Wonthaggi & District Hospital  
 Maldon Hospital & Community Care Yarram & District Health Service  
 Yarrawonga District Health

**SCHEDULE B - CLASSIFICATIONS AND SALARY INCREASES**

A. SALARIES - REGISTERED NURSES DIVISIONS 1, 2 AND 5

The following salaries will become payable to employees from the first pay period commencing on or after the date specified in the columns below.

SALARY PER WEEK

REGISTERED NURSES DIVISION 1

1 October 1 March 1 March 1 March

2000 2001 2002 2003

Registered Nurse Grade 1

\$618.20 \$636.70 \$655.80 \$675.50

Registered Nurse Grade 2

Year 1 \$636.90 \$656.00 \$675.70 \$696.00

Year 2 (Base Rate) \$670.50 \$690.60 \$711.30 \$732.60

Year 3 \$704.30 \$725.40 \$747.01 \$769.60

Year 4 \$739.80 \$762.00 \$784.90 \$808.40

Year 5 \$775.60 \$798.90 \$822.90 \$847.60

Year 6 \$811.20 \$835.50 \$860.60 \$886.40

Year 7 \$831.20 \$856.10 \$881.80 \$908.30

Year 8 \$851.20 \$876.70 \$903.00 \$930.10

Clinical Nurse Specialist \$886.00 \$912.00 \$940.00 \$968.20

Registered Nurse Grade 3A

Year 1 \$896.50 \$923.40 \$951.10 \$979.60

Year 2 \$910.90 \$938.20 \$966.30 \$995.30

Registered Nurse Grade 3B

Year 1 \$932.20 \$960.20 \$989.00 \$11,018.70

Year 2 \$953.50 \$982.10 \$13,011.60 \$13,041.90

REGISTERED NURSES DIVISION 1

1 October 1 March 1 March 1 March

2000 2001 2002 2003

Registered Nurse Grade 4A

Year 1 \$980.70 \$1,010.10 \$12,040.40 \$1,071.60

Year 1 (Charge Nurse) \$1,005.00 \$1,35.20 \$1,066.30 \$1,098.30

Year 2 \$1,007.60 \$1,037.80 \$1,068.90 \$1,101.00

Year 2 (Charge Nurse) \$1,032.80 \$1,063.80 \$1,095.70 \$1,128.60

Registered Nurse Grade 4B

Year 1 \$1,031.80 \$1,062.80 \$1,094.70 \$1,127.50

Year 1 (Charge Nurse) \$1,057.70 \$1,089.40 \$1,122.10 \$1,155.80

Year 2 \$1,059.00 \$1,090.80 \$1,123.50 \$1,157.20

Year 2 (Charge Nurse) \$1,085.50 \$1,118.10 \$1,151.60 \$1,186.10

Registered Nurse Grade 5

13-50 beds \$1,059.00 \$1,090.80 \$1,123.50 \$1,157.20

51-200 beds \$1,080.40 \$1,112.80 \$1,146.20 \$1,180.60

201-400 beds \$1,123.10 \$1,156.80 \$1,191.50 \$1,227.20

401-600 beds \$1,165.80 \$1,200.80 \$1,236.80 \$1,1273.90

601 and over beds \$1,208.60 \$1,244.90 \$1,282.20 \$1,320.70

Registered Nurse Grade 6

51-100 beds \$1,080.40 \$1,112.80 \$1,146.20 \$1,180.60

101-200 beds \$1,123.10 \$1,156.80 \$1,191.50 \$1,227.20

201-300 beds \$1,165.80 \$1,200.80 \$1,236.80 \$1,273.90

301-400 beds \$1,208.60 \$1,244.90 \$1,282.20 \$1,320.70

401-500 beds \$1,265.70 \$1,303.70 \$1,342.80 \$1,383.10  
 501-700 beds \$1,319.90 \$1,359.50 \$1,400.30 \$1,442.30  
 701 and over beds \$1,391.40 \$1,433.10 \$1,476.10 \$1,520.40

Registered Nurse Grade 7

REGISTERED NURSES DIVISION 1

1 October 1 March 1 March 1 March

2000 2001 2002 2003

Less than 13 beds \$1,080.40 \$1,112.80 \$1,146.20 \$1,180.60  
 13-24 beds \$3,123.10 \$1,156.80 \$1,191.50 \$1,227.20  
 25-50 beds \$1,165.80 \$1,200.80 \$1,236.80 \$1,273.90.  
 51-100 beds \$1,208.60 \$1,244.90 \$1,282.20 \$1,320.70  
 101-200 beds \$1,265.70 \$1,303.70 \$1,342.80 \$1,383.10  
 201-300 beds \$1,319.90 \$1,359.50 \$1,400.30 \$1,442.30  
 301-400 beds \$1,391.40 \$1,433.10 \$1,476.10 \$1,520.40  
 401-500 beds \$1,462.40 \$1,506.30 \$1,551.50 \$1,598.00  
 501-600 beds \$1,533.80 \$1,579.80 \$1,627.80 \$1,676.00  
 601-700 beds \$1,619.30 \$1,667.90 \$1,717.90 \$1,769.40  
 701 and over beds \$1,709.20 \$1,760.50 \$1,813.30 \$1,867.70

REGISTERED NURSES DIVISION 2

1 October 1 March 1 March 1 March

2000 2001 2002 2003

Registered Nurse Division 2 Pay Points

Year 1 (Allowance 577.40 594.70 612.50 630.90

Rate)

Year 2 588.90 606.60 624.80 643.50

Year 3 600.40 618.40 637.00 656.10

Year 4 613.50 631.90 650.90 670.40

Year 5 625.70 644.50 663.80 683.70

Year 6 637.70 656.80 676.50 696.80

Year 7 649.70 669.20 689.30 710.00

REGISTERED NURSES DIVISION FIVE

1 October 1 March 1 March 1 March

2000 2001 2002 2003

Group A

During 1st year of experience \$547.60 \$564.00 \$580.90 \$598.00

During 2nd year of experience \$557.10 \$573.80 \$591.00 \$608.70

During 3rd year of experience \$566.20 \$583.20 \$600.70 \$618.70

During 4th year of experience \$575.60 \$592.90 \$610.70 \$629.00

During 5th year of experience \$584.90 \$602.40 \$620.50 \$639.10

During 6th year of experience \$589.50 \$607.20 \$625.40 \$644.20

During 7th year of experience \$601.50 \$619.50 \$638.10 \$657.20

Thereafter \$613.50 \$631.90 \$650.90 \$670.40

Group B

During 1st year of experience \$575.60 \$592.90 \$610.70 \$629.00

During 2nd year of experience \$584.90 \$602.40 \$620.50 \$639.10

During 3rd year of experience \$589.50 \$607.20 \$625.40 \$644.20

During 4th year of experience \$603.50 \$621.60 \$640.20 \$659.40

During 5th year of experience \$616.40 \$634.90 \$653.90 \$673.50

During 6th year of experience \$628.80 \$647.70 \$667.10 \$687.10

During 7th year of experience \$640.80 \$660.00 \$679.80 \$700.20  
 Thereafter \$652.80 \$672.40 \$692.60 \$713.40

Group C

During 1st year of experience \$589.50 \$607.20 \$625.40 \$644.20  
 During 2nd year of experience \$603.50 \$621.60 \$640.20 \$659.40  
 During 3rd year of experience \$616.40 \$634.90 \$653.90 \$673.50

REGISTERED NURSES DIVISION FIVE

1 October 1 March 1 March 1 March

2000 2001 2002 2003

During 4th year of experience \$628.80 \$647.70 \$667.10 \$687.10  
 During 5th year of experience \$640.80 \$660.00 \$679.80 \$700.20  
 Thereafter \$652.80 \$672.40 \$692.60 \$713.40

Group D

During 1st year of experience \$603.50 \$621.60 \$640.20 \$659.40  
 During 2nd year of experience \$616.40 \$634.90 \$653.90 \$673.50  
 During 3rd year of experience \$628.80 \$647.70 \$667.10 \$687.10  
 During 4th year of experience \$640.80 \$660.00 \$679.80 \$700.20  
 Thereafter \$652.80 \$672.40 \$692.60 \$713.40

B. SALARY INCREASES FOR ALL NURSES

1 October 2000 3.5%

1 March 2001 3%

1 March 2002 3%

1 March 2003 3%

The first three increases will have retrospective operation. All increases to salaries and allowances have been incorporated into the salary and wage schedule above.

C. ADDITIONAL AUTOMATIC INCREMENTS

From 1 October 2000 the following additional automatic increments shall apply.

These have been incorporated into the salary and wage schedule above:

Registered Nurse Division 1, Grade 2 Year 7 \$20 per week

Registered Nurse Division 1, Grade 2 Year 8 \$20 per week

Registered Nurse Division 2, Pay Point 6 \$12 per week

Registered Nurse Division 2, Pay Point 7 \$12 per week

Registered Nurse Division 5, Group A, 7th year of \$12 per week  
 experience

Registered Nurse Division 5, Group A, thereafter \$12 per week

Registered Nurse Division 5, Group B, 7th year of \$12 per week  
 experience

Registered Nurse Division 5, Group B, thereafter \$12 per week

Registered Nurse Division 5, Group C, 5th year of \$12 per week  
 experience

Registered Nurse Division 5, Group C, thereafter \$12 per week

Registered Nurse Division 5, Group D, 4th year of \$12 per week  
 experience

Registered Nurse Division 5, Group D thereafter \$12 per week

D. ALLOWANCES

01/03/01 01/03/02 01/03/03

\$ \$ \$

REGISTERED NURSES

## DIVISION 1

Shift Allowance Morning shift 15.90 16.40 16.90

Afternoon shift 15.90 16.40 16.90

Night shift 40.10 41.30 42.54

Permanent shift 46.20 47.60 49.02

On Call Allowance 17.30 17.80 18.33

Change of Roster

Allowance

17.30 17.80 18.33

Hospital/Grad Certificate 27.60 28.50 29.35

Post Grad Diploma or

Degree

44.90 46.20 47.58

Masters/PhD 51.90 53.40 55.00

Uniform Allowance 1.03 1.06 1.09

5.08 5.23 5.38

Laundry Allowance 0.27 0.28 0.29

1.32 1.36 1.40

Vehicle Allowance Motor Cars

(35 PMU &amp; over) 71.52 73.67 75.88

(Under 35 PMU) 58.90 60.67 62.49

Motor Cycles

(250cc &amp; over) 34.44 35.47 36.53

(under 250cc) 25.84 26.62 27.41

Bicycles 8.55 8.81 9.07

Meal Allowance (during

overtime)

After 1 hour of shift 7.60 7.83 8.06

After 4 hours of

shift

6.08 6.26 6.44

5 hours on a Sat or

RDO

7.60 7.83 8.06

9 hours on a Sat or

RDO

6.08 6.26 6.44

## REGISTERED NURSES

## DIVISION 2

Shift Allowance Morning shift 14.85 15.30 15.75

Afternoon shift 14.85 15.30 15.75

Night shift 38.00 39.15 40.32

Permanent night 43.60 44.90 46.24

Change of shift 23.80 24.50 25.23

On Call Allowance 14.85 15.30 15.75

Change of Roster

Allowance

14.85 15.30 15.75

Senior Allowance Pay Point 1 59.45 61.25 63.08

Pay Point 2 60.65 62.50 64.37  
 Pay Point 3 61.85 63.701 65.61  
 Pay Point 4 63.20 65.10 67.05  
 01/03/01 01/03/02 01/03/03  
 \$ \$ \$  
 Pay Point 5 64.45 66.40 68.39  
 Pay Point 6 65.70 67.65 69.67  
 Pay Point 7 66.90 68.95 71.00  
 Certificate Allowance 6 month course - PP 1 23.80 24.50 25.23  
 6 month course - PP 2 24.25 25.00 25.75  
 6 month course - PP 3 24.75 25.50 26.26  
 6 month course - PP4 25.30 26.05 26.93  
 6 month course - PP5 25.80 26.55 27.34  
 6 month course - PP 6 26.25 27.05 27.86  
 6 month course - PP 7 26.75 27.55 28.37  
 12 month course - PP 1 44.60 45.95 47.32  
 12 month course - PP 2 45.50 46.85 48.25  
 12 month course - PP 3 46.40 47.80 49.23  
 12 month course - PP 4 47.40- 48.80 50.26  
 12 month course - PP 5 48.35 49.80 51.29  
 12 month course - PP 6 49.25 50.75 52.27  
 12 month course - PP 7 50.20 51.70 53.25  
 Uniform Allowance 1.08 1.11 1.14  
 5.44 5.60 5.76  
 Laundry Allowance 0.27 0.28 0.29  
 1.33 1.37 1.41  
 Vehicle Allowance Motor Cars  
 (35 PMU & over) 71.86 74.02 76.24  
 (under 35 PMU) 59.24 61.02 62.85  
 Motor Cycles  
 (250cc & over) 34.67 35.71 36.78  
 (under 250cc) 25.95 26.73 27.53  
 Bicycles 8.65 8.91 9.17  
 Meal Allowance (during  
 overtime)  
 After 1 hour of shift 8.03 8.27 8.51  
 After 4 hours of shift 6.44 6.63 6.82  
 5 hours on a Sat or RDO 8.03 8.27 8.51  
 9 hours on a Sat or RDO 6.44 6.63 6.82  
 Red Cross Mobile Unit  
 (Day)  
 1.46 1.50 1.54  
 Allowance  
 (Week) 7.37 7.59 7.81  
 REGISTERED NURSES DIVISION 5  
 01/03/01 01/03/02 01/03/03  
 \$ \$ \$  
 Shift Allowance Morning Shift 14.10 14.50 14.93  
 Afternoon Shift 14.10 14.50 14.93

Night Shift 38.00 39.10 40.27  
 Permanent Night Shift 43.60 44.90 46.24  
 On Call Allowance 6.23 6.42 6.61  
 Uniform Allowance 1.16 1.19 1.22  
 4.76 4.90 5.04  
 Laundry Allowance 0.24 0.25 0.26  
 0.96 0.99 1.01  
 Vehicle Allowance Motor Cars  
 (17hp & over) 35.00 36.05 37.13  
 (under 17hp) 26.72 27.52 28.34  
 Motor Cycles 11.12 11.45 11.79  
 Meal Allowance (during  
 overtime)  
 After 1 hour of shift 6.99 7.20 7.41  
 After 4 hours of shift 5.61 5.78 5.95  
 5 hours on a Sat or RDO 6.99 7.20 7.41  
 9 hours on a Sat or RDO 5.61 5.78 5.95

#### E. CLASSIFICATIONS

##### REGISTERED NURSES DIVISION 1

All classifications in the Award at clause 29 apply, subject to the amendments, which follow:

Clinical Consultant - a Registered Nurse Division 1 who is appointed as such to provide a clinical resource, clinical advisory/developmental role on a full-time dedicated basis (ie. performs only consultancy work on the relevant shifts) and undertakes related projects and research and development activities to meet specified clinical nursing needs in a clinical discipline.

