MONASH University

Peer assisted learning in undergraduate clinical medical education: a mixed methods study

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Abstract

Peer-assisted learning (PAL) involves students learning with and from each other. PAL activities may be informal, or undertaken formally in a curriculum, with or without educator facilitation. Reports on PAL in medical education suggest its value can extend beyond technical knowledge gain, to development of broader professional skills. However, the literature largely focuses on the value of PAL in the university environment, rather than how it occurs in the clinical context.

Medical students at Monash University are required to engage in PAL in their pre-clinical years. The researcher's experience as learner and teacher suggested students also formulated PAL strategies for clinical placements. However, activities were not formalised and unlikely to be optimised. This research aimed to identify students' and educators' use and perceptions of PAL during clinical placements to develop recommendations for PAL in clinical settings,

A tri-phasic study was designed using Biggs' Constructive Alignment as a framework to characterise students' PAL experiences, examining the intended, enacted, and perceived curriculum. Year 3 was the focus of the study, as this first clinical year contains many unstructured learning opportunities which may afford PAL. Research methods comprised a curriculum map (Phase 1), student survey and an observational study of the students on their clinical placements (Phase 2), and interviews with experienced educators (Phase 3).

Whilst the curriculum map identified few explicit learning objectives relating to PAL, students reported participation in PAL activities during clinical placements on average 20 times per week. Observations supported this reported frequency of peer interactions: two-thirds of students' time was spent in the company of peers. Survey and interview data revealed students valued teaching and feedback from peers, but doubted the accuracy of peer-generated information. The roles of 'feedback giver' and 'observer' were less valued by students. Significantly more female students reported that PAL contributed to a safe learning environment than males. PAL activities were reported to contribute to students' evaluative judgement: the comprehension of and ability to judge performance against notions of quality. Educator involvement was perceived to be a key ingredient for successful PAL. These data were used to develop a PAL Activity Matrix, which identified activities students could partake in within a clinical environment to optimise their learning.

In Phase 3, expert educators reported the study findings resonated with their own broader experience of PAL in clinical education. The activity matrix was confirmed as representing ideal strategies. Potential barriers and facilitators to the uptake of PAL were illuminated.

These ‘real world’ considerations for culture, epistemic authority, and patient-centred care were included in the resultant implementation framework for PAL.

This comprehensive study informs the current discourse on PAL in clinical medical education. It identifies barriers and facilitators to PAL, and presents strategies to improve the value of PAL. Future work could test the effect of PAL strategies on students’ clinical capacity, including technical competency, professional and communication skills, and preparedness and ability to teach. The use of PAL could also be examined in a broader range of clinical environments, at both undergraduate and postgraduate levels.

Publications during enrolment

Presentations arising from thesis work

Tai, J. Canny, B. Haines, T. Molloy, E. Engaging Medical Students in Peer Assisted Learning on Clinical Placements. ANZAHPE Conference 2013, Melbourne, June 24-27 (PeARLS presentation)

Tai, J. Canny, B. Haines, T. Molloy, E. Medical Students' Use of Peer Assisted Learning on Clinical Placements. AMEE Conference 2013, Prague, August 25-28 (ePoster)

MONARC Peer Learning in Clinical Education Seminar, 4 June 2014, joint seminar presented with Samantha Sevenhuysen

Tai J, Haines T, Canny B, Molloy E. Peer learning on clinical placements: what have students taught themselves to do? ANZAHPE Conference 2014, Gold Coast, July 7-10 (Oral Presentation)

Tai J, Canny B, Haines T, Molloy E. Peer Assisted Learning on Medical Clinical Placements: An observational study. AMEE Conference 2014, Milan, August 30 - September 3 (Poster)

Tai J, Canny B, Haines T, Molloy E. The development of medical students' evaluative judgement through peer learning on clinical placements: a mixed methods study. ANZAHPE 2015 Conference, Newcastle, March 29-31 (ePoster)

General Declaration

In accordance with Monash University Doctorate Regulation 17.2 Doctor of Philosophy and Research Master's regulations the following declarations are made:

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

This thesis includes one original paper published in peer reviewed journals and five as yet unpublished publications. The core theme of the thesis is *peer assisted learning in undergraduate clinical medical education*. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Health Professions Education and Educational Research (HealthPEER) unit, under the supervision of A/Prof Elizabeth Molloy, Professor Ben Canny, and Professor Terry Haines.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of Chapters 2, 5, 6 and 7, my contribution to the work involved the following:

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
2	Effects of same-level PAL in medical clinical placements: A narrative systematic review	Submitted to *Medical Education*; under consideration after revision	Led the conception of the study, undertook data collection, led data analysis & synthesis, drafted and prepared the manuscript for publication; 85%
5	A study of medical students' peer learning on clinical placements: what they have taught themselves to do	Published in the *Journal of Peer Learning*	Led conception of the study, formulated study tools, undertook data collection, was main analyser of data both quantitative and qualitative, drafted and prepared the manuscript for publication; 85%
5	Gender matters: students' perceptions of peer learning in clinical education	Submitted to *Focus on Health Professional Education*; under review	Led conception of the study, formulated study tools, undertook data collection, was main analyser of data, drafted and prepared the manuscript for publication; 85%
6	Identifying opportunities for learning: an observational study of medical students' use of peer assisted learning on clinical placements.	Submitted to *Teaching and Learning in Medicine*; under review	Led conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication; 85%
6	Building evaluative judgement through peer-assisted learning: opportunities in clinical medical education	Submitted to *Advances in Health Sciences Education*; accepted pending minor revisions	Led conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication; 85%

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
7	The development of a framework to support 'real world' implementation of peer learning in medical clinical education	Submitted to *Medical Teacher*; under review	Contributed to conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication; 85%

I have not renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Student signature: [redacted] Date: 20 August 2015

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student and co-authors' contributions to this work.

Main Supervisor signature: [redacted] Date: 20 August 2015

Acknowledgements

Much like the students I describe in this thesis, I would not have learned as much, nor completed this work, without the assistance of others.

The people who have provided scaffolding and structure must be acknowledged first. My supervisors, Associate Professor Elizabeth Molloy, Professor Ben Canny and Professor Terry Haines, have provided guidance in my research program, even from before the start of my doctorate.

My family have also modelled and provided the scaffolding to enter academia: thank you for encouraging my curiosity from an early age, and demonstrating that anything is possible, if I set my mind to it.

Knowledge is socially constructed by and within communities of practice. The communities [of practice] that I have been a part of over the past three years have also supported me through my PhD: thanks to all the wonderful people at HealthPEER and the doctoral group, who have celebrated and commiserated with me. Special thanks goes to Charlotte Denniston for being head proof-reader, and catching the micro-level errors in this document.

Thanks also to those who provided me with distractions and alternative tasks, so that I could return to my PhD with renewed interest: the Monash University Philharmonic Society, the friends I have made through swing dancing, and not least, my housemates.

Abbreviations & Glossary

CH	Children's Health
DE	Data extraction
GP	General Practice
HMO	House Medical Officer, also a Junior Medical Officer: graduates of a medical degree who have not yet entered a speciality training program.
MBBS	Bachelor Medicine/Bachelor of Surgery, the qualifying degree to be registered as a medical practitioner
NTS	Non-technical skills
OSCE	Objective Structured Clinical Examination, a practical examination involving a number of short "stations" (usually 8-10 minutes) where students are assessed on a specific task, e.g. taking a focussed history from a patient, performing some short patient education, or performing a focussed examination, injection technique
PAL	Peer assisted learning
PBL	Problem based learning, a commonly employed integrative learning method used in health professions education, where students in groups collectively decide on learning objectives and share information to "problem solve". This interaction is facilitated by a tutor who may or may not have specific content knowledge.
Psych	Psychiatry
PsycINFO	Bibliographic database for journal articles in the fields of psychology, behavioural and social sciences, run by the American Psychological Association
QA	Quality Appraisal
RCT	Randomised Controlled Trial
WH	Women's Health

Researchers mentioned in this thesis

BC	Ben Canny, associate supervisor
EM	Elizabeth Molloy, main supervisor
JT	Joanna Tai, author of this thesis & PhD candidate
TH	Terry Haines, associate supervisor

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Chapter 1
Introduction

There is universal acknowledgement among medical associations and governing bodies across the world that teaching skills are a valuable asset to physicians.

(Marton, McCullough, & Ramnanan, 2015)

Chapter 1 Introduction

Context

Whilst the teaching of medicine at universities has occurred for centuries, educators are constantly striving for improvement (Walsh, 2013). Clinical placements are a necessity for the experiential learning process (Yardley, Teunissen, & Dornan, 2012), however the optimal configuration for this experience has not yet been identified. This is partially because it is less clear how learning is undertaken in the "black box" of the clinical environment (Dornan et al., 2014). When transitioning to the clinical setting from the university environment, students are grappling not only with new material to learn, but a new environment in which to learn it. Though the university campus is somewhat different to school[1], it is not unlike school where learning is mainly theoretical with some practical components. The support of fellow students could be crucial at the transition to a workplace-based learning environment. Peers may provide motivation and assistance in the experiential learning process, when senior clinicians and supervisors (whom students are told to seek) are unavailable.

Peer assisted learning (PAL)[2] has been defined as "people from similar social groups, who are not professional teachers, helping each other to learn and by so doing, learning themselves" (Topping & Ehly, 1998, p. 1). This thesis focuses on the use of PAL, with an aim to better understand the *what*, *how* and *why* of PAL in clinical medical education. The research for the thesis has been undertaken within the Monash University Bachelor of Medicine/Bachelor of Surgery (MBBS), an undergraduate medicine degree, which, on award, confers eligibility for registration as a medical practitioner in Australia. This introductory chapter outlines the study setting to afford the reader an understanding of the current incorporation and recent developments in PAL within the MBBS program, the positioning of the researcher as part of this environment, the aims of the research, and an overview of the remainder of the thesis.

Study Setting: The Monash MBBS

At Monash University, the MBBS is awarded after five years of horizontally and vertically integrated study. The course consists of teaching in four themes: Personal and Professional Development; Population, Society, Health and Illness; Scientific Basis of Clinical Practice;

[1] attendance is not strictly compulsory; the structure of learning opportunities is different
[2] Throughout this thesis, this concept of peer learning may be referred to as PAL, or peer learning.

and Clinical Skills. The first two years (pre-clinical) are spent on campus, while the latter three years (clinical) are spent at hospitals, on core clinical rotations.

A graduate-entry equivalent program was also introduced in 2008 with Years 1 & 2 combined into an extended 'Year A'with students then continuing on to do Years 3-5, with the corresponding nomenclature of Years B, C and D. The two programs originally ran in parallel with little crossover between cohorts. Graduate students were based at Frankston hospital for their clinical placements in Years 3B and 4C. Clinical cohorts were later combined, and all students were able to access all clinical rotations across a number of metropolitan and rural sites (Monash University, 2015a).

