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THE DYNAMICS OF LOCAL RULES IN HOSPITAL ADMISSION PROCESSES

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Abstract

This paper reports on research into admission practices at a hospital that provided sub acute extended care. A System Dynamics model of the patient flow through the hospital was built to show the impact of the local rules used by the medical registrar. Local rules are behaviours that are local, and often idiosyncratic, adaptations to the local environment. Such adaptations can have a significant impact on organisational performance.

In the hospital, patients were admitted from two large acute hospitals and from the community sources, into two different streams of care a within the hospital. The process by which they were selected for admission set for up the dynamics of patient flows within the hospital. These dynamics involved the acuity of the patients and the demands they placed on the medical systems within the hospital. Hospital funding in Victoria is based on length of stay and occupancy rate. The types and acuity of patients being admitted had a profound influence of these funding bases. The local rules used by the medical registrar, in turn, had a profound influence on the types of patient being admitted. The System Dynamics model demonstrated the impact of these local rules. During the process of building the model, it became clear that neither the medical registrar, nor senior administrators within the centre understood the impact of the local rules.

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INTRODUCTION

Hospitals in Victoria, Australia are funded on a case mix formula. Sub acute aged care and rehabilitation hospitals are funded by streams of care on a per diem basis. Service targets and funding are renegotiated each year with an increasing emphasis on length of stay and bed substitution with domiciliary-based services. This paper discusses the experience of group modelling (Andersen and Richardson, 1980) that resulted in a System Dynamic Model and the identified the impact of the use of local rules used by the medical admitting officer.

DEFINITION OF THE PROBLEM

The management of bed occupancy in a sub acute extended care facility had shown substantial variation over a period of 12 to 24 months. Planned and unplanned bed reductions, the ability to access two acute beds in a feeder hospital and bed substitution with continuity of care had all impacted on the wait list which often had no patients listed for admission.

A reduction in the waitlist resulted in empty beds or transfer of patients from the acute feeder hospitals earlier in their recovery from their acute illness (Walker and Haslett, 1999) with a consequent increase in patient acuity. This increase in acuity led to an increase in the transfer of patients back to the acute hospital for readmission for management of an exacerbation of their illness. It was also common for the patient to be transported back to the acute hospitals on a daily basis for extensive clinical tests prescribed and scheduled prior to admission to the sub acute hospital. The costs were now borne by the sub acute facility.

Another factor impacting on the waitlist was the decreased wait times for discharge of patients requiring long-term residential care. The number of patients waiting had drastically reduced over a three-year period and this had a similar impact, to that of declining wait lists, on case mix and the acuity of patients.

There were clearly factors at the referral (pre-admission), the admission and separation point of the sub-acute inpatient process that were impacting on the rate of admission and bed occupancy so a decision was taken to examine the processes and test alternative scenarios.

PROJECT METHODOLOGY

The methodology used in this project was System Dynamic Modelling using the computer based simulation modelling package *ithink*. The success of this approach in simulating public and private sector policy issues has been reported extensively in the literature over the last twenty years.

There were four main reasons for using this simulation-modelling package.

1. **Feedback**

   Models built using *ithink* were capable of capturing the systemic complexities generated through feedback processes. This was particularly important in understanding the way in which the network responded to changes within the network itself.

2. **Management involvement**

   The technique for model building involved group model building techniques, where a specialist modeller worked with managers to elicit the structure to be modelled. The intention here was to ensure that the model reflected the actual structure to be modelled and to ensure ownership of the model by the end user.

3. **Useability**

   The model provided a user-friendly interface that could be used by managers with minimal or no experience in systems modelling. Run time versions of the model could also be made available to managers who were interested in improving the system.

4. **Scenario Testing**

   The user interface allowed managers to run multiple "what – if" scenarios where the parameters of the system could be changed to test the impact on the total system.

Experience has shown that while there may be modelling experience within the management of an organisation, such managers rarely have time to devote to building models. The first author had experience in using modelling as a change process and provided the link between the second author who was the modeller and the staff. The role is defined as the gatekeeper in the literature by Richardson and Andersen.

To move the model building process forward two weekly meetings were held with the management and clinical staff responsible for bed management.