Clinical Consultant A - a Registered Nurse Division 1 appointed as such who as a member of a specialist team fulfils the clinical consultant role in their first and second years of experience.

Clinical Consultant B - a Registered Nurse Division 1 appointed as such who fulfils the clinical consultant role as a Clinical Consultant A in her or his third and subsequent years of experience as a Clinical Consultant.

Clinical Consultant C - a Registered Nurse Division 1 appointed as such who fulfils the clinical consultant role, and

(a) is the sole Registered Nurse Division 1 in the specialty; or

(b) is in charge of a specialty team; or

(c) is a clinical consultant who takes referrals from, or delivers the consultancy outside more than one campus/worksites/centre of the Health Service  
 The term "sole Registered Nurses Division 1" means a clinical consultant at a

particular site or campus, whether full time or part time who is the only nurse consultant in that clinical specialty at that site or campus.

Similarly, where two or more nurses are employed in that clinical specialty at a combined EFT of one or less, but predominantly work different days or job share, the sole classification would apply.

Clinical Consultant D - a Registered Nurse Division I appointed as such who fulfils the clinical consultant role and who in addition principally consults on a multi Health Service or Statewide basis.

Clinical Consultant E - a Registered Nurse Division 1 appointed as such who fulfils the clinical consultant role on an interstate or national basis.

Community Health Nurse (Sole) - a Registered Nurse Division I who is the only community health nurse appointed as such at a particular site, whether employed on a full-time or part-time basis. This classification also applies where 2 or more community health nurses are employed but predominantly work different days or job share.

Clinical Nurse Specialist -

(a) A Registered Nurse Division I appointed to the grade with either specific post basic qualifications and twelve months' experience working- in the clinical area of her/his specified post basic qualification, and is responsible for clinical nursing duties, or minimum of four year's post registration experience, including three years' experiences in the relevant specialist field; or

(b) A registered Nurse Division 1 who meets the criteria set out at Appendix

2.

## F. CLASSIFICATIONS IN GRADES

The application of the classifications in grades set out below is subject to the transitional provisions contained in sub-clause 13.4 of this Agreement. All relevant classifications in grades as set out in clause 31 of the Award apply, subject to the amendments, which follow.

### Grade 3A

A Registered Nurse Division 1 with less than two years of experience (as defined) as an Associate Charge Nurse, appointed as an Associate Charge Nurse in a non-major hospital and paid as such.

### Grade 3B

A Registered Nurse Division 1 appointed as an Associate Charge Nurse in a major hospital and paid as such.

A Registered Nurse Division 1 with two years of experience (as defined) or

more as an Associate Charge Nurse, appointed as an Associate Charge Nurse in a non-major hospital and paid as such.

#### Grade 4A

A Registered Nurse Division 1 with less than two years of experience (as defined) as a Charge Nurse, appointed as a Charge Nurse in a non major hospital and paid as such.

A Registered Nurse Division 1 with less than two years of experience (as defined) as a Teacher, appointed as a Teacher in a non-major hospital and paid as such.

A Registered Nurse Division 1 appointed as a Clinical Consultant A with less than 2 years of experience (as defined) as a Clinical Consultant and paid as such.

#### Grade 4B

A Registered Nurse Division 1 appointed as a Charge Nurse in a major hospital and paid as such.

A Registered Nurse Division 1 with less two years of experience (as defined) or more as a Charge Nurse, appointed as a Charge Nurse in a non-major hospital and paid as such.

A Registered Nurse Division 1 appointed as a Teacher in a major hospital and paid as such.

A Registered Nurse Division 1 with two years of experience (as defined) or more as a Teacher, appointed as a Teacher in a non-major hospital and paid as such.

A Registered Nurse Division 1 appointed as a Clinical Consultant B and paid as such.

A Registered Nurse Division 1 appointed as a Clinical Consultant A with 2 years of experience (as defined) or more as a Clinical Consultant and paid as such.

#### Grade 5

A Registered Nurse Division 1 appointed as a Clinical Consultant C and paid as such. The first year rate of pay for this classification shall be the Grade 5 (51-200 beds). Thereafter the rate of pay for this classification shall be the Grade 5 (201-400 beds).

#### Grade 6

A Registered Nurse Division 1 appointed as a Clinical Consultant D and paid as such. The rate of pay for this classification shall be at the Grade 6 (301-

400 beds).

Grade 7

A Registered Nurse Division appointed as a Clinical Consultant E and paid as such. The rate of pay for this classification shall be the Grade 7 (401-500 beds).

Savings Clause

Registered Nurse Division 1 appointed as a Clinical Consultant who at the date of certification of this Agreement is classified at a higher grade or subgrade than that which applies to that Clinical Consultant under this Agreement will be maintained at the higher grade or sub-grade for the shorter of the period comprising:

- (a) the duration of the Agreement; or
- (b) the duration of that person's employment with the employer

## **SCHEDULE C - NURSE/PATIENT RATIOS**

### **PART 1A - NURSE/PATIENT RATIOS**

Nurse-Patient Ratio

General Medical Level 1 AM 1:4 + I/C

Surgical Wards Level 1 PM 1:4 + I/C

Level 1 ND 1:8

Level 2 AM 1:4 + I/C

Level 2 PM 1:5 + I/C

Level 2 ND 1:8

Level 3 AM 1:5 + I/C

Level 3 PM 1:6 + I/C

Level 3 ND 1:10

Level 3A AM 1:6 + I/C

Level 3A PM 1:6 + I/C

Level 3A ND 1:10

Ante/Postnatal All Levels AM 1:5 + I/C

PM 1:6+ I/C

ND\* 1:8

\* Night duty staff may assist in Levels 1 and 2 nurseries where geography and workload allows.

Other Hospitals (not referred to in page 2 of this Annexure) and

Aged Care Acute Wards AM 1:6 + I/C \*

PM 1:7 + I/C \*

ND 1:10

Aged Wards AM 1:7 + I/C\*

PM 1:8 + FC\*

ND 1:15

\* refer to Aged Care and Other Hospitals ratio

Level 1 (4+4)

Alfred

Austin & Repat Medical Centres

Monash

Royal Melbourne

St Vincent's

Royal Children's

Box Hill

Frankston

Geelong

Northern

Dandenong

Western (Footscray)

Peter MacCallum

Level 2 (4+5)

Mercy Hospital for Women

Royal Women's Hospital

Maroondah

Ballarat

Bendigo

Goulburn Valley

Latrobe

Sunshine

Werribee Mercy

Wangaratta

Mildura

Level 3 (5+6)

Angliss

Bairnsdale

Echuca

Gippsland Base (Sale)

Hamilton

Monash (Moorabbin)

Rosebud

Eye & Ear

Sandringham

Swan Hill

Warragul

Warrnambool

Williamstown

Wimmera

Wodonga

Level 3A (6+6)

Mt Alexander (acute)

Portland

PART 1B - INTERPRETATION

## 1 General Medical/Surgical Wards

(a) The following information is intended to assist in the interpretation of the methodology used to apply the nurse/patient ratios. Further, it is recognised that any application of the nurse/patient ratios must be flexible so that hospitals are able to adjust to variations in bed occupancy (up and down), subject to the meeting of the agreed nurse/patient ratios, and compliance with other requirements of the Award, agreements and employment contracts. The following information applies with respect to all ratios set out in Schedule C within wards and level 2 nurseries.

(b) The methodology used to apply the nurse/patient ratio needs to be consistent with the principle of ensuring that the number of nurses available is commensurate with the number of patients requiring care. Average occupancy may not reflect variations in patient numbers and therefore may not match staff to periods of peak demand.

(c) Consequently, the nurse/patient ratio should be calculated on actual patient numbers in a given ward or unit. If a hospital has a particular ward of 30 beds and only 26 beds are generally occupied, the four "unused" beds may only be used when additional staff are available to meet the ratio requirements.

(d) While the nurse/patient ratio set out in Schedule C will apply to the number of beds that are generally occupied, any occupancy of additional beds is subject to:

(i) additional beds being available; and

(ii) nurses being rostered to the level required to meet the nurse/patient ratio for the duration of the occupancy of additional beds.

In this context "rostered" does not require the application of normal Award notice periods.

(e) Where demand requires fewer beds, staffing may be adjusted down or redeployed prior the commencement of shifts, subject to compliance with relevant provisions in awards, certified agreements or an individual's employment contract.

(f) Where the application of the nurse/patient ratio results in a number of nurses, plus an additional requirement of more than 0.5%, rounding up shall be required.

(g) Where the application of the nurse/patient ratio results in a number of nurses, plus an additional requirement of 0.5% or less rounding down shall be regarded as being in compliance with the ratio.

(h) Where the application of the nurses ratio results in a number of nurses, plus an additional requirement of 0.5%, prima facie rounding down shall occur.

This is subject to the following safeguards:

- (i) patient care is not to be compromised;
- (ii) if the number of patients outside the nurse/patient ratio exceeds 50% of the requirement to appoint an additional nurse, a further nurse must be appointed.

Alternatively, where the number of patients outside the nurse/patient ratio is 50% or less, and where patient care would not be compromised, agreement would be reached to appoint for example, 6 nurses rather than 7.

Such decisions may be made by the Agreement Implementation Committee.

- (iii) On night duty shifts, and in aged care wards, it may be appropriate to appoint a floater to make up the part nurse/patient ratio.

- (iv) Where appropriate, the ratios in the Hospitals listed below may be reached with a mix of Divisions 1 and 2 Registered Nurses.

Alexandra District Dunmunkle Health  
 Hospital Services -  
 Alpine Health - Rupanyup  
 Bright, Mt Beauty, Dunolly Hospital  
 Myrtleford Echuca Hospital  
 Angliss Health Edenhope &  
 Service District Memorial  
 Ararat Hospital Hospital  
 Bairnsdale Hospital Far East Gippsland  
 Beaufort & Skipton Health & Support  
 Health Service Service, Orbost  
 Beechworth MPS  
 Hospital Gippsland Base  
 Benalla & District Hospital - Sale  
 Memorial Hospital Gippsland Southern  
 Bethlehem Hospital Health Service,  
 Birchip Hospital Korumburra,  
 Boort District Leongatha  
 Hospital Hamilton Hospital  
 Caritas Cristi Hesse Rural Health  
 Hospice Service  
 Casterton Memorial Heyfield Hospital  
 Hospital Heywood &  
 Caulfield Hospital District Memorial  
 Charlton Hospital Hospital  
 Cobram District Hopetoun Hospital  
 Hospital Inglewood &  
 Cohuna & District District Health  
 Hospital Service  
 Colac Community Jeparit Hospital  
 Health Service Kaniva Hospital

Coleraine District Kerang & District  
Hospital & Aged Hospital  
Care Kilmore & District  
Corangamite Hospital  
Regional Hospital Koo-wee-rup  
Services Regional Health  
Creswick Hospital Service  
Daylesford Hospital Koroit & District  
Djerriwarrh Health Memorial Health  
Service Services  
Donald District Kyabram & District  
Hospital Memorial Comm.  
Hospital  
Kyneton Hospital  
Lorne Community Rosebud Hospital  
Hospital Royal Victorian  
Maffra Hospital Eye & Ear Hospital  
Maldon Hospital & Sandringham  
Community Care Hospital  
Mallee Track Seymour District  
Health & Memorial Hospital  
Community Service South Gippsland  
Manangatang & Hospital  
District Hospital Southern Health  
Mansfield District Community Health  
Hospital Service  
Maryborough St Arnaud Hospital  
Hospital Stawell District  
McIvor Health & Hospital  
Community Sunshine Hospital  
Services Swan Hill District  
Monash Medical Hospital  
Centre - Swan Hill District  
Moorabbin Hospital  
Moyne Health Tallangatta  
Services Hospital  
Mt. Alexander Tatura Hospital  
Hospital Terang & Mortlake  
Nathalia District Health Service  
Hospital Timboon & District  
Natimuk Hospital Healthcare Service  
Nhill Hospital Upper Murray  
Numurkah & Health & Comm.  
District Health Services  
Services Waranga Memorial  
Omeo District Hospital  
Hospital Warracknabeal  
Otway Health & Hospital  
Community Warragul Hospital

Services Warrnambool Base  
 Peshurst & Hospital  
 District Memorial Williamstown  
 Hospital Hospital  
 Peter James Centre Wimmera, Health  
 Portland & District Care Service  
 Hospital (Dimboola)  
 Queen Elizabeth Wimmera, Hospital  
 Centre - Noble Wodonga Hospital  
 Park Wonthaggi &  
 Rainbow Hospital District Hospital  
 Robinvale District Wycheproof  
 Health Services Hospital  
 Rochester & Yarra Ranges  
 Elmore District Health Service  
 Health Service  
 Yarrarri & District Yea & District  
 Health Service Memorial Hospital  
 Yarrawonga Health  
 Service

(i) Where there is a dispute pre-ratio staffing shall be taken as being indicative of patient care requirements, subject to the right of review by the hospital. Otherwise, the prima facie position will be a rounding down, to be determined by the hospital in the event of disagreement at the local level, subject to a right of review of the decision by the ANF through the Monitoring Committee.