There are written and practical examinations throughout Years 1 to 4, and a 'Clinical Knowledge Test' in Year 5 to ensure that students have sufficient knowledge to graduate. Two additional 'Vertically Integrated Assessment' written examinations at the end of years two and four assess students across all the materials they have previously covered. The curriculum is a patient-centred hybrid of lectures and small group learning, with Problem Based Learning (PBL) used throughout the five years to integrate learning from the four themes (Monash University, 2013).

Monash University medical students spend the majority (three of four or five years)[3] of their undergraduate degree on clinical placements. Numbers of students have increased over the last decade, reducing the staff: student ratio and formal clinician-led teaching opportunities on placements (Health Workforce Australia, 2011). Despite these changes, expectations for student learning on clinical placements have not significantly changed over time. For their entire third year, students are placed at one hospital site, with rotations to different medical and surgical disciplines of four to six weeks' duration[4]. Though the previously established model of weekly PBL tutorials and didactic lecturing is continued for one day per week, the clinical years represent an upheaval in the learning environment, with less visible educational structure and support, and a growing expectation for students to be proactive in seeking learning opportunities (Dornan, Hadfield, Brown, Boshuizen, & Scherpbier, 2005). Clinical bedside tutorials, and student attachments to ward teams, where they participate in 'work' activities (Byrne & Cohen, 1973), are still considered the mainstays of clinical learning. Students may not be sufficiently equipped to cope with

[3] three of four years for graduate entry students

[4] In students' penultimate year (i.e. Year 4 for undergraduate students), time is split across hospital-based rotations in women's health, children's health and psychiatry, and clinic-based education in general practice, with additional on-campus learning. In their final pre-intern year, students undertake core rotations in medicine, surgery, emergency medicine and aged care (which are largely hospital based), with a speciality rotation and elective rotation of their choice. The majority of students' clinical years are therefore spent in hospital based placements, with some outpatient clinic experience included within this time.

learning independently in a clinical environment. Therefore, this model of clinical education may lead to inefficient student learning on placements, as their unsupervised and undirected time increases (Dornan et al., 2005).

PAL is interwoven through all aspects of the Monash University MBBS course. Formal PAL manifests predominantly as peer collaboration within the PBL setting. Peer modelling, observation and feedback are also used within clinical skills tutorials both on campus and clinical rotations, and during bedside medical consultations, to engage students in active learning. In addition to core learning activities, there are optional peer study groups supported by the faculty, called 'VESPA' (Vertically Enhanced Study Program Approach)(Kam, Mitchell, Tai, Halley, & Vance, 2010; Kam, Tai, Mitchell, Halley, & Vance, 2013), where students from all year levels are organised into groups for additional and supportive learning. A Student Mentorship Program (Raghunath, Tai, & Zimmerman, 2011), run by Year Five medical students, also exists as a form of peer mentoring for Year Three students, to provide support in the transition to clinical placements and experiential learning. The majority of documented PAL, however, occurs in classroom and preclinical settings, within both compulsory and voluntary activities. Students' PAL practices in the clinical environment are less well defined, and may vary greatly due to differences in experiences with tutors, patients, the structure of the placement and the students' own learning preferences and skills.

A structured PAL model for clinical placements was developed for physiotherapy students by Sevenhuysen et al (2013), and expanded to other allied health placements. A similar model was hypothesised to have potential benefits for medical students. However, it was realised that medical students' experiences are in fact different to other health professions students, as medical students already spend significant time in groups on the wards, especially in their first clinical year. Allied health students also tend to have greater patient management responsibilities, taking on a case load of their own. The responsibility trajectory for medical students is much shallower, with final year students still under heavy supervision and guidance. Therefore, a model assuming no prior interaction, and requiring independent assessment and management of patients, was not seen to be suitable for students with pre-existing and informal PAL practices. It became apparent that prior to any PAL intervention, a study of the nature of PAL interactions between students was required to understand the baseline levels of PAL occurring during clinical placements.

Researcher reflexivity is important in a program including qualitative research, as the researcher is very often a research instrument, and as such, previous pre-conceptions and opinions may influence the investigation and reporting of a phenomenon. The following

section of this chapter positions the researcher in respect to the research phenomenon, PAL, by detailing the researcher's prior involvement with PAL activities within the Monash University MBBS, both as a student, and as a graduate and educator.

A personal experience of PAL

Peer assisted learning is a very familiar concept, as I have unconsciously and consciously come across it many times through my formal education. I cannot accurately recall the first time I became involved in peer assisted learning. While it could have been as early as play group or kindergarten, my first memories of peer teaching were from Grade 6, my final year of primary education. I helped my schoolmates with their maths problems, attempting to explain fractions and guide them through the process of summing two numbers with different denominators together. In high school, I wrote a set of notes that followed the chemistry syllabus to the letter, which I was told were useful by my peers. Others developed a set of notes for history, which were also distributed amongst our class. In both of these examples, there may have been more of a benefit for the note-maker than the reader, however. Certainly by writing the chemistry notes and constructing my own knowledge in a tangible form, it solidified my own understanding. For, as many of us know, "to teach is to learn twice"[5].

By the time I started medicine, I was used to the concept of learning with fellow students. Suddenly, I was not miles ahead of everyone else and providing information to others. My peers had nuggets of know-how that I did not possess, due to the vagaries of a distributed learning system, and a greater body of required knowledge. Different tutorials and seminars meant we received different information from our tutors. Sometimes this information conflicted, or two people were familiar with smaller fragments of a larger concept. While occasionally this resulted in some uproar about how we were being educated, we pooled our knowledge to overcome these difficulties, and through doing so, learned that certain knowledge is contestable and context-dependent.

I had a regular study group by the end of my second year of study. There were variously up to eight of us involved, and we were all relatively high achievers. While we did circulate written exam questions, the strength of our group study was in our objective structured clinical examination (OSCE) stations trials, where we each developed one station to deliver to all the others. This type of study managed to get me through all the subsequent years of OSCEs.

[5] Attributed to Joseph Joubert, a French essayist (Ross & Cameron, 2007)

In the clinical years, what we were meant to learn was the ability to interact with patients: to construct a history, conduct an examination, to determine management, to deliver a diagnosis. This again was tested partially through the OSCE mechanism. With a number of methods to elicit a tendon reflex, and a variety of sequences in which to perform the various tests comprising a peripheral nervous examination, how were we to know which one was "correct" in the eyes of our examiners? What was best for the patient? What if there were different opinions? Our only hope was to share this information with each other, practice as many ways and times as we could, identifying the pros and cons of the various approaches. Since my study group were now dispersed amongst both metropolitan and rural sites, we were able to share a broader range of experiences with each other.

I was also aware that not all students recognised the value of PAL. Perhaps they thought that they could study better on their own, with fewer distractions, and a quiet environment: our sessions were frequently noisy and punctuated by food and gossip breaks. Perhaps they were too afraid, or shy, or lacking in confidence, to expose their skills in front of others. Some did not feel safety amongst their peers. These might have also been the students who could probably have used a bit of peer support and bolstering before encountering the expert gaze of the examiners, charged with the decision of competence. Perhaps they did go away and practice with friends from other clinical sites, unbeknownst to me? This might have been even more of an advantage, as I discovered with my own group.

During my time as a medical student, I also had a founding role in VESPA - the Vertically Enhanced Study Program Approach. I was brought into it by one of my 'study buddy' seniors (when we had a year 1 & 2 study group[6]), who thought I would like to get involved in organising a larger program of peer learning. This program not only promoted within year level learning, but had the ambition to involve all five years of the Monash MBBS in a single learning activity. The learning activity would be constructed like a PBL, and have sections aimed at different year levels. Students would share their knowledge, which ultimately 'solved' the case. This venture commenced in 2008 with some seed funding, and is still running today. While I was initially on the original working party, since 2012 I have been one of the co-chairs (the other is also a graduate of the Monash program). In this role, I supervise a committee of medical students to co-ordinate the case nights, and have become the link between each year's committees. These case nights, as it turns out, are both an academic activity, and a social one: the social connections between

[6] The "study buddy" groups were either self-appointed, or could be organised by the faculty. This was an optional but official co-curricular activity.

students are perhaps even more important than the learning, for these students will become doctors who will one day have to work together. In the busy and stressful clinical world, every face that is recognisable is one less obstacle that junior doctors have to face, and may even be of assistance.

In my intern year, my first year after graduation, I realised that clinical practice, for me, was not as attractive as I'd hoped. The environment which I had chosen was challenging, with a lack of support and structure, and I was discouraged. I found myself wanting to return to the field of medical education which I had previously explored through my Honours project on feedback in clinical medical education[7]. I therefore eagerly took up this opportunity to further investigate how PAL could be used better in an undergraduate MBBS program, and specifically, the MBBS program which I'd been a part of and still had links with. I saw many problems and issues with the state of clinical medicine and its training programs. Importantly, I saw an opportunity to have a greater effect on the hierarchy, bureaucracy and work pressure which contributed to a lack of peer support, communication, and a willingness to share, than I could exert as a single junior HMO[8].

Of course, I am explaining my interest in peer learning now, after over three years of reading, reflection, investigation, and analysis of data. I am armed with the names of theorists, and have absorbed some of their thinking when making sense of data from learners and educators. It's possible that at the time, I saw a peer group as the way to strategically learn more efficiently than having to think up exam cases and practice only by myself. Just like wanting to peek at the answer section before committing to a multiple choice answer, I was aware that I couldn't truthfully assess myself, and all my weaknesses, and required additional sets of eyes to improve my skills and keep me on task.

Even during my doctoral studies, long after the topic of peer assisted learning was proposed, and accepted, I have been an active member in, and now co-lead, my department's doctoral group. Its purpose is to support doctoral students throughout their studies: to provide a testing ground for upcoming milestone seminars and conference presentations; to allow us to vent, and admit our concerns, fears, and potential shortcomings; to help each other find solutions; and to provide a forum for conversation about our research process and progress that others might not be able to relate to so easily. While we may provide each other with scholarly advice and references to relevant theories, ultimately, without all the academic trimmings, we would be a group of peers, meeting to

[7] Bachelor of Medical Science (Honours), Thesis title "*Improving medical students' experiences and perceptions of feedback in clinical medical education: an inquiry and focussed educational intervention*"
[8] HMO stands for House Medical Officer, however the full version is hardly used in clinical parlance.

support each other, and that in itself is valuable. To know that there are people you can rely upon in times of difficulty is incredibly important when tackling big or new tasks.