THE STREAM OF CARE SIMULATION MODEL

This model was designed to test a series of scenarios based on policy options for the hospital. The model captured both structural and behavioural aspects of the hospitals operation. The structural aspects involve alterations to the configurations of bed allocations to various streams of care. Because of feedback and feed forward impacts, the simple allocation of extra beds to any one stream will have significant implications for other streams of care. Differential levels of funding make it important that such outcomes are well understood.

The second aspect the model captures is behavioural. The "local rules" or work practices, that is the way in which policies are actually put into practice by key individuals, are also modelled. In this situation, the rules used by the Medical Registrar for the queuing and admission of patients from various feeder hospitals were thought to have wide spread implications for patient flow and funding. Historically, these rules had varied from Registrar to Registrar. Given the relatively short tenure of Medical Registrars, it was important to model and understand these behaviours which dictate the mix of patients the hospital must deal with. The differential levels of funding and different demands that patients in different streams place on the hospital make this aspect as important as the structural.

The simulation models three streams of care: Rehabilitation (Rehab), Geriatric Evaluation and Management (GEM) and Booked Respite. Nursing Home Type (NHT) is a subset of GEM. The inflows to each stream of care are modelled on historical data and are admitted according to the priorities set by the Registrar. For GEM the priorities are TNH Acute, Community, Acute Hospital 1 (TNH) General and Other. For Rehab, the priorities are TNH General Admissions and long term Acute Hospital 2 (ARMC), ARMC short term and then Community and Other. A simplified model is shown in Figure 1.