## 2 Ante Natal/Post Natal

(a) Where hospitals have introduced different models of care such as Box Hill, Werribee and Sunshine Hospitals, agreements on staffing will be developed and agreed between hospital management and the ANF.

(b) Where a prior agreement was reached independently of the Recommended Nurse/Patient Ratios in Print S9958, it shall continue as indicative of staffing needs.

(c) Where a prior agreement was reached in the context of giving effect to the Recommended Nurse/Patient Ratios in Print S9958, the parties must renegotiate the local arrangement. The outcomes of the renegotiated local agreement must be based on the nurse/patient ratios contained in Schedule C to this Agreement.

## 3 Aged Care

Nurse/Patient ratio applicable to aged care relate to the number of aged care patients, not the number of patients in a ward, unit or department.

PART II - OTHER HOSPITALS (NOT REFERRED TO IN PAGE 2 OF THIS ANNEXURE) AND AGED CARE RATIOS

Acute Aged Care

AM 1:6 + In Charge 1:7 + In Charge

PM 1:7 + In Charge 1:8 + In Charge

N/D 1:10 1:15

1 GENERAL

Where aged care patients generally occupy beds designated as acute "aged ward" ratios shall apply for these patients.

2 IN CHARGE POSITIONS

The 'In Charge' positions referred to above relate to current arrangements. There is an intention as part of this total agreement that there will not be a number of charge nurses of small wards in the one facility eg. 10 acute beds and 15 aged care beds.

'In Charge' staffing will be maintained as at August 23rd 2001 subject to a joint review of facilities with the possibility that excessive In Charge Nurse positions may be reduced from such a review. Included in any review considerations regarding clinical incompatibility of units and geography will be taken into account.

Where an In-Charge nurse in these facilities has had a patient load, that practice may continue.

In situations such as inability to recruit or replace, sick leave replacement, unexpected increases in patient acuity, it may be necessary for an In-Charge nurse on an individual shift basis to accept a component of a direct patient load for the purpose of meeting the ratios.

3 SUPERNUMERARY GRADE 5

In small health facilities ie, 1 ward there would be a Grade 5 not supernumerary and one other Division 1.

In a facility of 2 wards or one ward and nursing home there would be a Grade 5 and a Grade 3 Grade 5 not supernumerary.

Facilities of 3 wards or more Grade 5 supernumerary and Grade 3 in charge of each ward.

PART III - DELIVERY SUITES LEVELS 1, 2 AND 3

1 2 MIDWIVES TO 3 DELIVERY SUITES ON EACH SHIFT

If the ward/unit believes that there is not the same requirement for staffing levels on night duty as for AM and PM, then a local agreement will be entered into.

In hospitals with less than 2 births per day, rosters should ensure that where possible, two midwives are rostered on in the hospital. If this is not possible, one may be on-call.

If other parts of the hospital are not busy, midwives may be relocated to work in delivery suites.

The number of delivery suites that a hospital wishes to utilise shall be nominated by the hospital. The nurse/patient ratio shall apply to the nominated suites, with use of additional suites being subject to additional midwives being available, and rostered to the level required to meet ratios for the duration of the usage of the additional suites. "Rostered " for the purpose of additional midwives in this context does not require the application of normal Award notice periods.

If the midwives rostered to delivery suites are not required, they may be utilised as additional staff in other hospital areas, provided that they return to the midwifery unit if required.

Where hospitals have introduced different models of care such as Box Hill, Werribee and Sunshine Hospitals, agreements on staffing will be developed and agreed between hospital management and ANF.

#### 2 NICU

(4 major units - Mercy Hospital for Women, Royal Women's Hospital, Monash Medical Centre, Royal Children's Hospital)

1:2 and In Charge on all shifts

#### 3 DISCRETE LEVEL 2 SPECIAL CARE UNITS

(a) Where more than 10 cots 1:3 on all shifts

(b) Where 10 cots or less 1:4 on all shifts

The general "rounding" principles as set out in Part 1B of this Annexure C, shall apply, provided that 2 nurses shall be required in respect of 6 cots.

\* 10 COTS = 3 nurses

\* 11 COTS = 4 nurses

\* 12 COTS = 4 nurses

\* 13 COTS = 4 nurses

\* 14 COTS = 5 nurses

\* 15 COTS = 5 nurses

\* 16 COTS = 5 nurses

#### 4 LEVEL 1 NURSERIES

Given the ratios in acute and postnatal wards these babies will be cared for by ward staff.

### PART IV - ACCIDENT AND EMERGENCY

#### 1 GROUP 1

AUSTIN & REPATRIATION MEDICAL CENTRE

ALFRED HOSPITAL

MONASH MEDICAL CENTRE

ROYAL MELBOURNE HOSPITAL

ST. VINCENT'S HOSPITAL

ROYAL CHILDRENS HOSPITAL

BOX HILL HOSPITAL

FRANKSTON HOSPITAL

GEELONG HOSPITAL

NORTHERN HOSPITAL

DANDENONG HOSPITAL

WESTERN HOSPITAL (FOOTSCRAY)

BALLARAT HOSPITAL

BENDIGO HOSPITAL

GOULBURN VALLEY HOSPITAL

LATROBE HOSPITAL  
 MAROONDAH HOSPITAL  
 WERRIBEE MERCY HOSPITAL  
 THE ANGLISS HOSPITAL

Ratios: AM 1:3 + In-Charge + Triage

PM 1:3 + In-Charge + Triage

ND 1:3 + In-Charge + Triage

The following night duty presentations formula applies only to Group 1 Accident and Emergency Departments. Group 1 staffing levels are adjusted for presentations and cubicle occupancy for the immediate preceding twelve month period. Group 1 staffing levels are not to be simply based on the number of cubicles.

The number of cubicles used for determining night duty staffing ratios is reduced in proportion to the average number of presentations at night compared with the day shifts. For example, Hospital A has an average of 13,000 presentations per daytime shift and 7,000 at night. It has 40 cubicles available. Base staffing ratios are determined as follows:

1. Determine proportion of night to day presentations ( $7,000/13,000 = 0.54$ )

2. Calculate a cubicle equivalent:  $40 \text{ cubicles} \times 0.54 = 21.6$

3. Base staff required using 1:3 + In-Charge + Triage ratios =  $(21.6/3) + 2 = 9.2 \text{ EFT}$

4. Because lower activity does not always correspond with reduced cubicle occupancy, adjustments of up to 50% of the gap between actual cubicles and "cubicle equivalents" is allowed by local agreement.

5. To calculate the 50% gap add "cubicle equivalents" (21.6) to 50% of the gap (9.2 cubicles)

$30.8 \text{ equivalent occupied cubicles Gap} = 40 - 21.6 = 18.4$

$50\% \text{ of gap } 18.4/2 = 9.2$

6. Maximum staffing using 1:3 + In-Charge + Triage ratio is  $(30.8/3) + 2 = 12.3 \text{ EFT}$

If an accident and emergency facility has a designated short stay admission (or areas), ward nurse/patient ratio shall apply where full assessment and admission has occurred, in respect of such patients.

Funding issues as between hospitals and the Department of Human Services arising from data or the year upon which funding was allocated, and the ratio requirement based on data for the immediate preceding 12 month period and other issues arising from variations in activity levels, are a matter for resolution between the hospitals and the Department of Human Services. The resolution of funding issues between the hospital and the Department of Human Services will not affect the staffing obligations arising from the Heads of Agreement.

Where there is a seasonal fluctuation, a hospital may staff at the level of a Group 3 category hospital for part of the year, and as a Group 2 category hospital for part of the year, depending on the number of presentations.

## 2 GROUP 2

Accident and Emergency Departments not in Group 1 with over 5000 presentations per annum.

AM 1:3 plus In Charge

PM 1:3 plus In Charge

### ND 1:3 Plus in Charge

Where these units have previously had a triage nurse these positions remain. Group 2 staffing requirements reflecting presentations and cubicle/trolley occupancy or average patient numbers relate to "per shift", and are based on data for the immediate preceding 12 month history of presentations.

### 3 GROUP 3

Less than 5000 presentations per annum.

When meeting the ratios in these hospitals there should be a minimum of 2 Division 1 Registered Nurses plus 1 "floater" (Division 1 or Division 2) per shift as staffing for the facility including Accident and Emergency.

In respect of 1 and 2 wards Group 3 Accident and Emergency Departments, the "floater" need not be a Supernumerary, provided that a Division 1 nurse is available to assess patients in Accident and Emergency, and there remains a Division 1 nurse in each ward.

There are no dedicated staff rostered in Accident and Emergency Departments.

### 4 DESIGNATED CORONARY CARE UNIT

AM 1:2 plus in-charge

PM 1:2 plus in-charge

ND 1:3

### 5 HIGH DEPENDENCY UNIT (STAND ALONE UNITS) IN LEVEL 1 HOSPITALS

AM 1:2 plus in-charge

PM 1:2 plus in-charge

ND 1:2

Where HDU is part of an Intensive Care Unit, the 'in-charge' position is to cover both HDU and ICU

### 6 HIGH DEPENDENCY UNIT CENTRAL GIPPSLAND, WESTGIPPSLAND, WIMMERA, WARRNAMBOOL

(for review Hamilton & Wodonga)

AM 1:2 plus in-charge

PM 1:2

ND 1:2

### 7 HIGH DEPENDENCY UNIT ANGLISS, BAIRNESDALE, ECHUCA & PORTLAND

AM 1:3

PM 1:3

ND 1:3

### 8 HIGH DEPENDENCY UNIT - PART OF GENERAL WARD - SWAN HILL, WILLIAMSTOWN

AM 1:4

PM 1:4

ND 1:4

### 9 PALLIATIVE CARE

AM 1:4 plus in-charge

PM 1:5 plus in-charge

ND 1:8

### PART V - REHABILITATION AND GEM

1 CATEGORY 1 REHABILITATION (AMPUTEES, ACQUIRED BRAIN INJURY, SPINAL INJURY)

AM 1:5 + In Charge

PM 1:5 + In Charge

ND 1:10

2 CATEGORY 2 REHABILITATION

AM 1:5 + In Charge

PM 1:7 + In Charge

ND 1:10

3 GERIATRIC EVALUATION MANAGEMENT (GEM) BEDS

AM 1:5 + In Charge

PM 1:6 + In Charge

ND 1:10

Where Rehabilitation and GEM beds are less than 25% of a ward/unit, the ratios according to the dominant clinical description shall apply. Where ward/unit has combined GEM and Rehabilitation only one In-Charge Nurse is required.

PART VI - OPERATING THEATRE RATIOS

Operating Theatres will normally have 3 nurses, one scrub nurse, one scout,, and one anaesthetic, nurse.

This may be varied up or down, depending on the following local circumstances:

- \* complexity of the surgery or procedure,
- \* pre-existing condition of the patient,
- \* number of operations on the list,
- \* experience and skill mix of staff,
- \* type of equipment used,
- \* number of students requiring supervision,
- \* temporary fluctuations in demand across the whole theatre suite during a session,
- \* layout and number of operating suites.

PART VII - POST ANAESTHETIC CARE UNIT/RECOVERY ROOM (PACU)

1 to 1 for unconscious patients.

PART VIII - AMENDED NURSE TO PATIENT RATIOS - CHANGE PROCESS

1 As a result of this Agreement an adjustment process to accommodate changes to staffing levels consistent with amended ratios may need to occur.

2 There is to be no impediment on implementation of change, provided that change is:

- (a) consistent with this Agreement and other operative agreements (for example, individual employment contracts); and
- (b) addressed through appropriate processes with ANF and local WICS and/or local management/ANF Change Committees as reflected in local and other agreements as to processes for the implementation of change.

3 Where the nurse/patient ratio requires an adjustment to permanent staffing levels this shall occur through natural attrition including resignations, non-replacement of leave etc, or an employee choosing to reduce hours or other processes as agreed, but does not include redundancy.

4 Where adjustments need to occur within a campus of a Health Service, for example one medical ward does not meet the amended ratio and another medical

ward has staff in excess of the ratio, movement of nurses from one ward to the other may occur. Should problems arise in this component of the readjustment process ANF and VHIA may be consulted.

5 This movement of staff may only occur from like clinical area to like clinical area within the one campus unless a nurse chooses to do so. Like clinical area is for example medical ward to medical ward, rehabilitation ward to rehabilitation ward, nursing home ward to nursing home ward unless a nurse chooses to do otherwise.

6 Where a nurse is moved, their customary or contracted hours and shifts must be maintained.

7 In the event of any dispute arising out of the above process, the matter shall be referred to the monitoring committee chaired by SDP Watson.

8 Specific Hospital matters will be addressed and hopefully resolved, in context of or the outcome of the present monitoring Committee. Any outstanding issues may be addressed through clauses 12 and 13 of the Heads of Agreement.

9 Changes to rosters in relation to the above will not occur prior to Monday 24 September 2001.

10 Other than in relation to particular agreed categories of employees (for example, Clinical Nurse Consultants, Directors of Nursing and -Nurse Educators) nurses absent on ADO's/study leave will be backfilled.

11 The initial allocation of 150 (50150150) Nurse Educators/ADONs/CNCs is in addition to any allocation required to meet ratios/growth.

12 The Heads of Agreement sets out the requirements on the parties. The Department of Human Services funding formula are intended to provide a practical basis for funding Department of Human Services, with particular funding issues to be determined between the Hospitals and Department of Human Services, and not relied upon to prevent compliance with the Heads of Agreement.

#### **APPENDIX 1 - LETTER OF APPOINTMENT**

The letter of appointment will contain the following information:

1 Name of employer.

2 Employee's classifications (eg. Gr 2 Year 4, Gr 4B Year 1).

3 The workplace/campus/location where the person is to be situated.

4 The name of the Award and Certified Agreement which contains their terms and conditions of employment.

5 Their mode of employment ie. whether full-time/part-time or bank.

6 Fortnightly hours will be [insert] and for part timers (by mutual agreement) additional shifts may be added. Shifts will be worked in accordance with roster. Payment of additional shifts will not be at casual rates. If you agree to work regular additional shifts your letter of appointment will be varied accordingly.