Since I commenced my doctoral research, I have also been involved in the MBBS as an educator. I was recommended (by a peer, who was then a colleague at the hospital I worked at) to take up the position of first year medicine tutor at Mannix College, the residential college associated with Monash University. My encouragement of peer learning in this role led to the establishment of peer study groups within the college, and students reported they found this more useful, and indeed, preferred it to the more didactic tutorials I ran. I have also acted as an examiner in the medical student OSCEs, and had the chance to observe the performance of some of my tutees[9].

Overall, in my own experience, I have found and observed that learning from and with peers has supported me in my work endeavours. Without an empirical evidence base for the widespread use of PAL, especially in the medical world, where hierarchy still dominates interactions[10], this useful and advantageous form of learning might remain underutilised. That is why this thesis exists.

Research aims

This research aims to examine the phenomenon of PAL in the clinical learning environment, as enacted by third year medical students in the Monash University MBBS course. The study uses mixed methods to examine the PAL experience of students in their first clinical year, through questionnaires, in situ observations of students in the clinical learning environment, and interviews and focus groups with both learners and clinical educators. Broadly, the research seeks to create a typology of PAL as enacted in undergraduate clinical medical education (i.e. *how* students enact PAL, *when* they use it, and *why* they use it).

The overall aims of this research program were to:

- Describe the effects of same-level PAL in undergraduate clinical medical education
- Discover students and educators' attitudes to PAL in clinical medical education (i.e. perceptions of the impact of PAL on learning)
- Describe the frequency and nature of PAL activities on clinical placements

[9] While this may seem a conflict of interest, it is the practice of the University to invite all tutors to examine students, and standardisation of marking is enacted through benchmarking videos.
[10] Hierarchy does not exist without its own good reasons, but can sometimes be more prohibitive than facilitatory

- Determine facilitators and barriers to using PAL in the clinical environment
- Examine if and how students' PAL practices in the clinical environment change over time

Thesis overview

This thesis describes a program of research designed to elicit the perceptions and experiences of Monash University Medical Students and their educators, in relation to PAL. The specific focus is on students' first clinical year, Year 3. This chapter, the introduction, has served as an orientation to the context of the research from a theoretical perspective, but also from within the medical program at Monash University, and experiences of the researcher which have provided an impetus for this research (and how these experiences have influenced the research process). The overall aims of the research have been defined.

Chapter 2 will provide a more comprehensive background on theories of learning for medical students, including the position of peer assisted learning within medical education. This chapter will include a systematic review (in the form of a paper submitted, with invited revisions) on the effects of peer assisted learning in clinical medical education. This information will assist in describing the methods chosen to achieve the aims for the research.

Chapter 3 will outline the methodology underpinning the research, including an overview of ethnography, as the guiding research methodology. The concept of constructive alignment will be introduced as an overarching framework and rationale for the research phases. The project design will then be discussed, including the development of survey tools and interview questions. A description of predominant analysis methods will be outlined to prepare the reader for the results chapters, which are ordered according to the study phases.

Chapters 4, 5, 6 and 7 contain the results of the research program. As this is a thesis *with* publication, while Chapter 4 functions as a traditional thesis chapter, Chapters 5 and 6 contain two publications each, while Chapter 7 contains one publication, with additional accompanying orienting material. These chapters collate the results arising from each study method, with successive chapters building upon the results of the previous chapters in an iterative fashion to build the argument for the use of PAL.

Chapter 8 then draws together the work from the previous results chapters to develop overarching recommendations for the implementation of peer learning in clinical education.

Chapter 9 is the final chapter of the thesis and summarises the work. It includes the strengths and limitations of the research program, suggests future areas for investigation, and makes a final conclusion regarding the place of peer assisted learning in undergraduate clinical medical education.

Chapter 2
Background

Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other.

(Freire, 1970, p. 72)

Declaration for Thesis Chapter 2

Declaration by candidate

In the case of the publication in Chapter 2, "Effects of same-level PAL in medical clinical placements: A narrative systematic review", the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Led the conception of the study, undertook data collection, led data analysis & synthesis, drafted and prepared the manuscript for publication.	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Elizabeth Molloy	Contributed to the conception of the study, assisted with data extraction and analysis, assisted in the drafting of the manuscript	n/a
Ben Canny	Contributed to the conception of the study, undertook data extraction and analysis, assisted in the drafting of the manuscript	n/a
Terry Haines	Contributed to the conception of the study, especially methodology, assisted with data extraction and analysis, assisted in the drafting of the manuscript	n/a

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's Signature: [redacted] **Date:** 20 August 2015

Main Supervisor's Signature [redacted] **Date:** 20 August 2015

*Note: Where the responsible author is not the candidate's main supervisor, the main supervisor should consult with the responsible author to agree on the respective contributions of the authors.

Chapter 2 Background

Introduction

The model of medical education has changed from a one-to-one, master-apprentice relationship to a university-based model. In the current Western model of medical education, there are multiple teachers (of both basic and clinical sciences) in the university classroom setting, prior to a range of clinical rotations, again supervised by many staff. Despite the changes to teaching and learning methods, the overall goals of medical education remain the same: establishing knowledge and basic skills required of a medical practitioner, to be able to diagnose and treat patients (Ten Cate & Durning, 2007). The 'gold standard' for medical education is still the experiential learning process.

While medical technology has significantly advanced since the first medical courses were established, the same ideas for curriculum reform have occurred time and time again (Walsh, 2013). Peer-assisted learning, the process of "people from similar social groups, who are not professional teachers, helping each other to learn and by so doing, learning themselves" (Topping & Ehly, 1998, p. 1) has been reported to occur in clinical medical education as far back as the 1970s (Byrne & Cohen, 1973). We cannot claim that peer learning in medicine, or peer learning in the clinical environment is a completely novel concept. Learning interactions between students have occurred since ancient times in Greek and Roman teaching: for example, Quintilian, a Roman orator, pointed out that students would be motivated by and learn from observing others' performance, and that "imitation of their fellow pupils is more pleasant than attempts to imitate the master, for the reason that it is easier" (Quintilian, 1966, p. 27). Peer teaching was commonly used throughout history, to cope with a lack of teachers, and many students. Various formats of schooling arose where a "monitor" was appointed per group of students, to ensure they were attending class and completing their exercises appropriately (Wagner, 1982). As courses and curricula are formalised and evaluated, so too are the educational methods by which they are delivered: hence the move in the late 20th century by educators to define PAL, and explore its potential as a learning method (Topping, 1996).

This chapter traces the development of PAL as a formal learning method, both in respect to the theory supporting current models of medical education, and the published empirical evidence for PAL. It commences by exploring the theories of learning that apply to clinical medical education which forms the context of this study, and the place of PAL in relation to these theories. The historical and current uses of PAL are then considered in

undergraduate (both pre-clinical and clinical) environments. A narrative systematic review of the effects of PAL is presented, including the reported impact on stakeholders involved in clinical medical education, namely students, staff and patients. Dually justified by the researcher's own experiences in PAL as outlined in the introduction, and the research on PAL, this chapter then concludes with the research questions posed.

Theory for PAL

Medical education is, for the most part, workplace based. Yardley et al (2013) advocates in particular that learning in medicine requires authentic experiences. Students are expected to become lifelong learners due to a rapidly expanding and evolving knowledge base (Karakitsiou et al., 2012). Improvements in technology, development of new treatments, and advances in research mean that medical practitioners must continue learning through their career to keep up to date with current practices (Norman, Wenghofer, & Klass, 2008). Universities in Australia are now gravitating towards a graduate-entry model, where students have completed a prior bachelor's degree, and then spend four years in a medical program, firstly learning the requisite basic sciences and introductory clinical skills, before embarking on clinical placements (GEMSAS, 2015).

Peer assisted learning may be an appropriate mechanism not only to learn the skills required to practice medicine, but also to develop skills that aid in lifelong learning (Carless, Joughin, & Mok, 2006). Collaborating and sharing experiences, and reflection on experiences, may aid in overall understanding, expanding an individual's breadth of clinical experience, and may also develop information evaluation and teamwork skills. These skills may be useful in students' future careers, where medical practitioners are reliant on their peers in the clinical environment and also in peer review for research (Page, 2008).

In the clinical years, learning is based in experiences from clinical placements, while the workplace creates a social learning environment. Both experiential and social learning theories may therefore apply. This section of the thesis describes the place of PAL within a range of learning theories that have been used to explain both child and adult learning. Though medical students are adults, the area of knowledge they are entering in clinical practice could be considered to be similar to a child's development of basic motor and language skills. Therefore, links will be made between the theories discussed and clinical medical education.

Experiential learning

Kolb (1984, 2015) drew together a range of experiential learning theories to develop his conception of an Experiential Learning Cycle. This four-part cycle is continuous: a student experiences events, grasps knowledge from this, and internalises this knowledge. Through this internal processing, the knowledge can be attributed to the experience. Extrapolation then allows the learning to be applied to future situations, where further experiences take place. Without this cyclical, reflective process, improvement in basic clinical skills such as history taking and examination would not occur.

Kolb (2015) then went on to describe four particular learning orientations: concrete experience; reflective observation; abstract conceptualisation, and active experimentation, based on the four processes in the cycle. These in turn were combined to form four learning styles. The convergent learning style favoured abstract conceptualisation and active experimentation, which lends itself to problem solving, while the opposing divergent learning style used concrete experience and reflective observation, which is useful for brainstorming and developing alternative points of view. An assimilation learning style used predominantly abstract conceptualisation and reflective observation, which aids in the creation of theoretical models, while the accommodative style uses mainly concrete experience and active experimentation, which is useful when the individual is required to adapt to the situation at hand. When Kolb (2015) investigated students' learning styles in higher education, he found that students who had similar learning styles were more involved with their peer group. This similarity in learning style was hypothesised to be an important component of professional socialisation.

Experiential learning theory was used to explain all types of learning, and it is especially applicable to the clinical medical environment. Students with similar learning styles may gravitate to each other to make the most of their learning opportunities, which may subsequently afford the use of PAL within these groups.

Learning as a social activity

Modern conceptions of peer learning can be attributed to the influence of sociocultural learning theory. Also known as social interactionist, or social construction, these theories all share the same basic tenet that "education is not an affair of 'telling' and be told, but an active and constructive process" (Dewey, 1916, p. 38). This implies active participation in a learning process on behalf of the learner. Vygotsky's (1978) concept of the 'zone of proximal development' suggested that with appropriate scaffolding (guidance and assistance), a child could reach beyond their independent (actual) developmental level to

an additional potential for learning. This concept could also be applied to adult learning from a peer; a student can learn from another as long as that peer has internalised (and can perform independently) that next step or level in development, skill, learning or understanding.