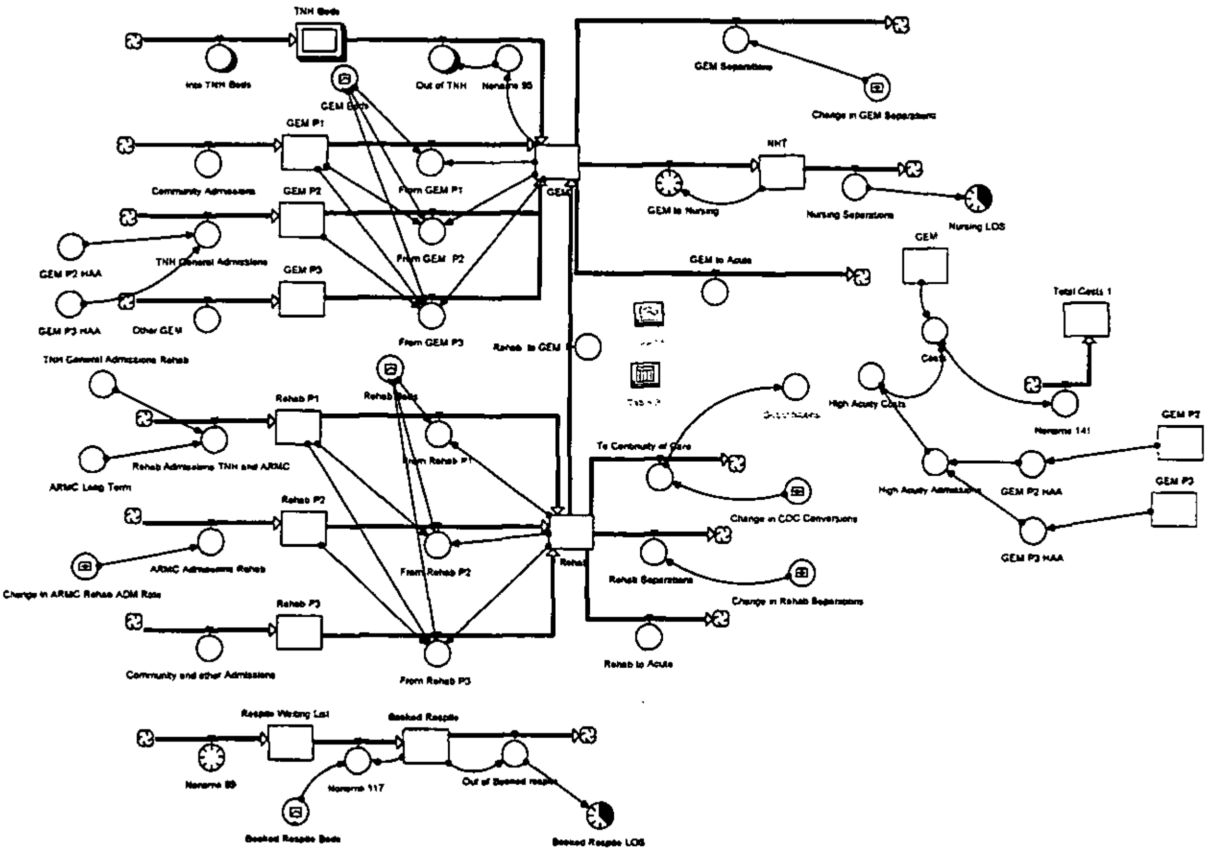


Figure 1: Simulation model of patient flow.

The outflows are modelled by destination. GEM separations are back to the community, back to acute care and to NHT. Rehabilitation separations are back to the community, back to acute care and to continuity of care (CoC). For the purpose of this paper, the behaviour of the GEM patient flow has been modelled.

ASSUMPTIONS

While the model is based on historical data, the data has been aggregated for the model using June 98 - May 99 data providing a total of 11 months. This data was averaged to give average admission and separation rates. These rates are then generated using a random number generator to produce average figures per month. This method has produced results within 1-2% of the historical data.

LOCAL RULES

Local rule behaviour derives from theories in evolutionary biology that suggest that behaviour based on the adaptive interactions between agents. These behaviours are designed to make the local environment of the agent stable and predictable. When successful these behaviours can be generalised over wide localities. In the biological sense, success is relative to the individual agent. However, in large organisations such individual success may be detrimental to the overall well-being of the organisation.

In this situation, the local rules were specific to one individual, the medical registrar responsible for hospital admissions. This position was rotated on a six monthly basis which meant that there was considerable variation in the admission policies from one registrar to the next. Given the way the hospital is funded, flow of patients from admissions is critical to the ability of the hospital to meet its budget.

The medical registrar at the time of the study had a policy of admitting patients from the community, that is patients under the care of private doctors, before admitting patients from feeder hospitals. The use of this priority system had the effect of establishing three separate and prioritized wait lists. The reason for this was simple. The community-based patients had nowhere to go while patients in the feeder hospitals were in a supervised medical situation. This was a perfectly well justified policy option medical perspective.

However, the dynamics of the situation were, in fact, detrimental to the hospital where the response of feeder hospitals to the queuing priorities made it to maintain patient flow, and the 100% occupancy of the hospital beds. The feeder hospitals developed two local rules of their own in response to the medical registrar's local rules. The first was to multiple list patients on a number of wait lists and the second was to move high acuity patients into the sub-acute hospital. The causal loop diagram in Figure 2 shows the dynamics of the situation.