7 Specified employment is ongoing unless a valid fixed term appointment is proposed.

8 Date of commencement.

9 Acknowledgment (where applicable) of prior service/entitlements to sick leave, long service, etc.

10 Other information as required depending on the nature of the position.

11 Relevant qualifications and allowances payable.

## **APPENDIX 2 - CLINICAL NURSE SPECIALIST CRITERIA**

Applicants must meet the clinical nurse specialist definition, be employed either full time or part time and demonstrate one criterion in each of paragraphs 1, 2 and 3.

### 1 Clinical Skill

- \* Higher level of skill demonstrated in clinical decision making - in particular in problem identification and solution, and analysis and interpretation of clinical data; and
- \* Maintenance and improvement of clinical standards.

### 2 Professional Behaviour

- \* Positive role model;
- \* Act as a mentor or preceptor to less experienced nurses, including graduate nurses;
- \* Support of, and contribution to, quality improvement and research projects within the area of practice and ward/unit/department; and
- \* Acting as a resource person to others in relation to clinical practice.

### 3 Professional Development

- \* Membership of relevant professional body;
- \* Contribution to the education of other professionals. For example, being willing to provide at least one in-service education program each year; and
- \* Undertaking own planned professional development and competence through various forms of continuing education. For example, conferences, study days, formal study, reading.

## **APPENDIX 3 - INDICATIVE POSITION DESCRIPTION FOR SUPERVISOR GRADE 5 - SMALL RURAL HOSPITALS POSITION PROFILE**

- \* The Supervisor will support and promote activities which are consistent with the objectives and philosophy of the Hospital.
- \* Act as a resource for staff (nursing, medical and others) and patients and their families.
- \* Being actively involved in the preparation, maintenance and implementation of emergency disaster plans, and together with other emergency control personnel, be responsible for coordination of staff and patient movement in the event of an emergency during their rostered shift(s).
- \* Liaise with Admitting Officer, to discuss bed availability and suitable patient placement.
- \* Facilitate the resolution of public relations issues as they arise, informing the CEO and/or DON as appropriate.
- \* Assist in the delivery of safe patient care by liaising with the Charge-Nurse and supporting war areas with appropriate nursing staff (includes adequate PSA support, orderlies, etc
- \* Responsible for quality control for nursing services delivered and allocation of staff during their rostered shift(s).

### **SPECIFIC RESPONSIBILITIES**

- \* Liaise with all staff acting as resource for staff, facilitating and promoting quality patient care.
- \* Co-ordinates and maintains appropriate nursing staff levels through consultation with clinical nurses, redeploying staff and engaging bank/agency

staff as required.

- \* Facilitates the process to ensure the performance and skills of bank nurses are maintained in accordance with hospital policy.
- \* Facilitates patient admission by discussing bed availability with the Admitting Officer in accordance with hospital policy.
- \* Liaises with emergency department nursing staff, Admitting Officer and operating suite staff to maintain an efficient after hours emergency surgery service.
- \* Ensures the smooth release of bodies from the mortuary after hours when necessary for coronial or religious reasons.
- \* To be an active member on the Emergency Procedures Committee or local equivalent, ensuring nursing input and profile is maintained.
- \* Responsible for maintaining own education relating to emergency and disaster procedures.
- \* Maintains an awareness of patient/nurse dependency throughout the shift as this will assist the safe co-ordination of staff and patients in such a situation.
- \* Assists with the monitoring and analyses of patient incidents and accidents.
- \* Ensures the necessary reports are completed and the CEO and/or DON are informed.
- \* Monitors consumer concerns, assists with the resolution and refers the matters to the CEO and/or DON.
- \* Assists in maintaining supportive relationships between staff, patients and is available for consultation and advice.
- \* Assists the DON with any projects or reports that may be necessary.
- \* If required to attend meetings during off duty periods will be paid in accordance with the Nurses Award and 2000 - 2004 Enterprise Agreement. These responsibilities will be performed by the out-of-hours Grade 5 Supervisor in small country hospitals where the necessary resources are provided by the employer.

#### **APPENDIX 4 - OCCUPATIONAL HEALTH AND SAFETY**

##### **1 Introduction**

The parties to this Agreement are committed to a pro-active approach in the prevention and management of workplace injuries amongst employees, and to the achievement of a reduction in workplace injuries through the implementation of risk management systems incorporating hazard identification, risk assessment and control, and safe work practices.

The employer will implement the hierarchy of controls to control hazards, and will eliminate the hazard at the source wherever practicable.

The provisions of this part of the Agreement shall be read and interpreted in conjunction with the Victorian Occupational Health and Safety Act 1985 as amended from time to time and the Victorian Accident Compensation Act 1985 as amended from time to time, provided where there is any inconsistency between a provision of this agreement and the aforementioned Victorian Acts, the Victorian Acts shall prevail to the extent of any inconsistency.

The parties to this Agreement recognise that consultation with nurses and their representatives is crucial to achieving a healthy and safe work environment for nurses. To this end, this agreement recognises that employers

and employees must co-operate to control and manage health and safety hazards in the workplace. Hazards include, but are not exclusive to:

- \* manual handling;
- \* blood borne and other infectious diseases;
- \* needlesticks;
- \* violence and aggression;
- \* hazardous substances; and
- \* security.

## 2 Definitions

For the purposes of this Appendix:

ANF shall mean the Australian Nursing Federation (Victorian Branch).

DWG shall mean designated work group as defined under the Occupational Health and Safety Act 1985 as amended from time to time and may include employees other than registered nurses.

DHS shall mean the Department of Human Services Victoria.

HSR shall mean health and safety representative elected in accordance with Section 30 of the Occupational Health and Safety Act 1985 as amended.

HSUA shall mean the Health Services Union of Australia Victorian No. 1 Branch.

Insurer shall mean an authorised agent as defined by the Accident Compensation Act 1985.

VHIA shall mean the Victorian Hospitals' Industrial Association.

Workplace shall mean workplace as defined under Section 4 of the Occupational Health and Safety Act 1985 as amended.

## 3 Designated Work Groups

3.1 Where ANF members constitute the majority of the workforce within a designated work group, the employer shall maintain a system of agreed designated work groups (DWGs) with the ANF.

3.2 The employer shall consult with employees in relation to the establishment or variation of designated work groups and where an employee requests, the ANF.

3.3 In determining the composition of DWGs, the following considerations shall, where practicable, be taken into account:

- (a) the specific needs, conditions and hazards affecting employees in the area(s) concerned;
- (b) the working arrangements, including shiftwork, of employees in the area(s) concerned;
- (c) the accessibility of health and safety representatives to employees in - the area(s) concerned; and
- (d) the geographical layout of the workplace.

## 4 Health and Safety Representative Election Process

4.1 The method of conducting the election shall be determined in consultation with the employer and the employees of the DWG concerned. Where the majority of employees of a DWG are members of the ANF, the ANF shall, where requested by the staff, conduct the election.

Provided that the following arrangements will be incorporated:

4.2 All employees in the relevant DWG shall be given the opportunity to nominate for the position. Nominations shall be called for by posting a notice(s) in the Designated Work Group and providing a nomination period of 14 days.

4.3 Candidates shall be nominated by their co-workers in the relevant designated work group and may also self-nominate. Nominations shall be made in writing.

4.4 Where there is more than one nominee for any vacancy of a health and safety representative position, a ballot will be held of the relevant employees in Accordance with agreed DWG electoral processes.

4.5 If there is only one nominee then the candidate will be elected unopposed.

4.6 The employer shall maintain a current list of DWGs as well as the name of the elected health and safety representative for each DWG and shall display this in a prominent place in the workplace at all times.

4.7 Employers will provide a copy of the DWG list to the ANF at least annually, or within 28 days of receiving a written request from the ANF.

4.8 Elected health and safety representatives shall be provided by the employer with a badge identifying them as HSRs. Health and safety representatives shall wear the badge at all times when on duty.

## 5 Health and Safety Representative Training

5.1 The employer shall permit health and safety representatives to take such time off work with pay as is necessary or prescribed to attend occupational health and safety training courses approved by the Victorian WorkCover Authority.

5.2 Health and safety representatives shall be entitled and encouraged to attend an approved course as soon as practicable but no later than within six months of their election.

5.3 When attending an approved course, health and safety representatives shall be paid their normal/expected earnings during course attendance, including pay entitlements relating to shift work, regular overtime, higher

duties, allowances or penalty rates that would have applied had the health and safety representative been at work.

5.4 Where health and safety representatives attend an approved course outside their normal working hours, they shall be paid as if they had been at work for the relevant time, including any relevant overtime rates, higher rates, allowances or penalty rates'. This might apply when a health and safety representative:

(a) normally works two days a week, attends a block five-day course;

(b) has a rostered day off during the course; and

(c) has a shift that does not overlap, or overlaps only marginally, with the course's hours.

5.5 Rosters or shifts shall be altered where necessary to ensure that health and safety representatives are not exposed to extra risks from fatigue due to working extended hours or shiftwork while attending a training course.

5.6 The employer shall pay course fees for selected approved courses.

5.7 Health and safety representatives shall have the right to choose which course to attend, provided it is an approved course. An employer shall not prevent or obstruct a health and safety representative from attending a chosen course.

5.8 The employer shall provide such information, instruction and training to all employees employed by the employer, as is required to enable them to perform their work in a manner which is safe and minimises risks to health. Information, education and training shall be provided on a regular basis as required to enable employees to remain informed in relation to health and safety hazards, policies and procedures.

## 6 Facilities for Health and Safety Representatives

6.1 Health and safety representatives shall be provided with reasonable access to an office, telephone, computer (including email facilities where available), notice board, meeting room, and such other facilities as are necessary to enable them to perform their functions or duties as prescribed under the Occupational Health and Safety Act 1985.

6.2 Health and safety representatives shall have reasonable time release from duty to perform their functions and duties as is necessary or prescribed under the Occupational Health and Safety Act 1985.

## 7 Health and Safety Committees

Health and safety committees shall be established in accordance with the

provisions of the Occupational Health and Safety Act 1985.

## 8 Reporting of Incidents, Accident Investigation and Prevention

8.1 The employer shall encourage early reporting of incidents by nurses, and ensure nurses who report incidents are appropriately supported.

8.2 Following an incident or injury affecting nursing staff, the employer shall take appropriate action to prevent further injury to staff, including conducting a worksite assessment where practicable and implementing workplace modifications to ensure a healthy and safe work environment for staff.

8.3 The employer shall provide information, instruction and training to employees and management staff regarding the importance of early reporting, procedures regarding incident reporting, and how this feeds into accident investigation and prevention.

## 9 Workers Compensation, Rehabilitation and Return to Work

This part shall be read in conjunction with the Accident Compensation Act 1985 as amended from time to time, provided where there is any inconsistency between a provision of this agreement and the Accident Compensation Act 1985, the Accident Compensation Act 1985 shall prevail to the extent of any inconsistency.

9.1 The employer is committed to the principles of early intervention such as to facilitate the effective occupational rehabilitation of employees.

9.2 The employer shall appoint a Return to Work Co-ordinator who shall have sufficient knowledge of occupational rehabilitation legislation, regulations and guidelines to undertake the task.

9.3 The employer will display and make available the Victorian WorkCover Authority "Stop the Injury Before it Happens" Poster and A4 version, as amended from time to time. The employer shall provide a copy of the poster (A4 version) to employees as soon as they report an incident/injury.

9.4 The employer will in respect of an injury for a period or periods which total 20 or more calendar days of no current work capacity, develop an appropriate return to work plan as soon as practicable but no later than 10 days after the twentieth day of no current work capacity. The return to work plan shall be developed in consultation with the injured employee concerned, his/her treating doctor and health professionals providing treatment or services to the injured employee as approved by the Victorian WorkCover Authority.

9.5 The employer shall assist injured employees to remain at work or return to work in suitable employment as soon as possible after injury. The employer shall ensure that the suitable employment will reflect and be commensurate with, as far as possible, the skills, education, age, experience, pre-injury employment, and any relevant medical restrictions of the injured employee.

The suitable employment shall also take into account the employee's pre-injury place of residence and hours of work.

9.6 Without limiting the content of the return to work plan, the plan shall include, but not be limited to:

(a) A return to work program signed by the employer, employee and treating doctor which covers:

- (i) the date;
- (ii) the position title;
- (iii) the duties and hours of work to be offered;
- (iv) the nature of the incapacity and any medical restrictions;
- (v) the applicable classification and pay rate; and
- (vi) the date or dates for regular review.

(b) The return to work plan may also consider:

(i) subject to approval by the insurer, any personal and household services required, including modifications to the home or car, household help, counselling, aids or appliances, transportation costs, etc; and

(ii) subject to approval by the insurer, any occupational rehabilitation services, including modifications to the workplace, home or car which will apply, equipment to be provided at the workplace, etc.

The return to work plan shall be reviewed at least monthly or more regularly as needed, in consultation with the injured employee and other relevant parties.

9.7 Employees shall have the right to have a union representative present at any interview arranged by their employer regarding their return to work or rehabilitation, including monitoring or review of their return to work program. When arranging such interviews, the employer shall advise the employee that he/she may have a union representative present. The employer shall where practicable provide to the employee at least 7 days notice of such interviews occurring.

9.8 The employer shall not seek to change the employee's duties, hours or other aspects of the employee's employment or return to work plan without consulting with the employee.

A representative of the ANF may be involved in any negotiations or discussions regarding any such proposed changes, at the request of the employee.

9.9 The employer and the employee shall mutually co-operate and participate in the agreed return to work plan. This plan will be reviewed at the request of any of the parties involved. Where agreement cannot be reached the processes of the Victorian Accident Compensation Act 1985 (as amended) shall apply.

#### 10 Accident Pay

Accident pay shall be in accordance with the Award.