Apprenticeship in thinking

While medical education is typically conceived as a type of apprenticeship, Rogoff (1990) used the metaphor of an 'apprenticeship in thinking' in the cognitive development of children, as an extension of Vygotsky's zone of proximal development. She proposed that learners required guidance not only on participation in activities, but also in how to think about a complex task: children needed to learn and reproduce the same cognitive processes in order to achieve the task goal, and be active participants in their own learning. Modelling of these cognitive processes was found to come from more skilled partners (i.e. adults, or senior peers), peers (of a similar status) could be even more adept at providing parts of this guidance. Additionally, through discussion and argumentation of ideas with peers, the process of coming to an understanding could lead to a "more considered view than either of them contribute independently" (Rogoff, 1990, p. 172).

In clinical medical education, shared language and a generationally distinctive approach and attitude to learning may enable fluid communication of concepts and processes in clinical reasoning, which is a specific type of cognition not previously encountered by medical students. With the demands placed on clinicians, students are more available for interaction, and may be able to assist and guide their peers. It may be that the students closer to, or at the same level as the learner, can undertake explanations more effectively, and through discussion with peers, come to understand complex considerations in patient management.

Legitimate peripheral participation and communities of practice

The use of clinical placements in medical education (over, for example, entirely simulated or theoretical environments) also complies with the premise that learning is situated: that is, it is context-dependent (Yardley, Brosnan, Richardson, et al., 2013). In studies of situated practice outside of medicine, Lave & Wenger (1991) found that the relationship between 'master' and 'apprentice' was less definite, and not necessarily dyadic. There were many apprentices to few masters, and were more often interacting with each other, or more experienced staff termed 'journeymen', than with the master. Lave & Wenger (1991) noted that the progression from a novice practitioner to mastery was mediated by 'legitimate peripheral participation', that is, by initially being involved in low-risk and

peripheral but authentic and important tasks, gradually gaining more responsibility as competence was demonstrated. In clinical medicine, this occurs within the training hierarchy: tasks given to medical students (e.g. fetching the patient files) are important for the work that needs to be done, but it is not a higher risk task that would be better allocated to a resident or registrar (e.g. prescribing medications; performing operations).

All of these individuals together form a 'community of practice', where knowledge is created, held, and transformed within a group (Rogoff, 1994). Whilst the hierarchy of medicine implies a top-down approach, where consultants teach registrars, registrars educate residents and interns, and these junior members of the clinical team take on the responsibility of teaching medical students when they have the time. Frequently, however, information exchanges also occur in the opposite direction, when junior team members are asked to research a topic. PAL fits within this concept: small, stepwise tasks could be taught or demonstrated by those more competent in the skill, even if they belong to the same class or level. Lave & Wenger (1991) also noted that, where a task or knowledge fragment was able to be distributed amongst peers, this was achieved very efficiently, more so, than if the exchange occurred between master and apprentice alone. This was hypothesised to occur because engaging in practice with others was an effective means of learning.

Invitations and affordances in workplace learning and clinical education

Billett (2001), in defining a workplace pedagogy built upon his research of workplace learning (in coal miners, hairdressers, and hospitality), found that learning and working could not be separated, as learning occurred through engaging in work activities. However, he did note that the quality of learning is mediated by the types of activities, support & guidance provided, and individuals' approaches to learning. Work-based learning was found to be highly structured, and informed by what activities actually occurred within a workplace. Stemming from this were the concepts of invitations and affordances: that the learner is only able to participate in what they are either invited to do, or are allowed to do. However, 'just doing it' and participating in work activities was found to be insufficient to develop workers' skills to adapt to new tasks. Workplace learning was also controlled by those operating within that environment, who may have their own motivations for teaching, or not teaching, learners, including being time poor and concerns about the loss of expert status. For example, Billett (2001) reports that skills are 'quarantined' through industrial (i.e. union) affiliations, and this preserves the allocation of specific work activities to individuals belonging to the same group.

Billett (2001) noted that "more than mere engagement in work activities, direct and indirect forms of guidance in the workplace are required to develop the kinds of knowledge required for performance at work" (p 77). While he described direct assistance as coming from more experienced co-workers, about 'tricks of the trade' or heuristics to complete tasks more efficiently, indirect guidance came through observation or listening to peers, experts or others, and also from the physical environment (e.g. where things are), and also helped workers to keep up with changing workplace environments.

Within this model of workplace-based learning, peers may play two roles. Firstly, they may be able to share vital information about where exactly the invitations for learning are (or are not), and secondly, create their own invitations for learning, alongside those afforded by more senior staff. These functions may therefore fulfil the descriptions of both direct and indirect forms of guidance. An orientation to invitations for learning may be particularly useful for medical students who are frequently commencing new rotations, and developing. Additional strategies to interpret environmental cues and opportunities to learn may be advantageous. While this may initially be seen as a disruption to the previous structure of workplace-based learning, and removing control from those who work there, PAL may result in superior learning experiences for medical students.

Social Comparison Theory

Social Comparison Theory (Raat, Kuks, & Cohen-Schotanus, 2010) has been used to explain how medical students benefit in their learning from comparison to those both better and worse than themselves. According to this theory, students preferred comparison with their peers to comparison with residents and tutors, as this gave them the most helpful information about their performance in relation to the level they needed to achieve. This social comparison was seen to work in two ways: the 'carrot' when comparing with better peers, and the 'stick' when comparing with poorly performing peers (Raat et al 2010). Interactions with peers, and learning alongside peers, may increase opportunities for comparison of performance, and therefore improve performance.

Summary

The theories outlined in this section support the notion that PAL may be useful for learning in the clinical environment. Given the practical and situated nature of clinical medical education, which occurs in complex, high stakes, and busy workplaces, peer learning may be an important learning method which affords learners practical experience and opportunities for discussion to challenge, confirm or refine knowledge and skills. Students may find it easier to learn from each other, compared with more experienced others (i.e.

clinicians) and the sharing of their experiences may also enrich their learning. PAL may also alter the nature of interaction between clinician and student: teaching of tasks is allocated to those with the appropriate knowledge, releasing senior clinicians to concentrate on teaching more complex tasks to students. The following section of this chapter provides a typology of PAL, so the nature of PAL interactions can be better understood.

Defining PAL: a typology

PAL is described as a two-way interaction, which "involves participants learning from and with each other in both formal and informal ways" (Boud, 1999, p. 6). This encapsulates both the social aspect of PAL, helping each other to learn, and therefore co-constructing knowledge, and also the experiential aspect of PAL: learning through doing (the doing is the process of helping others to learn). Where students are separated by experience, for example, being one year senior to their peers, this may be considered near peer learning. Through this thesis, the concept of peer learning may be referred to as PAL, peer-assisted learning, or peer learning. However, this does not accurately describe the dimensions of PAL interactions. A further typology of PAL is therefore required.

Types (or activities) of PAL include peer teaching, peer monitoring and observation, peer feedback, peer assessment, peer modelling, and peer collaboration. These activities were observed and reported in the context of children's learning and development. The transfer to higher education has been made in the drive to improve on forms of higher education, with much introspection on the cost-effectiveness and efficacy of traditional teaching methods (Topping, 1996).

Definitions of types of PAL are reasonably well explained by their names. Topping & Ehly (1998) provide a comprehensive typology, summarised here. Peer teaching or tutoring involves a student assuming the role of an information possessor, while another student is positioned as the less knowledgeable learner. Roles may be swapped, as in reciprocal peer teaching (Krych et al., 2005). Peer monitoring and observation occurs when a peer is present, and potentially reporting on, another peer's behaviour, actions, or task completion. Peer feedback goes one step further than observation, and involves a peer providing information on an observed performance. Peer assessment follows on from feedback as a formative evaluative judgement, where a score or grade is awarded by the observing peer, either for tracking and progress purposes, or to count towards an end of term grade. Peer modelling uses a peer as an exemplar for other students, not necessarily with any direct explicit teaching from the peer themselves. Peer collaboration involves

students working together to achieve a common goal. Another term which refers to a form of [near] peer learning is 'Supplemental Instruction', entailing a particular type of structured peer teaching and learning activity, designed to complement traditional teaching methods in 'high risk' courses (Dawson, van der Meer, Skalicky, & Cowley, 2014). Examples of PAL in clinical medical education are presented in Table 2.1.

Table 2.1 Examples of PAL in medical education

PAL type	Medical education example
Peer tutoring/teaching	Amy teaches Bob about the diagnosis of pneumonia using an X-Ray to demonstrate the changes in the lung fields
Peer monitoring/ observation	Bob watches Amy take a medical history from a patient
Peer feedback	Bob discusses Amy's examination technique with her
Peer assessment	Amy rates Bob on his professional behaviour during placements using the criteria-based marking tool provided by the University
Peer modelling	Bob demonstrates how to consent a patient for surgery to Amy
Peer collaboration	Amy, Bob and Carl develop a presentation on diabetes together, to present at their problem-based learning tutorial

Justifications for the use of PAL

Dandavino, Snell & Wiseman (2007) phrased commonly outlined benefits of students learning to be teachers in a practical and succinct manner:

- Medical students are future residents and faculty members who will have teaching roles.
- Medical students may become more effective communicators, as teaching is an essential aspect of physician-patient interaction.
- Medical students with a better understanding of teaching and learning principles may become better learners.

However, this does not consider the benefits of also learning from peers. The hypothesised benefits of PAL in medical education have also been considered as including sharing of information, improved teamwork and feeling of belonging, increasing the confidence of learners, along with cost reduction and efficient use of teaching staff (Topping & Ehly, 1998). Peers are held to be 'safer' companions for 'intellectual risk taking', including revealing emotion, ambiguity and incompetence, compared with teachers or tutors (Ladyshewsky, 2013; Lincoln & McAllister, 1993). Motivation and confidence may be increased, with greater commitment to the task at hand (Topping, 1996). By involving peers, learning may be more participatory and active. Working with peers with less direction from seniors may also build self-directed learning skills, trust, improve evaluative judgement (self-reflection, as compared to peer evaluation), and their ability to partake in

productive team work (Boud, Cohen, & Sampson, 2001; Carless, 2013a; Wood, 2003). These are all qualities necessary to become an effective medical practitioner. While there may be an expectation for graduates to teach students (Dickson, Harrington, & Carter, 2011), undergraduates may not see the value of being trained in educational skills until after having to teach themselves (Amorosa, Mellman, & Graham, 2011). Educational skills have been outlined in a number of competency frameworks developed for junior doctors, including the Canadian Medical Education Directives for Specialists (CanMEDS), the US physician competences from the Accreditation Council for Graduate Medical Education, the British Medical Council's Tomorrow's Doctors guide, and the Australian Curriculum Framework (Confederation of Postgraduate Medical Education Councils, 2009; Ross & Cameron, 2007; Srinivasan et al., 2011).