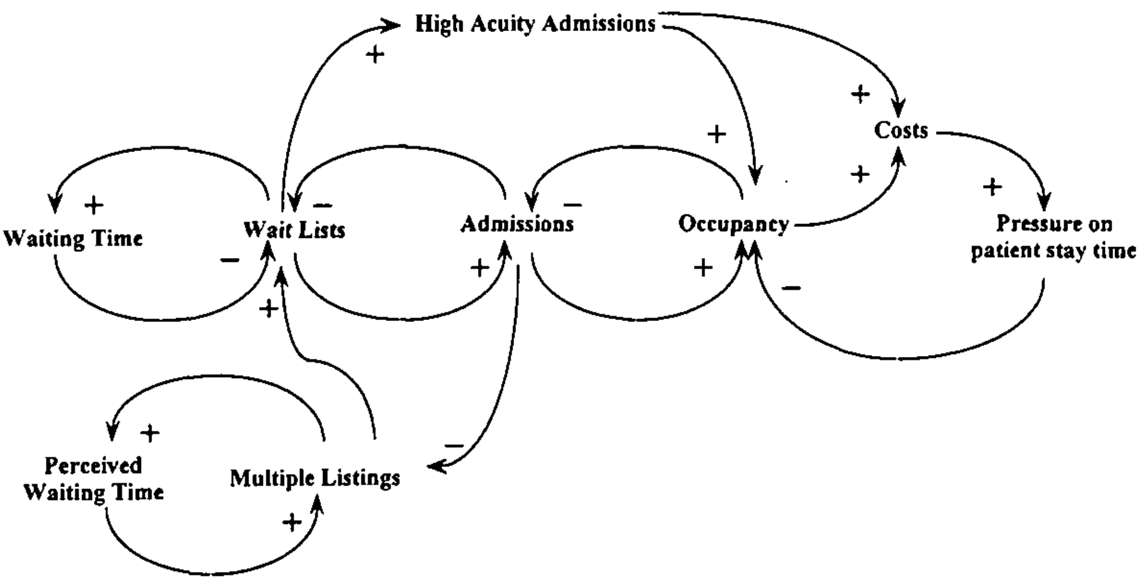


Figure 2. The impact of wait lists on multiple listings and high acuity listings

The wait lists are central to this dynamic. Hospital admissions drive wait lists down, and short wait lists reduce the waiting time of patients. However, as wait lists grow so do waiting times and as this happens patients, who are often on multiple waiting lists, find alternative care in other hospitals. Multiple listing produced highly unstable wait lists as patients were withdrawn as alternative care was found. This exacerbated the problem of aged patients being withdrawn because they recover or die. This is shown diagram Figure 3 which is a more detailed representation of the dynamics of the wait lists.

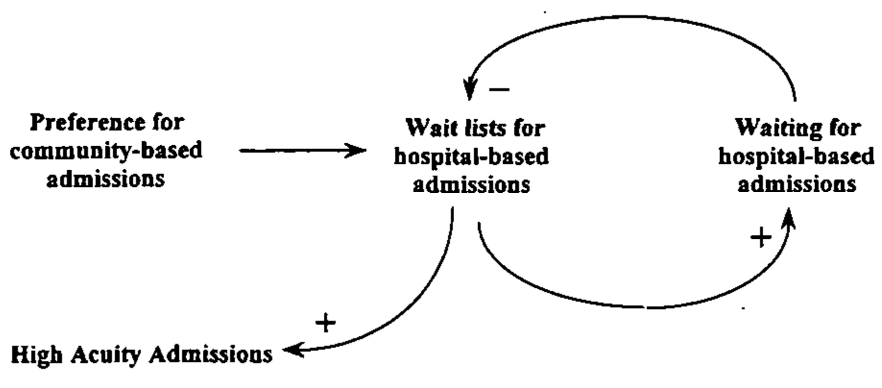
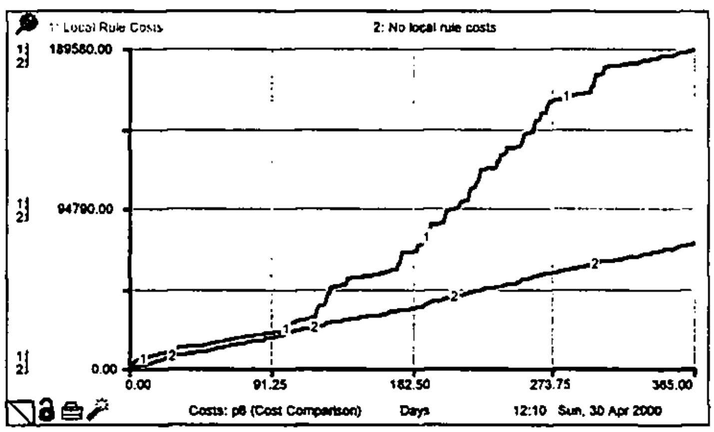


Figure 3. Impact of registrar's local rule on wait lists.

The patients most likely to do this were those of the second and third priority wait lists from feeder hospitals. When the feeder hospitals recognized that the wait lists for the second and third priority feeder hospitals had declined, they moved high acuity patients on to the wait lists of the sub-acute hospital. These patients required the level of care above that which the hospital was funded for. As these patients appeared on the wait lists when the wait lists were short, the hospital was obliged to admit them to maintain occupancy rates.

The system dynamics model that was built to simulate these local rules demonstrated the impact that the medical registrar's behaviour had on the budget process of the hospital. Figure 3 shows the budget variance as a result of the local rule, short wait lists and the admission of high acuity patients by comparing the medical registrar's local rule of prioritizing wait lists with a model where patients are admitted from a single un-prioritised wait list. This second policy maintains wait lists at a level that effectively short-circuits the feeder hospital second local rule of moving high acuity patients onto the wait list of the sub acute hospital.