#### 11 Rehabilitation, Re-training and Re-education

11.1 Subject to approval by the insurer, the employer may refer the employee to a Victorian WorkCover Authority approved occupational rehabilitation provider for assessment. In accordance with WorkCover guidelines, such referral may be required in the following circumstances:

- (a) the period of total incapacity has been greater than three weeks;
- (b) the nature of the injury means it will be difficult for the worker to remain at or return to pre-injury duties;
- (c) there is difficulty identifying suitable return to work duties;
- (d) the worker, who is at work on restricted hours or duties, is not making progress;
- (e) the worker's condition has deteriorated;
- (f) other factors appear to be affecting the return to work (for example, communication problems within the workplace or with the treating doctor); and
- (g) the worker regularly experiences pain or discomfort while performing specific tasks.

Provided that such referral may be made at the request of the employee, the treating doctor, or any other approved service provider, individual or agency, on behalf of the employee, subject to approval by the insurer.

11.2 Subject to approval by the insurer, an occupational rehabilitation assessment may include, but is not limited to:

- (a) a worksite assessment, including an assessment of any modifications to the workplace, equipment to be provided, etc.;
- (b) a functional capacity assessment;
- (c) an assessment of the need for any modifications to the home or car, the need for the provision of aids, appliances, etc.;
- (d) any personal and household service, including household help, attendant

care, and counselling, which may be required to assist the injured nurse to be rehabilitated and/or return to work;

(e) the need for any re-training or re-education which may be required to assist the injured nurse to return to work in suitable employment; and

(f) vocational assessment and counselling.

11.3 An employee's request for occupational rehabilitation services, personal or household service shall be considered wherever it can assist the employee's occupational rehabilitation. Requests for approval must be made in writing by the employee, his/her treating medical practitioner, or any other approved service provider on behalf of the employee. In accordance with the Accident Compensation Act 1985 as amended from time to time, approval for payment for services shall be subject to agreement by the authorised insurer.

11.3.1 Where the employer receives such a request, the employer shall ensure that the request is processed in a timely manner. Provided further that the employee must be notified in writing of the decision by the insurer. This should occur within 28 days of the request, in accordance with guidelines issued by the Victorian WorkCover Authority to its agents.

11.4 The employer or insurer may pay for any re-training or re-education which is required to assist the employee to remain at work or return to work in suitable employment in accordance with guidelines issued by the Victorian WorkCover Authority to its agents. Approval for such re-training or reeducation may be requested by the employee, his/her treating practitioner, or any other Victorian WorkCover Authority approved service provider, individual or agency, on behalf of the employee.

11.5 Where it has been established that an employee has a permanent injury or condition which prevents them returning to their pre injury employment the employer shall ensure that the employee is advised of all vacancies as they become available.

11.6 At the request of the employee, the employer shall notify the ANF before any action is taken to terminate, permanently re-deploy, permanently re-locate or otherwise permanently change the employment status of an injured employee, and shall consult with the ANF, the employee, the rehabilitation provider, and the treating doctor, to determine all possible options for rehabilitation/return to work, including vocational assessment, re-training and re-education, prior to such action being taken.

## **APPENDIX 5 - MISCELLANEOUS**

### **1 PATIENT DEPENDENCY SYSTEM**

1.1 The ANF's participation in a patient dependency systems review in

accordance with clause 12 of this Agreement, will not require the Department of Human Services to reach agreement with the ANF as to which patient dependency system will be piloted.

1.2 The ANF will be represented in the piloting program of the preferred patient dependency system. The Department of Human Services will fund an ANF representative to participate in the piloting program.

## 2 CLASSIFICATIONS AND SALARY INCREASES - RDNS

2.1 For Royal District Nursing Service (RDNS) District Nurses, effective 3 November 2000, each of the 17 affected Centres will ensure there is a District Nurse nominated as the contact person for all weekend and public holiday day shifts.

(a) The nominated District Nurse will be paid at the Grade 4A Year 1 rate for the full shift on each such occasion. During periods of annual leave the payment will be made on a pro-rata basis.

(b) Any consequential workload issues shall be addressed through the Workplace Implementation Committee. If unable to be resolved the matter may be referred back to the Commission for determination under s.111AA.

2.2 Assistant Centre Managers who currently do not have access to Grade 4B are to progress to Grade 4B after completion of two years' experience with the RDNS at Grade 4A.

(a) Those currently classified at Grade 4A who have two years' experience or more shall move to the first increment of Grade 4B effective 1 October 2000 and to the second increment 12 months later.

(b) An employee cannot access Grade 4B until she/he has two years' experience (as defined) as a Grade 4A.

## 3 CLASSIFICATIONS AND SALARY INCREASES - NON RDNS

3.1 For District Nursing Service (non RDNS) the following shall apply from 1 October 2000.

(a) Experienced District Nurses will undertake functions that could be expected of an experienced employee such as orientation of new staff members and to act as a support person for inexperienced District Nurses, with these functions forming a part of position descriptions for District Nurses Level 2.

(b) Those currently classified at District Nurse Level 1 who have one year's District Nursing or comparable community nursing experience shall move to the first increment of Grade 3A on 1 October 2000 and to the second increment twelve months later.

(c) Those currently classified at District Nurse Level 1 who have two years' experience or more shall move to the second increment of Grade 3A on 1 October 2000.

(d) An employee cannot access Grade 3A until she/he has one year's experience (as defined) as a District Nurse or comparable community nursing experience and as required will carry out the duties identified in paragraph 3.1 (a) above.

#### 4 NURSE/PATIENT RATIO

4.1 The Department of Human Services has committed to funding nursing staff levels across the public health sector agencies to at least 2600 EFT above the June 2000 levels for- the fife of this Agreement.

4.2 The ANF will not impede or oppose the opening of new beds at public health sector agencies to which growth funding has or will be provided by the Department of Human Services, provided that the nurse/patient ratios are met in accordance with this Agreement.

#### 5 STUDY LEAVE

5.1 If more than 1000 EFT employees apply for study leave in accordance with sub-clause 26.2 of the Agreement, the ANF and the Government will hold discussions.

5.2 For the purposes of post-graduate study, from 1 January 2001, up to 1000 EFT employees will be granted 4 hours' paid study leave for 26 weeks per annum.

#### 6 ORGANISATIONAL CHANGE AGREEMENT

6.1 A working party consisting of representatives from DHS, VHIA and ANF to develop a model organisational change agreement for registered nurses covered by the Agreement is to be established.

6.2 The aim of the working party will be to finalise the model organisational change agreement within 6 months of the certification of this Agreement.

#### 7 WORKFORCE DATA

DHS shall provide data to the ANF and VHIA on at least an annual basis. The data that would be provided would include, but not limited to:

(a) the total number of EFT in the Public Sector; and

(b) the umber of full time and part time nursing EFT in the Public Sector.

#### 8. RURAL EFT

The parties note that the additional EFT rural nursing positions that were created in 1997 will remain and continue to be funded by the Department of Human Services on an ongoing basis.

## 9. PUBLIC HOLIDAYS

Clause 25 of this Agreement operates upon the agreement of and acknowledgment by the parties that clause 25 will not result in a net additional cost for the provision of public holiday benefits to part-time employees in excess of \$3 million above the cost of providing public holiday benefits to part-time employees immediately before 31 August 2000.

### ERRATUM

### REGISTERED NURSES ENTERPRISE BARGAINING AGREEMENT

### OVERTIME

#### New Clause 18.4

18.4 In lieu of receiving payment for overtime worked in accordance with this clause, employees may, with the consent of the employer, be allowed to take time off, for a period of time equivalent to the period worked in excess of ordinary rostered hours of duty, plus a period of time equivalent to the overtime penalty incurred. Such time in lieu shall be taken as mutually agreed between the employer and the employee, provided that the accrual of such leave shall not extend beyond a 28 day period, Where the leave is not taken within 28 days payment shall be made in accordance the provisions of clause 42.3 of the Award.

Explanation: The proposed clause as dead prevents the employers from granting and employee accepting time in lieu for working overtime. The attached change restores the ability for the employer and employee as per the award to enter into such arrangements. The original decision of Commissioner Blair did not remove the time in lieu provision in main to working overtime.

#### Change of Shift

#### Amended Clauses 30.2 and 303

30.2 Where a ward or unit has established a self-rostering system, and an employee chooses his or her own shifts from a genuine choice of shifts, the employee will receive a fixed payment of two (2) change of shift allowances per pay period (fortnight) and sub-clause 30.1 shall not apply. Provided that this sub-clause does not apply where an employee works fixed shifts and never works shifts that would entitle the employee to payment under 30.1.

30.3 A Registered Nurse Division 2 who was employed by his or her employer as at 11 June 2002, and who receives change of shift allowances per pay period (fortnight) on the basis of an historical agreement between the employer and employee (agreement may be in writing or be based on past custom and practice) that exceeds the entitlement arising from these provisions such employee shall be maintained at that entitlement for the duration of this Agreement

Explanation: Concern has been expressed in regard to the application of this clause as it relates to part-time employees who work permanent day, afternoon or night shift and participate in a self-rostering arrangement. Tho proposed changes require an employee to be available for and actually work different

shift to affect the minimum payment two per fortnight. The change in clause

30.3 clarifies what can be considered an historical arrangement These changes reflect the decision of Senior Deputy President Watson in this matter.

Public Holidays-Part Time Employees

New Clause 25.6

25.6 Night Duty

" part of a shift" means that period on a public holiday from:

- \* midnight to completion of shift; or
- \* commencement of shift to midnight

(a) A night duty employee is entitled to be paid at the appropriate public holiday rates for each hour worked on that part of a shift that falls on the public holiday.

(b) A night duty employee is entitled to be paid at the pro rata public holiday 'rostered off' benefit for that part of a shift that falls on the public holiday that they are not rostered to work and do not work.  
example: an employee whose average hours are 0.6EFT is rostered to work from 9.30 pm to 7.30 am with the shift commencing the day before the public holiday. The hours worked between midnight and 7.30am fall on the public holiday and therefore each hour attracts the public holiday rate, eg 7.6 hours at double time. The same employee is not rostered to the night shift that commences on the public holiday. ie the shift that commences at 9.30 pm. The period from 9.30pm to midnight attracts a pro-rata payment of 2.5 hours x 0.6 (EFT) x 1 or 1.5 (single time Division 1 or time and 1 half for Division 2 nurses)=hours payable

Explanation: The proposed change is designed to reflect more precisely the decision of Commissioner Blair that part-time employees are paid for the time worked on public holidays and are not disadvantaged compared to other parttime nurses when rostered off either for part or all of the day. It also provides an example of the calculation method for employees working part of the public holiday.

## Appendix B

### HEADS OF AGREEMENT

#### 1. SALARY & LENGTH OF AGREEMENT

- (a) 3½ year agreement commencing 1/4/04 and expiring 30/9/07.  
Negotiations for the next Agreement to commence six months prior to 30 September 2007.
- (b) The parties agreed that:
- (i) All provisions of the current Multi Business Agreement will be maintained except where expressly varied by this agreement.
  - (ii) That nothing in the agreement will diminish any existing entitlement of any employee covered by the agreement.
  - (iii) That this agreement is in full and final settlement of the 2004 log of claims that were the subject of Bargaining Periods and no further claims will be made by any party to this agreement.
- (c) Payments:
- |                |    |
|----------------|----|
| FFPPOA 1/04/04 | 3% |
| FFPPOA 1/10/04 | 3% |
| FFPPOA 1/10/05 | 3% |
| FFPPOA 1/10/06 | 3% |

Work related allowances will also be adjusted in line with these increases.

#### 2. CONDITIONS

- (a) Additional Increments:
- Division 1 Grade 2 an additional increment of \$22 per week;
  - Division 2 an additional increment of \$13 per week;
  - Division 5 and additional increment of \$13 per week;
  - NUM an additional increment of \$30 per week.

In relation to additional increments for Division One Grade 2, Division 2, Division 5 and Nurse Unit Manager/Charge Nurse, the increments will each apply from 1/4/04 and be added to salaries prior to the calculation of the first 3% pay increase. Current service will count towards the incremental increase, eg; A Division One Grade 2 Year 8 nurse who at 1/4/04 has 12 months or more experience as a Division 1 Grade 2 Year 8 will progress to Division One Grade 2 Year 9. A Division One Grade 2 Year 8 who has less than 12 months experience at Grade 2 Year 8 will progress to Grade 2 Year 9 once she/he has 12 months experience at the Grade 2 Year 8 level. The same principles will apply in relation to progression to new increments for Division 2, Division 5 and Nurse Unit Manager/Charge Nurse increments.

- (b) Division 5 “equalisation”

Pursuant to the Nurses (VHS) Award (The Award) and the current nurses (Victorian Public Sector Health (Sector) Multi-Business Agreement 2000 2004 (the MECA), there are three groups of mothercraft nurses as defined in clauses 29.37.1, 29.37.2, 29.37.3 and 29.37.4 of the Award as Group A, Group B Group C and Group. The current salaries are set out in Schedule B of the MECA.

As from 1/4/04 each Division 5 nurse shall be paid pursuant to the salaries set out in Group C. Division 5 nurses who are currently paid pursuant to Group A or B shall transfer to the appropriate year of experience rate of pay outlined in Group C, eg; A Division 5 nurse who is currently paid as Group A or B, 6th or 7th year of experience will be paid at Group C “Thereafter” rate, eg; a Division 5 nurse who is currently paid as Group A or B, 1st, 2nd, 3rd, 4th or 5th year of experience will be paid at the equivalent year of experience in Group C. Any anomalies arising in Group D “additional responsibilities” will be the subject of further discussion between the parties.