There are potential financial benefits of PAL. Cost effectiveness is said to be achieved through a reduction or alteration in required tutor input, though with this comes the potential disadvantage of reduced quality control, and monitoring of materials (Topping, 1996). Conversely, to 'do' PAL well, there may need to be teacher investment in orientating students to the purpose of PAL and in scaffolding the development of behaviours that underpin PAL. This teacher investment in changing 'students' to 'learners'[11] (Boud, 2000), developing both independent and inter-dependent learners, is largely neglected in studies that examine the efficiencies of PAL. Educating students on educational skills may also mean that less time is needed for clinical supervisor education in the future, representing a cost-saving in the long term. The speculative nature of these benefits suggests that further investigation in this area is required, including the nature of educators' involvement with PAL.

Summary

This section has described PAL in relation to predominant learning theories in medical education, where PAL could be positioned as an integral part of the experiential learning process that students undergo. A typology of PAL for clinical medical education has been outlined. The utility, specific use, and benefits of PAL have therefore been outlined from a theoretical perspective. The following section will describe the empirical work investigating the use of PAL across the spectrum of medical education, from pre-clinical teaching to the postgraduate environment, including a systematic review on the effects of PAL in clinical undergraduate medical education, the area of focus of this thesis.

[11] Boud (2000) writes that, in the case of developing lifelong learning capabilities, students must be equipped with appropriate skills, including the ability to assess their performance against learning tasks, and to seek feedback from others, with the flexibility to operate within a wide range of environments.

PAL in practice

PAL in medical education

Peer Assisted Learning (PAL) is a learning format that has been used for over four decades in primary, secondary and tertiary education, with origins in ancient Greek pedagogy (Boud, 2000; Topping, 1996; Wagner, 1982). The shift to the use of peer assisted learning in undergraduate medical education has been more gradual, however (Wadoodi & Crosby, 2002). There has been an increasing focus on PAL as an adjunct or alternative to conventional forms of education (Burgess, McGregor, & Mellis, 2014; Hu, McColl, Thistlethwaite, Schuwirth, & Wilkinson, 2013). Previous studies of PAL in medical education have highlighted many benefits, including a deeper understanding of the topic being taught, the ability to perform clinical skills, improved communication and teamwork between students, and the development of professional qualities (Burgess et al., 2014; Santee & Garavalia, 2006; Secomb, 2008; Yu, Wilson, & Singh, 2011). PAL takes many formats, including peer teaching, peer observation, peer feedback, peer assessment, and peer discussion (Topping & Ehly, 1998). A common activity for medical students, problem based learning (PBL), is even considered a type of PAL, where students may decide the direction of the tutorial, and generate the content to be learned.

Given the variety of environments and settings, PAL can therefore take a number of different configurations, according to the year level(s) of the learners (are they the same or different?), the direction of the interaction (one way or two way?) and the broader setting in which it occurs (pre-clinical or clinical). Types of PAL could be represented more easily with a diagram (Figure 2.1). This thesis is interested largely in same-level, clinical PAL interactions, however additional levels of complexity could be added around the topic, location (for even hospital students use classrooms), if there is a simulated element, if there is educator supervision, and so on.

	Same year level	Different year levels
Preclinical		
Clinical	Focus of this work	

Figure 2.1 Student configurations for PAL

While it seems logical that senior students are able to teach knowledge effectively to junior students, the premises that students of the same level have wisdom to offer, and that

complex clinical skills can be taught by students, are less certain. The following section establishes what is already reported about the success of various configurations of PAL in the health professions literature.

Reports of PAL in the literature

Systematic reviews on the subject of PAL

Several systematic reviews of the literature have been conducted on the subject of PAL in health professions education. None of the reviews precisely addressed the topic of this thesis: PAL in same-level, undergraduate, clinical medical education. Secomb (2008) reviewed studies on peer teaching and learning in clinical health sciences. Medical students did not feature in any of the 12 included studies. Santee & Garavalia (2006) reviewed peer tutoring programs in health professions schools, intending to provide evidence for the use of PAL in pharmacy studies. However, in 13 of 20 included papers, subjects were medical students, but this review specifically focussed on peer teaching where there was a difference in seniority of peers.

Secomb's (2008) review provides some evidence for same-level PAL; nine of the 12 studies contained same-level students in nursing, physiotherapy or occupational therapy. Due to the heterogeneity of the included studies, no pooling for statistical analysis was undertaken. Cognitive and psychomotor skill development was noted as a product of PAL in a number of studies. Two included studies reported student dissatisfaction with the process itself, however the majority of students were positive about their peer learning experiences. Benefits reported were the development of a supportive environment, improvement in student leadership, autonomy, and time management (this also included time-saving for clinicians). Areas requiring improvement included preparation for clinicians, and dealing with potential changes in peer group configurations due to personality and ability.

Santee and Garavalia (2006) reviewed the literature with regards to, a particular subset of PAL. All studies contained students at different year levels with a control and experimental group. The authors excluded reciprocal peer tutoring or collaborative tutoring based on the rationale that poorly performing students would be unable to "fulfil the teaching role for students who were performing adequately" (p. 2). Included studies demonstrated that PAL did maintain or improve students' academic performance, although not all performance measures had been tested for reliability. Many papers lacked information on program details, making it difficult for the review authors to compare the duration and intensity of

interventions. The presence of confounding factors and non-random exclusion of students from analysis (i.e. those that dropped out) also impacted the accuracy of the analyses.

These two reviews addressed questions of PAL's benefits and effectiveness as a teaching and learning method, albeit in slightly different groups to the population of interest. Both concluded that additional high quality studies of PAL were required. These studies, reviewing literature to 2004 (Santee & Garavalia, 2006) and 2005 (Secomb, 2008) respectively, could hardly be considered current. More recent systematic reviews on the subject of PAL have been undertaken, with foci closer, or overlapping, with the concept of same-level PAL in undergraduate clinical medical education. Speyer, Pilz, Jolien, & Brunings Wouter (2011) specifically investigated the validity and reliability of peer assessments, however also included studies involving residents (i.e. those who had already graduated from medicine). Both Yu et al (2011) and Burgess et al (2014) restricted their studies to medical students only. Yu et al (2011) intended to identify the effectiveness of PAL and impact on objective learning outcomes for both tutors and tutees, whilst Burgess et al (2014) concentrated solely on how PAL was implemented and the benefits for, and competency of peer tutors.

The goal of Speyer et al (2011) was to identify tools used for peer assessment, and hence determine the validity and reliability of those tools. The authors found that the majority of peer assessments focussed on professional behaviour, whilst leadership, interview skills and performance in problem-based learning groups were also assessed by peers. The tools used for these areas were therefore heterogeneous, and many did not provide sufficient information about the validity and reliability of their tools, with six providing no psychometric data (Speyer et al., 2011). Therefore no conclusions could be drawn on the research question itself, and the authors recommended that the choice of a peer assessment tool should be made on the basis of its psychometric properties being sufficient for its task. Burgess et al (2014) also intended to investigate peer assessment tools with respect to the peer tutors' competency in marking. Evidence from this review was equivocal, with a variety of accuracies reported.

Reviews by both Burgess et al. (2014) and Yu et al. (2011) identified that peer teaching was a beneficial endeavour, much like Santee & Garavalia (2006) and Secomb (2008) did some years earlier. However, these reviews contained few studies of students at the same level and in the clinical environment (Yu et al (2011) appears to contain two studies, whilst Burgess et al. (2014) contains three studies). Yu et al. (2011) identified four broad categories of outcomes for peer teaching: 1, that peer teaching was at least as effective as expert teaching, 2, that peer teaching was better than no peer teaching, 3, that peer

teachers performed better than their learners, or a control group, and 4, that students appreciated their peer teachers, because they could understand learning difficulties and created a more relaxed learning environment. However, students in the included studies were also concerned that peer interaction reduced the time they had with faculty, and that peers may be less competent. Burgess et al. (2014) also identified that peer tutors developed professional attributes such as understanding teaching principles of facilitation, assessment, & feedback, leadership qualities and confidence. Some tutors however felt awkward in providing feedback. Peer tutors were also found to have increased their understanding of knowledge content, though did not consistently outperform the students they taught.

While these reviews have considered a large number of papers, in medical education and allied health fields, their focus has nevertheless been narrow, and mainly on peer teaching/learning, and to a lesser extent, on peer assessment. The typology of PAL described a broader range of PAL activities, such as peer collaboration, peer observation, and the giving of feedback (as a distinct activity from making a formal assessment/awarding a grade). Same-level PAL in undergraduate medicine has also not yet been the focus of a systematic review. Therefore, this section details the evidence for same-level PAL, both in pre-clinical and clinical settings, and the benefits and outcomes of PAL on the participating stakeholders.

PAL in the classroom

Many studies of PAL in medical education have occurred in the pre-clinical university setting. Common applications of PAL in the preclinical setting include anatomy and clinical skills teaching, and also problem-based learning (PBL), which is now widely adopted in many medical schools. PBL constitutes a specific type of collaborative learning. Students not only research aspects of a larger topic and share their knowledge, but also as a group, negotiate the learning objectives and decide on the direction of the task, with some guidance from a facilitator (Schmidt, Rotgans, & Yew, 2011). However, Onyon (2012) highlights that students overall perform about the same (either a little better, or a little worse), despite the wealth of theory supporting PBL as a superior learning mechanism.

The anatomy laboratory has been the location for a number of PAL trials. The reasons for the implementation of peer teaching include its potential benefits of active learning (Hendelman & Boss, 1986; Johnson, 2002; Krych et al., 2005; Vasan, DeFouw, & Compton, 2011), increased collaboration and developing professional qualities such as communication, teamwork, leadership (Chen et al., 2009; Hendelman & Boss, 1986;

Johnson, 2002; Krych et al., 2005) Time saving (Henderson & Johnson, 2002; Nnodim, 1997; Wilson, Petty, Williams, & Thorp, 2011; Yeager & Young, 1992), and improving their critical thinking and self-assessment skills (Gukas, Miles, Heylings, & Leinster, 2008). Studies demonstrated that students were largely satisfied with this alternate model of learning (Gukas et al., 2008; Hendelman & Boss, 1986; Johnson, 2002; Krych et al., 2005; Nnodim, 1997; Yeager & Young, 1992). They reported developing their professional skills, such as teamwork and communication (Chen et al., 2009; Hendelman & Boss, 1986; Krych et al., 2005; Vasan et al., 2011), and measured performance on tests was the same or better as compared to traditional models of teaching (Johnson, 2002; Nnodim, 1997; Vasan et al., 2011; Wilson et al., 2011; Yeager & Young, 1992). However, there were some concerns about the peers' ability to teach, and their knowledge base (Gukas et al., 2008; Johnson, 2002). It can therefore be seen that in the concrete but practical subject of gross anatomy, peer teaching has been established as an effective means of learning and development of professional attributes.