The importance of this variance is that the hospital is only funded for occupied beds. When beds are vacant there is no funding for that bed. However if patient costs rise above the budget at the level the hospital is not reimbursed for those costs. It is therefore a great importance to maintain occupancy and 100% of the agreed and budgeted level and to contain costs to a point equal to, or lower than, the budget cost. Figure 4 shows the variance from budget of the local rule policy and the un-prioritised policy is continued over a year.



The difference in the variation is $133,000 over a year making the local rule less cost effective. Table 1 shows cost of the local rule is a 6% overrun on budget where as the no local 3% under budget.

	Budget	Variance	Total Cost	Against budget
Local rule	2367390	200,880	2,431,640	+ 6%
No local rule	2367390	77,840	2,286,760	- 3%

Table 1. Performance against budget of local rule.

Figure 4 shows the impact of the high acuity patients whose cost was 80% higher (and unbudgeted) than the normal GEM patients.

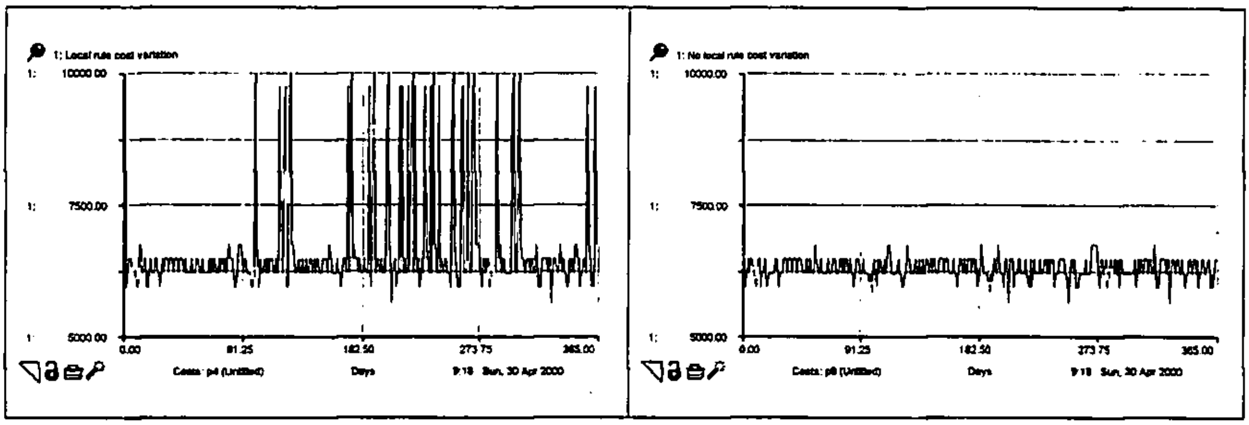


Figure 4. Comparison of cost variation.

CONCLUSION

The simulation demonstrates that the local rule used by the medical registrar would cause a budget over-run. Had the local will not been used, the hospital would come in under budget. The medical registrar was exercising professional judgement in the matter waiting lists. This judgement is made without reference to the financial implications. This was an aspect of hospital administration which the medical registrar was, quite rightly, not concerned. However, the simulation suggests that this single decision on the matter of admission priorities would cause a 6% budget over-run over a year. One of the key issues for the effective running of hospitals will be the maintaining of the balance between professional judgments of medical practitioners and the costs of these judgments.

The local rule used by the medical registrar would be relatively transient, as the position is rotated on a six-monthly basis. This means that a new local rule could easily be a place with next medical registrar. The systemic impact of any new local rule is completely unknown. However, it will have impact, as local rules in one domain will always produce local rule behaviours in another domain. This was seen in the feeder hospitals responses to the medical registrar's local rule. The challenge for the hospital administration is to be aware of, and manage, these local rules, particularly those generated in the domain of the professional judgement medical practitioners. This is a domain hospital administrators venture with justifiable caution.

This study also demonstrates the effectiveness of group modelling techniques which combine the expert knowledge of "systemic insiders" with that of a System Dynamics modeller. Without this combination would not be possible to understand implications of behaviour straight in this case.

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