- (c) Division 2 nurses who complete their undergraduate training will commence at the Division 1 pay scale at Grade 2 Year 2 where they would otherwise have a reduction in pay. A Division 2 registered nurse who completes their undergraduate training and obtains registration as a Division 1 nurse will commence at the Division 1 pay rate of Grade 2 Year 2 provided that she/he was employed as a registered nurse pay point 4, 5, 6, 7 or 8 prior to registration as a registered Division one.
- (d) The parties remain committed to reforms in Occupational Health and Safety. The parties acknowledge that there are a wide range of OHS items raised in the ANF’s 2004 Public Sector claim. The parties agree to establish a OHS working party consisting of representatives of DHS, VHIA, ANF and HSUA (1) to discuss, investigate and where possible, make recommendations in relation to those claims.
- (e) Additional parental leave – Phase in of 2 weeks’ additional paid maternity leave and equivalent adoption leave. An additional one week’s paid maternity and adoption leave will be available as from 1/4/04 making a total of 7 weeks paid maternity or adoption leave. A further one week’s paid maternity leave and paid adoption leave will be available as from 1/4/05 making a total of 8 weeks paid maternity leave or adoption leave.
- (f) DHS will make funding available for a total of 25 x EFT positions from 1 July 2004 and a further 25 EFT from 1 July 2005. The ANF will notify DHS within 14 days as to the mix of positions required. That is how many of the positions will be No Lift Co-ordinators and how many will be Nurse Preceptors. The Nurse preceptors will be paid at the Grade 3B classification and the no lift Co-ordinators will be paid at the Grade 4A.

Individual health agencies will apply in writing to DHS for part of the available funding for the preceptor or no lift coordinator positions.

A sub-committee of DHS and ANF will assess and made recommendations in relation to funding allocation.

- (g) One week's additional annual leave to community health nurses provided public holiday rates are adjusted consistent with other Division 1 nurses.

### 3. WORKLOAD

- (a) Current workload management arrangements in place at local health services (including current fixed ratios) apply unless variation is made in accordance with the following process.
- (b) Local health agency committees will be established or where already established consist of equal numbers of local management and ANF representatives. These committees will be consulted on proposals made under this clause. Where nursing staff are HSUA members in significant numbers, they will participate in the local committee.
- (c) At the instigation of local hospital management or nursing staff a proposal to vary local working arrangements can be made on the basis of but not limited to:
- clinical nursing assessment of patient needs;
  - the demands of the environment such as ward layout;
  - statutory obligations including workplace safety and health legislation;
  - the requirements of nurse regulatory legislation and professional standards;
  - workloads; and
  - occupancy.

Proposals under this section can only be within the following parameters:

- Current fixed ratio hours for the 4 week roster period on the ward/unit must remain on the ward/unit.
- Short shift provision is one six hour shift per am or pm. Where a proposal to introduce a short shift is agreed such a shift would commence in the am at the usual commencement time, eg; 7.00am and in the pm 2 hours later than the normal shift commencement, eg; 3.00pm. If a full time employee works a 6 hours shift she/he still receives an ADO in line with current Award provisions.
- Nurses will not be rostered to work short shifts unless they agree to work them.
- Proposals agreed to by the local committee outside these parameters can be referred to the ANF and the DHS for consideration.

Once agreement is reached in principle at the local committee in relation to a proposal, then that proposal can proceed to a secret ballot of nursing employees (the ballot is to be conducted by an independent person) on the ward/unit where the change is proposed. Where there is no agreement following discussion at the committee level, management may refer the proposal to a secret ballot of

nursing employees on the ward/unit where the change is proposed. The parties may appoint a scrutineer for the purpose of counting the ballot.

- (d) The local committee may avail itself of a variety of data and information to help inform it in relation to the proposals. This could include information from various sources including data from health services report patient dependency systems, skill mix, weis, drg's, separations, length of stay where available.
- (e) If the proposal is accepted by a majority of nursing staff in the ballot then amended, workload arrangements as determined through this process replace workload arrangements under the current agreement and remain in force until another proposal is reviewed and accepted by the majority of affected staff. Any change would take effect from the next roster period following the ballot.

#### 4. OTHER MATTERS

- (b) **Professional Development Leave**  
One day to default to annual leave.  
Home study tightened, in that the nurse applying must show relevance of the PD to their position and will complete an agreed form providing details as to the nature of the home study.
- (d) **Higher Duties** – DHS claim to apply only to ACN positions provided the appropriate number of ACNs have been appointed.
- (e) **The Classification Title of Charge Nurse** can be called either Charge Nurse or Nurse Unit Manager (hereinafter Nurse Unit Manager). (5.7)
- (f) **The Classification Title of Associate Charge Nurse** can be called either Associate Charge Nurse or Associate Nurse Unit Manager. (5.16)
- (g) Where an employee is required to attend pre-natal appointments or parenting classes and such appointments or classes are only available, or can only be attended during the ordinary rostered shift of the employee, then the employee on production of satisfactory evidence to this effect may access their Carer's leave credit for such purpose. (12.9)
- (h) During the daylight saving change over period, an employee shall be paid for actual hours worked. (14.1)
- (i) CNS as contained in the 2000 MECA remains with the amendment to advertisement of the position to take place every 6 months.
- (j) Long Service Leave

It is agreed that an employee, in addition to current entitlements, may take long service leave in accordance with the following options;

- 1 An employee may take a period of long service leave at double pay for half the period of long service leave entitlements, eg; if a nurse has an entitlement of four months' long service she/he may take two months' leave with four months' pay.
2. An employee may take a period of long service leave at half pay for double the period of long service leave entitlements, eg; if a nurse has an entitlement of four months' long service leave she/he may take eight months' leave at half pay.

Both options (1) and (2) are only by mutual agreement between the employer and employee. The employer would provide financial advice to the employee in relation to income tax implications in respect of either option.

## **5. STATEWIDE CONSULTATIVE STRUCTURE**

Representatives of DHS, VHIA, ANF and HSUA established to meet on a quarterly basis to discuss such issues including, but not limited to:

- Health management
- Workforce change issues
- Clinical focused nursing research projects

Proposals for alternate work organisation in public aged high care facilities can be considered by this committee and thereafter trialled only where the majority of nurses in the identified facility agree by ballot.

First meeting of this committee is to take place within one month of date of enterprise agreement being reached.

## Appendix C

## PROJECT OUTLINE INFORMATION SHEET

Research area  
Nursing costs

**Research Project****An analysis of patient dependency data utilizing the Trend Care System**

Investigators

Plummer V, Heslop L, Seldon L, Diers D.

**Description**

This study investigates whether Trend Care provides appropriate and reliable acuity data for apportioning nursing resources for patient care. The study will test the validity of Trend Care version 2.1 for its purported administrative applications by examining data collected across several sites in Australia, New Zealand and Thailand. Validity testing will compare predicted and actualized nursing hours per patient day with nurse-to-patient ratios.

**Key research questions**

What are the best measures for operationally defining patient acuity?

How does the formula called 'nurse patient ratios' for apportioning nursing costs compare with the formula 'hours per patient day'?

**Method**

Statistical analysis of de-identified patient acuity data in standard Trend Care reporting format will consider the variance between predicted/actualized nursing hours per patient day and nurse patient ratios.

**Results**

Results are expected to explore relationships between patient acuity and models for apportioning nursing work. The results will be important for planning nursing resources and budgeting.

**Study timetable**

2001-2004

**Granting body**

Monash Research Fund scholarship

**Further information**

email: virginia.plummer@med.monash.edu.au



Centre for Health Services Operations Management



## Appendix D

## PARTICIPATING SITES - DHS PILOT

| Level by Heads of Agreement | Hospital        | Ward Description              | Ward Code                   |
|-----------------------------|-----------------|-------------------------------|-----------------------------|
| Level 1                     | Alfred          | Cardiothoracic                | 2F                          |
|                             |                 | Medical / Oncology            | 7 East                      |
|                             |                 | Surgical / Burns              | 6 West                      |
|                             |                 | Emergency Department          | E.D.                        |
| Level 1                     | Monash          | Paediatric                    | 41 North                    |
|                             |                 | Neurology / Neurosurgical     | 54 South                    |
|                             |                 | Medical                       | 44 South                    |
|                             |                 | Cardiology / Cardiothoracic   | 32 South                    |
| Level 1                     | RCH             | Intensive Care                | ICU                         |
|                             |                 | Medical / Chronic-resp        | 8 West                      |
|                             |                 | Orthopaedic                   | 4 North                     |
|                             |                 | Adolescent / Med. / Surg.     | 3 East                      |
| Level 1                     | BHH             | Surgical                      | 1 South                     |
|                             |                 | Day Procedure Day Surgery     | 1 North Surgical Adm centre |
|                             |                 | Medical                       | 2 North                     |
|                             |                 | Intensive Care Unit           | ICU                         |
| Level 2                     | Mercy East Melb | Maternity Antenatal Postnatal | 9 <sup>th</sup> Floor       |
|                             |                 | Surg / Med HDU                | 8 North                     |
|                             |                 | Maternity Antenatal Postnatal | 6 North                     |
|                             |                 | Maternity Antenatal Postnatal | 6 South                     |
|                             |                 | Delivery Suite 1              | Suite 1                     |
|                             |                 | Delivery Suite 2              | Suite 2                     |

|         |                        |                                                 |               |
|---------|------------------------|-------------------------------------------------|---------------|
| Level 2 | Mercy Werribee         | Surgical                                        | C2            |
|         |                        | Medical / Surg                                  | C3            |
|         |                        | Palliative Medical                              | D3            |
|         |                        | Child Birth Centre                              | D2            |
| Level 3 | The Angliss            | Rehabilitation                                  | 1 West        |
|         |                        | Gen Medical                                     | 2 East        |
|         |                        | Med / Surg                                      | 2 West        |
|         |                        | CCU / HDU                                       | CCU           |
|         |                        | Obstetric Female Surg Short Stay                | 3 East        |
|         |                        | Paediatric / Surg                               | 3 West        |
|         |                        | Special Care Nursery Level 2 Family Birth Suite | SCN           |
|         |                        | Delivery Suite                                  | DS            |
| Level 2 | Maroondah              | Acute Med / Surg Short Stay                     | 1 South       |
|         |                        | Acute Surg / Med                                | 2 South       |
|         |                        | Ortho / Acute Med                               | 1 North       |
|         |                        | Acute Med                                       | 3 East        |
|         |                        | Rehab / (GEM)                                   | 1 East        |
|         |                        | Emergency Med Short Stay                        | EMM / 2 East  |
|         |                        | EMM / EMS                                       |               |
|         |                        | Critical Care                                   |               |
| Level 2 | Latrobe                | Surg / Med                                      | Tanjil        |
|         |                        | Med / Palliative                                | Tyers         |
|         |                        | Paediatrics Orthopaedics                        | Tarra         |
|         |                        | Critical Care                                   | Tambo         |
|         |                        | Obstetrics Special Care Nursery                 | Thomson       |
|         |                        | Rehabilitation                                  | Callignee     |
|         |                        | Residential GEM Respite                         | Erica         |
| Level 2 | Mildura                | Med / Surg Paeds                                | Ward 2        |
|         |                        | Med/ Surg Adult                                 | Ward 3        |
|         |                        | ICU                                             | ICU           |
| Level 2 | Goulburn Valley Health | Medical                                         | Medical Unit  |
|         |                        | Surgical                                        | Surgical Unit |

|             |              |                                                                       |                                                                      |
|-------------|--------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|
|             |              | Maternity                                                             | Maternity                                                            |
|             |              | Paediatric                                                            | Paediatric                                                           |
|             |              | Special Care                                                          | SCN                                                                  |
|             |              | Nursery                                                               |                                                                      |
|             |              | Birth Suite                                                           | Birth Suite                                                          |
|             |              | Intensive Care                                                        | ICU                                                                  |
|             |              | Rehabilitation<br>GEM                                                 | Mary Coram Unit                                                      |
| Level 2     | Wangaratta   | Paediatric Medical                                                    | Ground West                                                          |
|             |              | Surgical Midwifery                                                    | One East                                                             |
|             |              | Rehabilitation                                                        | Thomas Hogan                                                         |
|             |              | Sub / Acute<br>Aged Care/<br>Step Down                                | Ground East                                                          |
|             |              | Midwifery<br>Labor                                                    |                                                                      |
|             |              | Special Care<br>Nursery                                               |                                                                      |
|             |              | Aged Care                                                             | Dicker Wing                                                          |
|             |              | Aged Care                                                             | Mathew Rohan                                                         |
| Acute       | Benalla      | Medical                                                               | Medical                                                              |
|             |              | Surgical                                                              | Surgical                                                             |
|             |              | Midwifery                                                             |                                                                      |
| Acute other | Colac        | Med / Surg<br>Special Care<br>Obstetrics<br>Palliative<br>Paediatrics | Acute Ward                                                           |
|             |              | E.D.                                                                  | ED                                                                   |
| Acute       | Djerriwarrh  | Med / Surg                                                            | Med / Surg                                                           |
|             |              | Maternity Services                                                    | Maternity                                                            |
| Acute other | Mansfield 16 | Medical<br>Surgical<br>Maternity                                      | General Ward                                                         |
|             |              | A & E                                                                 | A&E                                                                  |
| Rehab       | Peter James  | Rehabilitation                                                        | West                                                                 |
|             |              | Rehabilitation                                                        | East                                                                 |
|             |              | Rehabilitation                                                        | Centre                                                               |
| Level 3     | Hamilton     | Bottom Floor<br>ICU / Medical                                         | ICU<br>Medical                                                       |
|             |              | Top Floor<br>Surgical<br>Obstetrics<br>Short Stay<br>Paediatrics      | Surgical (12)<br>Obstetrics (6)<br>Short Stay (6)<br>Paediatrics (6) |
| Rehab       | BECC         | Rehabilitation                                                        | Ward One                                                             |

|       |               |                           |         |
|-------|---------------|---------------------------|---------|
|       |               | Rehabilitation            | PCW     |
|       |               | Rehabilitation            | KAW     |
|       |               | Rehabilitation            | IBNH    |
| Rehab | Barwon health | GEM / Palliative          | Ward 12 |
|       |               | Rehabilitation level<br>1 | Ward 3  |
|       |               | Rehabilitation            | Ward 4  |