Peer teaching and feedback has also been extensively used in clinical skills training in the pre-clinical environment. Again, reasons for the use of PAL included difficulties in recruiting clinical staff (Dickson et al., 2011; Salerno-Kennedy, Henn, & O'Flynn, 2010; Tolsgaard et al., 2007), and the need for additional teaching (Burke, Fayaz, Graham, Matthew, & Field, 2007). Peer tutors were also seen as potentially more approachable and familiar with material (Burke et al., 2007; Dickson et al., 2011; M. Field, Burke, McAllister, & Lloyd, 2007; Salerno-Kennedy et al., 2010), whilst the goal of increasing respect, self-esteem and commitment to work through peer interaction was also mentioned (Burke et al., 2007).

Overall, students found that peer teaching was a positive and useful experience (Dickson et al., 2011; Salerno-Kennedy et al., 2010; Tolsgaard et al., 2007). Superior performance on examinations was also demonstrated (Burke et al., 2007; Dickson et al., 2011; Tolsgaard et al., 2007). However, these studies all trained senior students in their final or penultimate year of study to undertake the peer teaching with junior students. Perera, Mohamadou & Kaur (2010) alone used same-level peer feedback for clinical skills teaching in an attempt to improve both evaluation and clinical skills. In this setting, there were concerns again with confidentiality and the inexperience of peers. Some students also reported feeling shy or awkward giving feedback. However, a large proportion of students (70%) did also report self-awareness of deficiencies in their own interviewing skills.

While students may have some misgivings about using PAL, it is clear that there are benefits to PAL in the pre-clinical years, whether students are taught by same-level peers, or near-peers who are senior students in the same course.

PAL on clinical placements

It is likely that students engage in informal PAL on the wards to varying degrees, given the prevalence of group work and peer learning in the preclinical environment. Research suggests clinical teaching staff are time poor and find it difficult to juggle their clinical, administrative and teaching loads (Bearman, Molloy, Ajjawi, & Keating, 2013; Higgs & McAllister, 2007; Kilminster & Jolly, 2000). PAL may represent one means of enabling students to achieve better learning from their clinical placements, with little effort on behalf of already-busy clinical staff. Students could look to other sources of learning, including their peers. Formalised PAL activities may enable all students to take part in additional valuable learning, and remove some of the responsibility and load from clinicians.

While some preclinical PAL strategies may be able to be transferred, it is likely that different strategies and purposes for PAL exist in the clinical environment. While previous studies have focussed largely on implementing and evaluating peer teaching models in clinical practice, there remains a question of which types of PAL are effective in the clinical environment. The success of PAL is also partially dependent on both students' and educators' perceptions of the activity (Konopasek, Kelly, Bylund, Wenderoth, & Storey-Johnson, 2014). The dominance of work-based learning in postgraduate training in a strong tradition of socio-cultural learning (Swanwick, 2005), and the reliance on interactions with peers for learning within this apprenticeship model (Colville, 2011) also suggests it would be advantageous to establish the attitudes and behaviours required for successful clinical PAL in the undergraduate setting, where learners may devote more time to learning (rather than being overworked *and* needing to build these skills simultaneously).

Peer tutoring or teaching

Peer tutoring has been employed in same level clinical medical education, both for theoretical knowledge and clinical skills development. Heckmann et al. (2008) investigated the effect of peer teaching on neurological clinical skills. Peers who had passed the clerkship one semester earlier were enlisted to teach neurological examination and lumbar puncture to the current neurological clerkship students in a control & experimental group study design. The control group was taught by postgraduate tutors, the experimental group

by their peers. There were no significant differences in both written and practical examination results. In this case, the peer tutors were carefully selected. The same effect might not be seen if there was no discrimination in selection of tutors. Kernan, Quagliarello & Green (2005) reported on 'Student-Faculty Rounds', classroom peer teaching which occurred during clinical placements, on a student-nominated topic in Internal Medicine. Here, only student satisfaction was measured through end of clerkship evaluation forms, where the average rating was 9.2 of 10 (where 10 was outstanding) for satisfaction. While the majority of comments were positive, some remarked that the quality of the teaching presentations varied, and that the 30-minute allocation for the teaching session was insufficient. Students also suggested that further guidance on presentations, verbal feedback after presentations, and continuity of supervising faculty (who did not interfere with the presentation) would improve the process. As the authors suggest, this type of PAL activity may benefit the teaching peer more than the learner.

Peer assessment

In the clinical education environment, peer assessment is used frequently (L Arnold, Willoughby, & Calkins, 1981; Asch, Saltzberg, & Kaiser, 1998; Kovach, Resch, & Verhulst, 2009; Speyer et al., 2011), however there are fewer studies of PAL involving teaching and feedback, with some of these still occurring within classrooms (Chou et al., 2011; Heckmann et al., 2008; Kernan et al., 2005), rather than being ward-based. There is a lack of clarity as to what may constitute PAL in the clinical setting, and whether activities involving peer engagement are useful for learning.

Peer assessment is used in clinical placements because peers are likely to have spent more time together and have observed more of their peers' behaviour than the supervisor (Burnett & Cavaye, 1980; Kovach et al., 2009). Student reaction to peer assessment has been mixed. While the students were sometimes eager for feedback and to take on board ratings from fellow students (Asch et al., 1998), a minority were not comfortable with the idea of passing judgement on those at the same level (Burnett & Cavaye, 1980). While anonymity was preferred in some cases (Kovach et al., 2009), both students and staff noted that this removed some of the responsibility of being accurate in their assessment, increased the potential risk of 'cheating' the system through friends rating each other higher than those outside the friendship group, and also prevented opportunity for discussion on performance. Peer ratings have had some correlation with staff ratings (r values ranging from 0.18 to 0.37, all statistically significant), and had better correlation with staff ratings, than self-ratings of performance (Asch et al., 1998; Burnett & Cavaye, 1980; Kovach et al., 2009; Levine, Kelly, & Karakoc, 2007; Sullivan, Hitchcock, &

Dunnington, 1999). This suggests that students may be able to accurately assess and provide feedback on their peers' performance. One study (Langendyk, 2006) also investigated self, peer and faculty marking on a formative written examination. Marks awarded by students to themselves were lower than faculty marks (1.5%, CI 0.2-2.7%, p = 0.02), however peer marking did not differ significantly from faculty marking. Analysis of peer marking by subgroups of performance found that satisfactorily performing students were accurate peer markers. Peers therefore may be a better source of information on progress than self-evaluation, and more accessible than faculty. Importantly, the process of peer assessment may benefit the peer assessor just as much as the recipient in that the assessor must think about performance standards, and how a task attempt compares to that reference point (Boud & Molloy, 2013a).

Giving feedback to peers

Peer feedback has also been used in clinical medical education. This could be seen as a facet or subset of peer assessment, however as feedback is defined as "Specific information about the comparison between a trainee's observed performance and a standard, given with the intent to improve the trainee's performance" (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008, p. 193) it may have broader purpose than assessment alone – to assign a mark or grade for the purposes of ranking or promotion.

Kalet et al. (2005) developed a surgical communication skills curriculum which included peer feedback on communication skills with a simulated patient, staff and the simulated patient also provided feedback. Students felt the majority of their skills improved through these workshops, though it is unclear how much of this was due to peer feedback specifically.

Paul, Dawson, Lanphear, & Cheema (1998) used video recording with self, faculty and peer evaluation in a paediatric rotation to practice history taking and examination skills. Students felt it was a helpful exercise to improve their technique. 62% were comfortable with peer feedback, and found it to be constructive. Students were anxious about the videotaping but their ease with providing feedback to other students was not reported.

Peer feedback on smoking cessation counselling skills has been shown to be similar to audio and video feedback from tutors, and superior to the standard lecture format (Roche, Eccleston, & Sanson-Fisher, 1996), in improving performance in an OSCE.

Working collaboratively with peers

Students were required to learn collaboratively on clinical placements in two studies. Trevena et al. (2002) details a group work approach to a population health curriculum,

although the focus of the report was on the content rather than the process. Students took turns to lead the individual sessions, and found the program to be useful for their learning. Poncelet et al. (2011) described a longitudinal clerkship were students remained with the same cohort for one year of placements, instead of block rotations in separate departments. These students met regularly for group work assignments and reflection on their progress. These students reported that they valued the opportunity to work closely with peers. When compared to other students not placed in this program, they performed similarly on written examinations, and performed significantly better on their clinical practice exam. The clerkship placements themselves were also integrated, thus the overall structure of the placement also differed from the norm. Therefore it is unknown how much peer collaboration and support contributed to their superior performance.

Summary

The evidence for the utility of same-level peer tutoring, feedback and collaboration in clinical medical education is mixed. There is some evidence for the relative reliability of peer assessment, when compared to faculty assessment, as opposed to self-evaluation. Studies in pre-clinical peer tutoring, feedback and collaboration however number significantly, with results suggesting that PAL is useful for learning, and additionally may develop crucial professional skills. While other reviews have established that peer teaching in medical education has benefits (Burgess et al., 2014; Yu et al., 2011), and that peer assessment validity and reliability is likely a function of the instruments themselves (Speyer et al., 2011), little is known about other PAL types in clinical education. Further research is therefore required to determine the benefits of PAL during clinical placements.

Same-level peer-assisted learning in medical clinical placements: A narrative systematic review

Despite a substantial body of evidence for the equivalence or superiority of specific same-level PAL interventions as compared to expert teaching, less was known about the broader effects of same-level PAL for medical students, and by extension, their teachers, and the patients they interacted with. Socio-cultural learning theory, outlined in the previous section, suggests that students will gain knowledge through participating in a PAL activity. The positive evidence for PAL use in pre-clinical settings and with near-peers may indicate that there are also benefits to be gained from same-level PAL in clinical education.

Therefore, a systematic review of the literature on PAL in undergraduate clinical medical education was undertaken to uncover any further benefits of PAL that might have arisen

from undertaking a PAL activity, which while not the focus of the research, was also mentioned as a 'side-effect'.

This review was submitted for publication, and appears inserted here as a manuscript resubmitted to *Medical Education* after minor revisions.

Abstract

Introduction: Peer assisted learning (PAL) is increasingly used in medical education, and benefits of this approach have been reported. Previous reviews have focussed on the benefits of peer tutoring, by senior of junior students. Forms of PAL such as discussion groups and roleplaying have been neglected, as have alternative teacher-learner configurations (e.g. same-level PAL), and effects on other stakeholders including clinician educators and patients. This review examines the benefits of same-level PAL for students, clinician educators and patients in pre-registration clinical medical education.

Method: Medline, PsycINFO, CINAHL and ERIC were searched in March 2014. 1228 abstracts were retrieved for review; 64 full text papers were assessed. Data were extracted from empirical studies describing a same-level PAL initiative in a clinical setting, focussing on effects beyond academic performance and student satisfaction. Qualitative Thematic Analysis was employed to identify types of PAL, and to cluster the reported PAL effects.

Results: 43 studies were included in the review. PAL activities were categorised into roleplay, discussion, teaching and assessment. Only 50% of studies reported information beyond self-report and satisfaction with the PAL intervention. Benefits for students (including development of communication and professional skills) and clinician educators (developing lesser used facilitation skills) were reported. Direct patient outcomes were not identified. Caveats to the use of PAL emerged, and guidelines for the use of PAL were perceived as useful.

Discussion: Many student-related benefits to PAL were identified. PAL contributes to the development of crucial skills required for a doctor in the workplace. Vertical integration of learning and teaching skills across the curriculum and tools such as feedback checklists may be required for successful PAL in the clinical environment. Patient and educator benefits were poorly characterised within the included studies. Future work should evaluate the use of PAL with regards to student, clinician educator and patient outcomes.

Background

Peer assisted learning (PAL) is a valuable adjunct to conventional teaching methods, especially in clinical environments. Originating in primary and secondary education, it has

been implemented in higher education for many years (Topping, 1996), including in medical education (Wadoodi & Crosby, 2002). The term PAL encompasses a range of learning activities including peer tutoring, peer observation, peer feedback, and peer assessment. A commonly cited definition of PAL is "people from similar social groupings, who are not professional teachers, helping each other to learn and by so doing, learning themselves"(Topping & Ehly, 1998, p. 1). PAL may occur between near-peers, where senior students nearing completion of their studies teach junior cohorts, who are relative novices, or between students of the same level, where students are encountering new material together, though they may not be at the exact same point in their studies (Topping & Ehly, 1998). The evidence to support the use of PAL is vast, with several systematic reviews of PAL in healthcare settings. The argument for implementing PAL in medical education has been previously justified with both hypothesised and evidence-based benefits (Lincoln & McAllister, 1993). While the evidence base grows for students' knowledge gain and performance on examinations (e.g. (Burgess et al., 2014)), there are a number of published benefits of PAL that remain speculative.

Previous reviews of PAL in health professions education have focussed largely on peer teaching (Burgess et al., 2014; Santee & Garavalia, 2006; Secomb, 2008; Yu et al., 2011). Two reviews focussed specifically on the benefits for the tutors alone (Burgess et al., 2014; Yu et al., 2011), while two identified the effects on students receiving the peer based tutelage (Santee & Garavalia, 2006; Secomb, 2008). However, studies involving medical students were not included in the Secomb (2008) review. Additionally, most of the studies included in these reviews occurred in near-peer settings, where a more senior, experienced group of students taught a more junior cohort (Burgess et al., 2014; Santee & Garavalia, 2006; Secomb, 2008; Yu et al., 2011). There is no doubt that peer tutoring is comparable to other more conventional teaching methods when it comes to effects on knowledge. While knowledge gain has been demonstrated for both peer tutors and tutees, the benefits for peer tutors in terms of knowledge gain and performance on examinations are greater (Burgess et al., 2014). Yu et al (2011) identified that a relaxed environment and better understanding of learning difficulties were developed, though there was concern that PAL reduced contact time with educators. Burgess et al (2014) identified a range of professional attributes that peer tutors developed, namely facilitation skills, teaching, assessment, feedback, leadership, ability to admit uncertainty, development of confidence, contribution to education, and autonomy in learning.

Peer assessment in medical education has also been well studied: Speyer et al (2011) included 22 studies of peer assessment in their review. Many uses and goals for peer

assessment were identified, including generating marks, learning to be an assessor, student interaction, social control, development of self-regulation and self-monitoring, and active participation in learning. The focus of the peer assessment was largely professional behaviour, with few studies asking students to assess each other on their clinical performance. The studies that were identified were heterogeneous in design, with a diverse range of peer assessment tools, and data on psychometric characteristics of these tools were often restricted or unavailable. It was concluded that statistical pooling was not possible: further research should investigate the psychometric properties of assessment tools. Caution was therefore recommended when using peer assessment (Speyer et al., 2011). Moreover, the broader educational outcomes of engaging in peer assessment were not a focus of the review.

These reviews have not made the distinction between same-level and near-peer PAL. Wadoodi & Crosby (2002) suggested same-level PAL would have the "advantage of greater informality", but was concerned about a lack of direction for learners. From a practical perspective, same-level PAL would be more easily implemented, as students are more likely to have similarly timetabled commitments, in similar locations.

Table 2.2 Benefits of PAL as reported in the literature

Hypothesised	Supported by evidence
• Ability to reflect • Application of skills and knowledge (communication and procedural) • Collegial relationships with peers (i.e. supportive, rapport building) • Compatibility with adult learning theory (active participation) • Deeper learning resulting in improved retention • Higher self-disclosure • Immediate feedback • Lowered anxiety • Metacognitive awareness • Professional identity formation • Reduced clinician/educator input; increased teaching efficiency • Student ownership of activity • Scaffolded exploration	• Cognitive development (i.e. academic performance) • Psychomotor (clinical skills) development • Empathy towards clients • Satisfaction with peer teaching • Increased learning opportunities • Leadership skills • Appreciation of lifelong learning • Teaching skills (facilitation, feedback) • Confidence

(Burgess et al., 2014; Lincoln & McAllister, 1993; Santee & Garavalia, 2006; Secomb, 2008; Topping & Ehly, 1998; Yu et al., 2011)

The implementation of PAL in clinical environments has had several driving forces, including theoretical and reported benefits. Knowledge gain has been demonstrated in many studies (Santee & Garavalia, 2006; Secomb, 2008), however many theorised benefits of PAL remain theoretical. Table 2.2 provides an overview of hypothesised and evidence supported PAL benefits. Both Lincoln & McAllister (1993) and Topping (1996) identified technical skills, affective components which may increase student motivation to engage in learning, deeper cognitive aspects of learning, and some practical benefits to PAL activities. Though Secomb (2008) identified some of these aspects for health professions students on clinical placements, and Burgess et al. (2014) identified a range of professional behaviours engendered by PAL for peer tutors, neither study examined the benefits of PAL for all medical students in a clinical context. PAL activities such as peer discussion and role-playing have not been investigated in previous reviews. More broadly, the effects of PAL for other stakeholders in medical education such as clinician educators, and importantly, patients, have not been well investigated. We use the term 'clinician educators' to mean any qualified clinician involved in the direct education or supervision of medical students, regardless of formal university or faculty appointment. Clinicians within our local context are called upon to teach students with little prior training; novel educational methods may impact on their willingness to contribute their time and services gratis.

This review seeks to determine the effects of same-level PAL in clinical environments, for medical students themselves, clinician educators and patients.

Methods

This review was conducted in a systematic fashion, with minor variations on the standard systematic literature review approach. An inspection of the included studies indicated that a quantitative meta-analysis of the effects was inappropriate. The research questions, where given, had a wide range of foci, and outcomes were measured with a variety of methods. A thematic analysis and realist synthesis was undertaken (Bearman & Dawson, 2013), resulting in a more narrative review on PAL in same-level, undergraduate clinical medical education (Eva, 2008). From this point, we refer to same-level PAL simply as 'PAL'.

Procedure

The question for the review was 'What are the effects of same-level, peer assisted learning in undergraduate clinical medical education?' Relevant search terms and their synonyms were used within four databases: Medline, PsychINFO, CINAHL and ERIC. The search was run on 14 March 2014. The search aimed to capture all studies published in English, reporting on PAL activities which medical students from the same year level undertook

during clinical placements. Studies which did not meet these criteria were excluded (Figure 2.2). The search was updated on 27 January 2015, following the same procedure, where one additional citation was identified. The reference lists of included papers were also hand-searched for additional references for inclusion.

Search terms

The PICO framework (R. Sharma, Gordon, Dharamsi, & Gibbs, 2014) was used to develop the search terms. For 'P', the people or group of interest were medical students in clinical environments. Cognizant of the varying entry schemes to study medicine worldwide, while "undergraduate" was included as a search term, "student" was also used to capture all pre-registration trainees. The following terms were used: (medic* and (undergraduat* or student*)) AND (placement* or clinic* or practic*). The intervention of interest ("I") was a peer assisted learning or teaching program. Search terms used were: (peer* or student-led or student-run) AND (learn* or teach* or educ* or PAL or "supplemental instruction" or SI). There was no specific comparison group of interest ("C"). Whilst it was known that some studies would compare peer teaching to clinician, expert or educator teaching, studies with no comparison group were also of interest. The outcomes ("O") sought were any impacts or changes in perceptions or performance: (chang* or evaluat* or compar* or effect* or impact) and (attitud* or percept* or perform* or result* or score or competen*). The results of these above searches were combined with the 'AND' operator to search for papers with all three elements.