## Appendix E

## WARD MAPPING – SCHEDULE C EQUIVALENCE FOR NON VICTORIAN HOSPITALS

| Hospital           | Ward Description    | Ward Type            | Ward Code |
|--------------------|---------------------|----------------------|-----------|
| <b>Wakefield</b>   | Intensive/Coronary  | ICU                  | 16        |
|                    | L1 Ortho            | Medical/Surgical     | 1         |
|                    | L2 Cardiac          | Medical/Surgical     | 1         |
|                    | L3 General          | Medical/Surgical     | 1         |
| <b>Wanganui</b>    | Critical Care       | Coronary Care Unit   | 8         |
|                    | Easson              | Medical/Surgical     | 1         |
|                    | Simpson             | Medical/Surgical     | 1         |
| <b>John James</b>  | Aubrey Tow          | Medical/Surgical     | 1         |
|                    | Canberra Cancer C   | Medical/Surgical     | 1         |
|                    | Curtin Ward         | Medical/Surgical     | 1         |
|                    | Day Surgery Unit /R | Medical/Surgical     | 1         |
|                    | Deakin Ward         | Medical/Surgical     | 1         |
|                    | Delivery Suite      | Delivery Suite       | 5         |
|                    | Garran Ward         | Medical/Surgical     | 1         |
|                    | Intensive Care Unit | High Dependency Unit | 9         |
|                    | Maternity Unit      | Ante/Postnatal       | 2         |
|                    | Nursery Unit        | Ante/Postnatal       | 2         |
|                    |                     | Special Care Nursery |           |
|                    |                     | Special Care Nursery | Level 2   |
| <b>Mid Central</b> | CCU                 | Coronary Care Unit   | 8         |
|                    |                     | Special Care Nursery |           |
|                    | NNU                 | Level 2              | 6         |
|                    | STAR2               | Rehab Category 2     | 12        |
|                    | STAR3               | Rehab Category 2     | 12        |
|                    | WD23                | Medical/Surgical     | 1         |
|                    | WD24                | Medical/Surgical     | 1         |
|                    | WD25                | Medical/Surgical     | 1         |
|                    | WD26                | Medical/Surgical     | 1         |
|                    | WD27                | Medical/Surgical     | 1         |
|                    | WD28                | Medical/Surgical     | 1         |
|                    | WD29                | Medical/Surgical     | 1         |

|                              |                          |                      |    |
|------------------------------|--------------------------|----------------------|----|
|                              | Child                    | Medical/Surgical     | 1  |
| <b>Westmead</b>              |                          |                      |    |
|                              | ACU                      | Medical/Surgical     | 1  |
|                              | Birthing Suite           | Delivery Suite       | 5  |
|                              | Critical Care            | ICU                  | 16 |
|                              | DSU                      | Medical/Surgical     | 1  |
|                              | East Wing                | Medical/Surgical     | 1  |
|                              | Postnatal                | Ante/Postnatal       | 2  |
|                              |                          | Special Care Nursery |    |
|                              | Special Care Nursery     | Level 2              | 6  |
|                              | West Wing                | Medical/Surgical     | 1  |
| <b>Taranaki</b>              |                          |                      |    |
|                              | General Surgical         | Medical/Surgical     | 1  |
|                              | Hawera Inpatient         | Medical/Surgical     | 1  |
|                              | Intensive Care           | ICU                  | 16 |
|                              | Maternity-Antenatal      | Ante/Postnatal       | 2  |
|                              | Medical & Rehabilitation | Rehab Category 1     | 11 |
|                              | Medical Ward - WD        | Medical/Surgical     | 1  |
|                              |                          | Special Care Nursery |    |
|                              | Neonatal                 | Level 2              | 6  |
|                              | Orthopaedic/Surgical     | Medical/Surgical     | 1  |
|                              | Paediatrics - Wd 2       | Medical/Surgical     | 1  |
| <b>Ascot</b>                 |                          |                      |    |
|                              | Coronary Care Unit       | Coronary Care Unit   | 8  |
|                              | East                     | Medical/Surgical     | 1  |
|                              | Intensive Care Unit      | High Dependency Unit | 9  |
|                              | West                     | Medical/Surgical     | 1  |
| <b>Mercy</b>                 |                          |                      |    |
|                              | Cardiothoracic Unit      | Medical/Surgical     | 1  |
|                              | Coronary Care Unit       | Medical/Surgical     | 1  |
|                              | Intensive Care Unit      | High Dependency Unit | 9  |
|                              | St Cecilia's Ward        | Medical/Surgical     | 1  |
|                              | Stella Maris Ward        | Medical/Surgical     | 1  |
| <b>Mater Adults Hospital</b> |                          |                      |    |
|                              | 10B - Oncology           | Medical/Surgical     | 1  |
|                              | 7A - Orthopaedic         | Medical/Surgical     | 1  |
|                              | 7B - Surgical            | Medical/Surgical     | 1  |
|                              | 8A - Women's Health      | Medical/Surgical     | 1  |
|                              | 9A - General Medical     | Medical/Surgical     | 1  |
|                              | 9B - General Medical     | Medical/Surgical     | 1  |
|                              | CCU - Coronary Care      | Coronary Care Unit   | 8  |
|                              | Day Surgery              | Medical/Surgical     | 1  |
|                              | Gastroenterology         | Medical/Surgical     | 1  |
|                              | Intensive Care           | ICU                  | 16 |

**Mater Children's Hospital**

|                             |                  |    |
|-----------------------------|------------------|----|
| 7 East - Paediatric         | Medical/Surgical | 1  |
| 7 South - Paediatric        | Medical/Surgical | 1  |
| 8 East - Paediatric         | Medical/Surgical | 1  |
| 8 South - Babies            | Medical/Surgical | 1  |
| Mater Children's Paediatric | Medical/Surgical | 1  |
| Paediatric Day Unit         | Medical/Surgical | 1  |
| Paediatric Intensive Care   | ICU              | 16 |

**Mater Mother's Hospital**

|                        |                      |    |
|------------------------|----------------------|----|
| Delivery Suites - Pu   | Delivery Suite       | 5  |
| Intensive Care Nursery | ICU                  | 16 |
| MM4 - Maternity Unit   | Ante/Postnatal       | 2  |
| MM5 - Public Maternity | Ante/Postnatal       | 2  |
|                        | Special Care Nursery |    |
| Special Care Nursery   | Level 2              | 6  |

**Mater Mother's Private Hospital**

|                       |                |   |
|-----------------------|----------------|---|
| Delivery Suites - Pri | Ante/Postnatal | 2 |
| MM6 - Private Mater   | Ante/Postnatal | 2 |
| MM7 - Private Mater   | Ante/Postnatal | 2 |

**Mater Private Hospital**

|                        |                  |    |
|------------------------|------------------|----|
| 10E - General Surgical | Medical/Surgical | 1  |
| 10N - General Surgical | Medical/Surgical | 1  |
| 8E - Medical Oncology  | Medical/Surgical | 1  |
| 8N - Haematology/O     | Medical/Surgical | 1  |
| 9E - Neuro Vascular    | Medical/Surgical | 1  |
| 9N - General Medical   | Medical/Surgical | 1  |
| Endoscopy Unit - M     | Medical/Surgical | 1  |
| Intensive Care - MP    | ICU              | 16 |
| Rehabilitation         | Rehab Category 2 | 12 |

**Ipswich**

|                           |                      |    |
|---------------------------|----------------------|----|
| Birth Suite               | Delivery Suite       | 5  |
| Children's Suns           | Medical/Surgical     | 1  |
| Intensive & Coronary Care | Coronary Care Unit   | 8  |
| Maternity/Gynaecology     | Ante/Postnatal       | 2  |
| Medical                   | Medical/Surgical     | 1  |
| Medical/Surgical          | Medical/Surgical     | 1  |
| Orthopaedic               | Medical/Surgical     | 1  |
| Palliative Care           | Palliative Care      | 10 |
| Short Stay Unit           | Medical/Surgical     | 1  |
|                           | Special Care Nursery |    |
| Special Care Nursery      | Level 2              | 6  |
| Surgical                  | Medical/Surgical     | 1  |
| Perioperative &           | Medical/Surgical     | 1  |

## Rehabilitation

**Calvary Health Care ACT**

|                   |                      |    |
|-------------------|----------------------|----|
| 2N Public Mentan  | Medical/Surgical     | 1  |
| 3N Private Mate   | Ante/Postnatal       | 2  |
| 3S Public Mater   | Ante/Postnatal       | 2  |
| 4E Public Surgi   | Medical/Surgical     | 1  |
| 4W Public Orth    | Medical/Surgical     | 1  |
| 5W Public Medic   | Medical/Surgical     | 1  |
| 6E Private Medic  | Medical/Surgical     | 1  |
| 6W Private Surg   | Medical/Surgical     | 1  |
| BS Birthing Suite | Delivery Suite       | 5  |
| CDU Clinical De   | Medical/Surgical     | 1  |
| CVL the Act Con   | Aged Care Aged       | 4  |
| HG Hyson Gree     | Medical/Surgical     | 1  |
| Hosp Clare Hol    | Palliative Care      | 10 |
| 24 HOUR WARD      | Medical/Surgical     | 1  |
|                   | Special Care Nursery |    |
| SCN Special Care  | Level 2              | 6  |
| ICU               | ICU                  | 16 |

**Hawkes Bay**

|                     |                    |    |
|---------------------|--------------------|----|
| AAU - 4th Floor     | Medical/Surgical   | 1  |
| Intensive Care Unit | ICU                | 16 |
| Med Resp & Renal    | Medical/Surgical   | 1  |
| Medical Coronary    | Coronary Care Unit | 8  |
| Medical B1          | Medical/Surgical   | 1  |
| Medical B2          | Medical/Surgical   | 1  |
| Paediatrics         | Medical/Surgical   | 1  |
| Surgical A2         | Medical/Surgical   | 1  |
| Surgical A3         | Medical/Surgical   | 1  |
| Surgical B3         | Medical/Surgical   | 1  |

**Sydney Adventist**

|                         |                      |   |
|-------------------------|----------------------|---|
| 04 Maternity            | Ante/Postnatal       | 2 |
|                         | Special Care Nursery |   |
| 04 Special Care Nursery | Level 2              | 6 |
| 05 Delivery Suite       | Delivery Suite       | 5 |
| 05 Maternity            | Medical/Surgical     | 1 |
| 06 Children's Ward      | Medical/Surgical     | 1 |
| 06 Poon                 | Medical/Surgical     | 1 |
| 07 Burnside             | Medical/Surgical     | 1 |
| 09 Radley               | Medical/Surgical     | 1 |
| 10 Hudson               | Medical/Surgical     | 1 |
| 11 Gee                  | Medical/Surgical     | 1 |
| 12 Harrison             | Medical/Surgical     | 1 |

|                     |                    |    |
|---------------------|--------------------|----|
| CCU                 | Coronary Care Unit | 8  |
| Intensive Care Unit | ICU                | 16 |

**Mater Adults Hospital**

|                      |                    |    |
|----------------------|--------------------|----|
| 10B - Oncology       | Medical/Surgical   | 1  |
| 7A - Orthopaedic     | Medical/Surgical   | 1  |
| 7B - Surgical        | Medical/Surgical   | 1  |
| 8A - Women's Health  | Medical/Surgical   | 1  |
| 9A - General Medical | Medical/Surgical   | 1  |
| 9B - General Medical | Medical/Surgical   | 1  |
| CCU - Coronary Care  | Coronary Care Unit | 8  |
| Day Surgery          | Medical/Surgical   | 1  |
| Gastroenterology     | Medical/Surgical   | 1  |
| Intensive Care       | ICU                | 16 |

**Grey Base**

|                     |                           |    |
|---------------------|---------------------------|----|
| Barclay Ward        | Medical/Surgical          | 1  |
| Brian Waterson Unit | Medical/Surgical          | 1  |
| Critical Care Unit  | Coronary Care Unit        | 8  |
|                     | Rehabilitation - category |    |
| Hannan Ward         | 2                         | 12 |
| McBrearty           | Ante/Postnatal            | 2  |
| Morice Ward         | Medical/Surgical          | 1  |
| Pafitt Ward         | Medical/Surgical          | 1  |

**Bundaberg Health Services**

|                      |                                 |    |
|----------------------|---------------------------------|----|
| Rehabilitation Unit  | Rehab Cat 2                     | 12 |
| Surgical             | Medical/Surgical                | 1  |
| BFU - Floor          | Ante/Postnatal                  | 2  |
| Intensive Care       | ICU                             | 16 |
| Medical Ward         | Medical/Surgical                | 1  |
| Mental Health Ward   | Medical/Surgical                | 1  |
| Paediatric Unit      | Medical/Surgical                | 1  |
| Surgical             | Medical/Surgical                | 1  |
| Birth Suites         | Delivery Suite                  | 5  |
| Day Surgery Unit     | Medical/Surgical                | 1  |
| Renal Unit           | Medical/Surgical                | 1  |
| Special Care Nursery | Special Care Nursery<br>level 2 | 6  |

**Hollywood Hospital**

|                    |                    |   |
|--------------------|--------------------|---|
| Charles Pope       | Medical/Surgical   | 1 |
| Clifford Sadler    | Medical/Surgical   | 1 |
| Coronary Care Unit | Coronary Care Unit | 8 |
| Day Procedure Unit | Medical/Surgical   | 1 |
| Gastroenterology   | Medical/Surgical   | 1 |

|                    |                               |                           |    |
|--------------------|-------------------------------|---------------------------|----|
|                    | Henry Murray                  | Medical/Surgical          | 1  |
|                    | Intensive Care Unit           | ICU                       | 16 |
|                    | James Woods                   | Medical/Surgical          | 1  |
|                    | Jim Gordon                    | Medical/Surgical          | 1  |
|                    | John Carroll                  | Medical/Surgical          | 1  |
|                    | John Carroll - Day            | Medical/Surgical          | 1  |
|                    | Leon Goldsworthy              | Medical/Surgical          | 1  |
|                    | Palliative Care Unit          | Palliative Care           | 10 |
|                    |                               | Rehabilitation - category |    |
|                    | Rehabilitation Unit           | 2                         | 12 |
|                    | Stan Gurney                   | Medical/Surgical          | 1  |
|                    | The Hollywood Clinic          | Medical/Surgical          | 1  |
|                    | Thomas Axford                 | Medical/Surgical          | 1  |
| <b>Greenslopes</b> |                               |                           |    |
|                    | Theatre Adm / Day             | Medical/Surgical          | 1  |
|                    | Wd 11 Card /Thor /V           | Medical/Surgical          | 1  |
|                    | Wd 13 Urology/ Car            | Medical/Surgical          | 1  |
|                    | Wd 14 KPU Psychiatric         | Medical/Surgical          | 1  |
|                    | Wd 21 Orthopaedic/            | Medical/Surgical          | 1  |
|                    | Wd 23 Surg/ENT/PI             | Medical/Surgical          | 1  |
|                    | Wd 25 Cardiac Sur             | Medical/Surgical          | 1  |
|                    | Wd 31 Haem/Onc/M              | Medical/Surgical          | 1  |
|                    | Wd 21A Day Chemo              | Palliative Care           | 10 |
|                    | Wd 33 Resp/ Infect/           | Medical/Surgical          | 1  |
|                    | Wd 35 Orthopaedics            | Medical/Surgical          | 1  |
|                    | Wd 41 Medical/Stro            | Medical/Surgical          | 1  |
|                    | Wd 43 General Medical         | Medical/Surgical          | 1  |
|                    | Wd5 Endocrine/Me              | Medical/Surgical          | 1  |
|                    | Wd Coronary Care              | Coronary Care Unit        | 8  |
|                    | Wd Florence Syer U            | Aged Care Aged            | 4  |
|                    | Wd Intensive Care             | ICU                       | 16 |
|                    |                               | Rehabilitation - category |    |
|                    | Wd Rehabilitation U           | 2                         | 12 |
| <b>Phyathai 3</b>  |                               |                           |    |
|                    | Coronary Care                 | Coronary Care Unit        | 8  |
|                    |                               | Accident and              |    |
|                    | Emergency                     | Emergency                 | 7  |
|                    | High Dependency -<br>Medical  | High Dependency           | 9  |
|                    | High Dependency -<br>Surgical | High Dependency           | 9  |
|                    | Intensive Care Special        | ICU                       | 16 |
|                    | Intensive Care                | ICU                       | 16 |
|                    | Labour                        | Delivery Suite            | 5  |
|                    | Maternity                     |                           |    |
|                    | (Antenatal/Postnatal          | Ante/Postnatal            | 2  |
|                    | Medical                       | Medical/Surgical          | 1  |

|                                  |                      |    |
|----------------------------------|----------------------|----|
| Maternity (Mothers with Babies)  | Ante/Postnatal       | 2  |
| Paediatric                       | Medical/Surgical     | 1  |
| Paediatric - Babies to 12 months | Medical/Surgical     | 1  |
| Paediatric - Intensive Care      | ICU                  | 16 |
| Psychiatric                      | Medical/Surgical     | 1  |
| Renal Dialysis                   | High Dependency      | 9  |
| Short Stay - Medical             | Medical/Surgical     | 1  |
| Short Stay - Surgical            | Medical/Surgical     | 1  |
| Special Care Nursery             | Special Care Nursery | 6  |
| Surgical                         | Medical/Surgical     | 1  |

Appendix F

WARD PERIOD COMPARISON REPORT

Ward Period Comparison Report

Printed: 24/10/2003  
2:35:43 PM

Ward: **Ward 3 East**  
Month: **May, 2003**

| Calendar Date  | No. Of Categorized Patients |       |       | 'Actual' Required by Acuity |      | Inpatient Clinical Hours Worked |      | Inpatient Clinical Variance |       | Other Nursing Hours |      | Other Non-Nursing Hours |      | Medical / Allied Health |      | Total Worked |      | Ward Util% |
|----------------|-----------------------------|-------|-------|-----------------------------|------|---------------------------------|------|-----------------------------|-------|---------------------|------|-------------------------|------|-------------------------|------|--------------|------|------------|
|                | Day                         | Even. | Night | Hours                       | HPPD | Hours                           | HPPD | Hours                       | HPPD  | Hours               | HPPD | Hours                   | HPPD | Hours                   | HPPD | Hours        | HPPD |            |
| 1/05/2003 Thu  | 31                          | 30    | 30    | 136:45                      | 4.51 | 137:00                          | 4.52 | 0:15                        | 0.01  | 104:00              | 3.43 | 12:00                   | 0.40 |                         |      | 253:00       | 8.34 | 101.11%    |
| 2/05/2003 Fri  | 30                          | 25    | 24    | 123:20                      | 4.68 | 127:00                          | 4.82 | 3:40                        | 0.14  | 12:00               | 0.46 | 12:00                   | 0.46 |                         |      | 151:00       | 5.73 | 87.78%     |
| 3/05/2003 Sat  | 24                          | 19    | 19    | 95:50                       | 4.64 | 96:00                           | 4.65 | 0:10                        | 0.01  | 4:00                | 0.19 |                         |      |                         |      | 100:00       | 4.84 | 68.89%     |
| 4/05/2003 Sun  | 19                          | 21    | 21    | 85:40                       | 4.21 | 88:00                           | 4.33 | 2:20                        | 0.11  |                     |      |                         |      |                         |      | 88:00        | 4.33 | 67.78%     |
| 5/05/2003 Mon  | 25                          | 28    | 28    | 119:30                      | 4.43 | 122:00                          | 4.52 | 2:30                        | 0.09  | 8:00                | 0.30 | 11:00                   | 0.41 |                         |      | 141:00       | 5.22 | 90.00%     |
| 6/05/2003 Tue  | 33                          | 30    | 30    | 141:45                      | 4.57 | 139:00                          | 4.48 | -2:45                       | -0.09 | 9:00                | 0.29 | 12:00                   | 0.39 |                         |      | 160:00       | 5.16 | 103.33%    |
| 7/05/2003 Wed  | 33                          | 30    | 29    | 141:15                      | 4.61 | 140:00                          | 4.57 | -1:15                       | -0.04 | 16:00               | 0.52 | 12:00                   | 0.39 |                         |      | 168:00       | 5.48 | 102.22%    |
| 8/05/2003 Thu  | 29                          | 30    | 30    | 116:55                      | 3.94 | 116:00                          | 3.91 | -0:55                       | -0.03 | 16:00               | 0.54 | 13:00                   | 0.44 |                         |      | 145:00       | 4.89 | 98.89%     |
| 9/05/2003 Fri  | 30                          | 28    | 28    | 99:20                       | 3.47 | 105:00                          | 3.66 | 5:40                        | 0.20  | 8:00                | 0.28 | 13:00                   | 0.45 |                         |      | 126:00       | 4.40 | 95.56%     |
| 10/05/2003 Sat | 28                          | 21    | 21    | 76:25                       | 3.28 | 92:00                           | 3.94 | 15:35                       | 0.67  | 12:00               | 0.51 |                         |      |                         |      | 104:00       | 4.46 | 77.78%     |
| 11/05/2003 Sun | 21                          | 26    | 26    | 68:05                       | 2.80 | 79:00                           | 3.25 | 10:55                       | 0.45  |                     |      |                         |      |                         |      | 79:00        | 3.25 | 81.11%     |
| 12/05/2003 Mon | 35                          | 30    | 28    | 140:55                      | 4.55 | 145:00                          | 4.68 | 4:05                        | 0.13  | 25:00               | 0.81 | 8:00                    | 0.26 |                         |      | 178:00       | 5.74 | 103.33%    |
| 13/05/2003 Tue | 28                          | 28    | 28    | 134:19                      | 4.80 | 112:00                          | 4.00 | -22:19                      | -0.80 | 8:00                | 0.29 | 13:00                   | 0.46 |                         |      | 133:00       | 4.75 | 93.33%     |
| 14/05/2003 Wed | 30                          | 19    | 20    | 106:03                      | 4.61 | 122:00                          | 5.30 | 15:57                       | 0.69  | 22:00               | 0.96 | 11:00                   | 0.48 |                         |      | 155:00       | 6.74 | 76.67%     |
| 15/05/2003 Thu | 19                          | 20    | 20    | 87:10                       | 4.43 | 112:00                          | 5.69 | 24:50                       | 1.26  | 8:00                | 0.41 | 11:30                   | 0.58 |                         |      | 131:30       | 6.69 | 65.56%     |
| 16/05/2003 Fri | 22                          | 26    | 26    | 118:25                      | 4.80 | 117:00                          | 4.74 | -1:25                       | -0.06 | 8:00                | 0.32 | 12:30                   | 0.51 |                         |      | 137:30       | 5.57 | 82.22%     |
| 17/05/2003 Sat | 25                          | 22    | 22    | 102:05                      | 4.44 | 99:00                           | 4.30 | -3:05                       | -0.13 | 4:00                | 0.17 |                         |      |                         |      | 103:00       | 4.48 | 76.67%     |
| 18/05/2003 Sun | 22                          | 27    | 27    | 102:35                      | 4.05 | 108:00                          | 4.26 | 5:25                        | 0.21  |                     |      |                         |      |                         |      | 108:00       | 4.26 | 84.44%     |
| 19/05/2003 Mon | 31                          | 29    | 29    | 138:00                      | 4.65 | 141:00                          | 4.75 | 3:00                        | 0.10  | 12:00               | 0.40 | 12:00                   | 0.40 |                         |      | 165:00       | 5.56 | 98.89%     |
| 20/05/2003 Tue | 29                          | 29    | 29    | 132:00                      | 4.55 | 133:00                          | 4.59 | 1:00                        | 0.03  | 10:00               | 0.34 | 12:00                   | 0.41 |                         |      | 155:00       | 5.34 | 96.67%     |
| 21/05/2003 Wed | 29                          | 29    | 30    | 121:20                      | 4.14 | 123:00                          | 4.19 | 1:40                        | 0.06  | 8:00                | 0.27 | 12:00                   | 0.41 |                         |      | 143:00       | 4.88 | 97.78%     |
| 22/05/2003 Thu | 31                          | 30    | 29    | 112:20                      | 3.74 | 112:00                          | 3.73 | -0:20                       | -0.01 | 12:00               | 0.40 | 12:00                   | 0.40 |                         |      | 136:00       | 4.53 | 100.00%    |
| 23/05/2003 Fri | 29                          | 26    | 26    | 99:05                       | 3.67 | 95:00                           | 3.52 | -4:05                       | -0.15 | 8:00                | 0.30 | 9:00                    | 0.33 |                         |      | 112:00       | 4.15 | 90.00%     |
| 24/05/2003 Sat | 32                          | 22    | 22    | 99:10                       | 3.91 | 102:30                          | 4.05 | 3:20                        | 0.13  | 4:00                | 0.16 |                         |      |                         |      | 106:30       | 4.20 | 84.44%     |
| 25/05/2003 Sun | 22                          | 24    | 24    | 76:20                       | 3.27 | 82:00                           | 3.51 | 5:40                        | 0.24  |                     |      |                         |      |                         |      | 82:00        | 3.51 | 77.78%     |
| 26/05/2003 Mon | 30                          | 30    | 30    | 138:33                      | 4.62 | 122:00                          | 4.07 | -16:32                      | -0.55 | 10:00               | 0.33 | 12:00                   | 0.40 |                         |      | 144:00       | 4.80 | 100.00%    |
| 27/05/2003 Tue | 30                          | 28    | 28    | 138:50                      | 4.84 | 126:00                          | 4.40 | -12:50                      | -0.45 | 8:00                | 0.28 | 12:00                   | 0.42 |                         |      | 146:00       | 5.09 | 95.56%     |
| 28/05/2003 Wed | 30                          | 28    | 28    | 134:40                      | 4.70 | 120:00                          | 4.19 | -14:40                      | -0.51 | 8:00                | 0.28 | 12:00                   | 0.42 |                         |      | 140:00       | 4.88 | 95.56%     |
| 29/05/2003 Thu | 31                          | 29    | 29    | 142:10                      | 4.79 | 130:00                          | 4.38 | -12:10                      | -0.41 | 20:00               | 0.67 | 12:00                   | 0.40 |                         |      | 162:00       | 5.46 | 98.89%     |
| 30/05/2003 Fri | 32                          | 27    | 27    | 128:41                      | 4.49 | 123:00                          | 4.29 | -5:41                       | -0.20 | 12:00               | 0.42 | 12:00                   | 0.42 |                         |      | 147:00       | 5.13 | 95.56%     |
| 31/05/2003 Sat | 27                          | 27    | 27    | 134:05                      | 4.97 | 139:00                          | 5.15 | 4:55                        | 0.18  | 12:00               | 0.44 |                         |      |                         |      | 151:00       | 5.59 | 90.00%     |
|                | 867                         | 818   | 815   | 3591:36                     | 4.31 | 3604:30                         | 4.33 | 12:54                       | 0.02  | 388:00              | 0.47 | 258:00                  | 0.31 |                         |      | 4250:30      | 5.10 | 89.61%     |

## Appendix G

## WARD ACUITY HPPD PER PATIENT TYPE REPORT

## Ward Acuity HPPD per Patient Type

Printed: 30/03/2004  
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| Patient Type   |                            | Average Patient Days | Required Clinical Hours | Part Specialled Hours | Required Clinical HPPD |
|----------------|----------------------------|----------------------|-------------------------|-----------------------|------------------------|
| HDS            | High Dependency - Surgical | 26.33                | 252.04                  | 4.00                  | 9.57                   |
|                | - Specialled               | 0.67                 | 16.00                   |                       | 24.00                  |
| MED            | Medical                    | 250.00               | 988.12                  | 5.00                  | 3.95                   |
|                | - Specialled               | 0.33                 | 8.00                    |                       | 24.00                  |
| PCU            | Palliative Care            | 11.00                | 67.67                   |                       | 6.15                   |
| SHM            | Short Stay - Medical       | 5.33                 | 16.08                   |                       | 3.02                   |
| SHS            | Short Stay - Surgical      | 54.33                | 185.42                  |                       | 3.41                   |
| SUR            | Surgical                   | 477.33               | 2033.03                 | 7.00                  | 4.26                   |
| <b>TOTALS:</b> |                            | 825.33               | 3566.36                 | 16.00                 | 4.32                   |