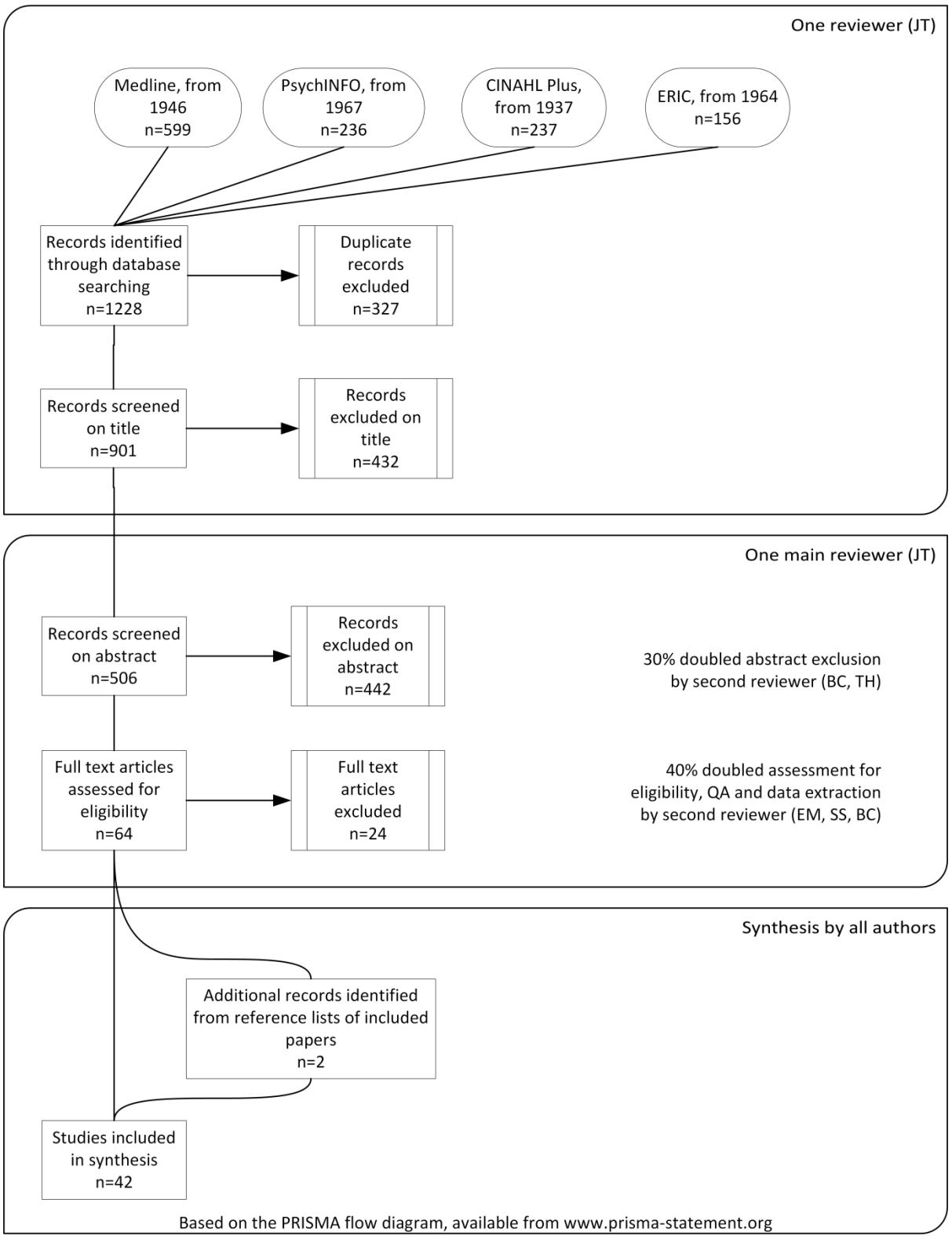

Figure 2.2 PRISMA Flowchart of citation handling for original search, March 2014

Inclusion criteria

At each stage of the review, papers were excluded if they did not meet all of the following inclusion criteria:

- Participants must be medical students (undergraduate or graduate entry) (i.e. pre-registration, not interns or residents or completing post-graduate training, or physicians)
- Participants must be in the same year level (i.e. near-peer tutoring is excluded – senior students working with junior students, paid peer tutors in a more senior year level). Where students had the same level of prior experience (e.g. all year 3 and 4 students who were learning musculoskeletal ultrasound), they were deemed to be of the same year level.
- Setting must be clinical (i.e. must not be preclinical; students should be undertaking a clinical placement at the time of the intervention – simulation and role-play is included if it is part of a clinical placement)
- The study must focus on an intervention or phenomenon that involves peer-assisted learning (e.g. peer teaching, peer case presentation, peer feedback, peer assessment, peer discussion). The intervention may be a comparison arm of a larger trial involving multiple education methods (e.g. PAL compared to traditional methods, PAL compared to other novel teaching methods), or a PAL intervention alone with no comparison.
- Outcomes of the intervention must be reported (i.e. purely descriptive studies with no evaluation component are excluded).
- Report must be published in English

Screening and selection of studies

A pragmatic approach to ensure accuracy and consistency with respect to abstract and paper review was adopted. Previous systematic reviews have engaged a second reviewer to check a proportion of decisions made by the primary reviewer, including decisions on exclusion by title, paper categorisation and data extraction (Brennan, Bosch, Buchan, & Green, 2013; Fatmi, Hartling, Hillier, Campbell, & Oswald, 2013; Mosley, Dewhurst, Molloy, & Shaw, 2012; Thistlethwaite et al., 2012). The proportion of double-checking has ranged from 10% (Brennan et al., 2013) to 37.5% (Thistlethwaite et al., 2012) of all citations. We took a sensitive rather than a specific approach (i.e. tried to be inclusive rather than exclusive); any papers for which decisions were uncertain were discussed between JT and BC, and a relatively high proportion of citations were double reviewed. The principal reviewer (JT) assessed all citations at abstract and full text levels, and undertook all quality appraisal and data extraction. Between the secondary reviewers (BC &

TH), 156 (30%) abstracts were reviewed and assessed for inclusion, with 94% agreement initially. There were nine abstracts for which two reviewers were uncertain about inclusion at the abstract screening stage: five were excluded entirely on re-reading, two were included at the abstract stage but failed to meet all criteria on a full-text reading, and another two were included in the review. The secondary reviewers (EM, BC & TH) then assessed 27 (40%) papers for eligibility, for which there was 100% agreement for inclusion or exclusion of papers.

Quality appraisal and data extraction

The criteria published by Buckley et al (2009) were used for the Quality Appraisal (QA) tool, to assess the risk of bias and trustworthiness of findings in each paper. These quality indicators which examined study design, process, data analysis, and conclusions drawn, were used due to their applicability to quantitative and qualitative research methods, and their formulation for the medical education context. Several items within the QA tool were adapted to allow for more detailed consideration of qualitative studies. The "Confounding variables acknowledged" item was considered met if other, external influences on results were discussed. The "triangulation of data" included triangulation through researchers' interpretation of the data, along with data collection from separate sources. Papers were scored on eleven criteria, with a seven or above indicating a lower risk of bias (Table 2.4). This enabled a judgement to be made on how likely the findings were to be trustworthy on the basis of the published report. For the 18 double-reviewed studies included, reviewers' scores were identical for 56% (n=10) of the studies. Scores differed by 1 for 28% (n=5) of studies, and by 2 for 16% (n=3) of studies. The lower of the two scores was reported. Critically, none of these score differences altered the classification of the study.

A simple data extraction (DE) tool was developed on the basis of the required information for the review, separating out quantitative and qualitative findings, largely to sharpen the reviewers' focus for both types of data. In addition to the results reported pertaining to the papers' research questions, effects mentioned in the text as incidental findings were also extracted by reviewers for completeness of data. Included in the DE tool was an assessment of educational outcome. A modified version of Kirkpatrick education outcome levels published by Barr et al (2000) was used: Level 1, learners' reaction; Level 2a, modification of attitudes/perceptions; Level 2b; acquisition of knowledge/skills; Level 3, Change in behaviour; Level 4a, Change in organisational practice, and Level 4b, benefits to patients/clients (Barr et al., 2000). These descriptors were included as part of the document to assist reviewers. To ensure consistency of approach and interpretation of the text within the tools, both DE and QA tools were piloted on three papers by JT and EM.

Data analysis and synthesis

Descriptive statistics were calculated for the studies based on year of publication, quality, level of educational outcomes, and type of study conducted. The remainder of data were heterogeneous, requiring a qualitative synthesis where results are pooled and then collectively interpreted. A realist approach was taken, which requires the context of the results to be considered (e.g. for whom does the intervention work, and in what circumstances) and described, with an equal emphasis on summarising what is known, and developing theory on the subject of the review (Bearman & Dawson, 2013). Qualitative analysis of the data was therefore undertaken in a number of aspects. Data on the PAL activity or intervention were firstly examined then coded by the primary reviewer (JT) according to the type of activity undertaken to identify the contexts in which findings were made. The coding categories were examined by a secondary reviewer (EM) for fit, and the classification of individual studies was changed where necessary. For instance, the paper by Fornari et al (2011) was originally classified as being a roleplay activity on the basis of students assuming patient roles, however on further inspection, students were actually required to present their experiences as a patient in a teaching session, and therefore the study was reclassified as a teaching activity. Findings from included studies were examined using thematic analysis (Miles, Huberman, & Saldana, 2014). Outcomes were coded by JT. The codes were then discussed with BC for agreement, and initially sorted according to the CanMEDs framework (Royal College of Physicians and Surgeons of Canada, 2014), Australian Curriculum Framework for Junior Doctors (Confederation of Postgraduate Medical Education Councils, 2009) however, they did not account for the effects identified for patients and educators. An alternative was considered: "Non-technical skills" (NTS) is a well-used term, defined more by what it is not (that is, technical, procedural skills that can be learned), though Nestel et al. (2011) argue that communication skills can be taught and therefore NTS is a poor descriptor. However, most of the codes aside from knowledge gain and technical ability could have been placed in the "non-technical skills" category. These frameworks were found to be unhelpful in developing meaning from the identified codes. Therefore, we chose to synthesise the effects of PAL by codes alone; any further collapsing resulted in a loss of detail. Some grouping was then provided through the group or stakeholder that benefited from them. Pitfalls of PAL were also coded in a separate category. This approach was therefore realist in being attentive to surrounding context and direction of effects, and also ensured that attention was paid to situations where further clarifying work was required.

Results

A total of 43 papers met the inclusion criteria and underwent data extraction (see Table 2.3 for summary) and quality appraisal (see Table 2.4 for scoring). The publication date of papers ranged from 1975 to 2014, with 23 (53%) papers published since 2010, reflecting the increasing interest in this area in medical education[12]. Quality appraisal resulted in a wide range of scores, from two to the maximum of eleven. Thirty-six papers (84%) were considered of be of good quality, scoring a seven or above. Lower quality studies were not excluded as they did contribute some additional information on the effects of PAL. Thirty-two studies (74%) provided Kirkpatrick level 1 (i.e. participant satisfaction) information in their results, while only half the studies (50%) examined the effects on learning or flow-on effects (2b, 3, 4b). Fifteen studies were controlled trials with a comparison control group (Chunharas et al., 2013; Fornari et al., 2011; Hahn, Croen, Kupfer, & Levin, 1991; Milani et al., 2013; Perry, Burke, Friel, & Field, 2010; Van Bruwaene, De Win, & Miserez, 2009); nine of these were randomised (Aper, Reniers, Koole, Valcke, & Derese, 2012; Hans M Bosse et al., 2010; Hans Martin Bosse et al., 2012; Cave, Washer, Sampson, Griffin, & Noble, 2007; Knobe et al., 2010, 2012; Kühl et al., 2012; Mounsey, Bovbjerg, White, & Gazewood, 2006; Roche et al., 1996). Qualitative analysis of the papers' results revealed that there were four main groups of PAL interventions: Facilitated discussion between peers, role-playing a patient for a peer, peer teaching, and peer evaluation (Table 2.5). The effects of PAL described were mostly benefits, which could largely be described as "non-technical skills". The relationship between type of PAL and effect of PAL is detailed in Table 2.5. Some caveats to the use of PAL were identified.

[12] As of 7 August 2015, there were 137051 papers indexed under the "Medical Education" subject heading in Medline. 27668 of these had been published since 2010; a proportion of 20%.

Table 2.3 Included studies

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Al-Kadri et al 2013	15 Unknown year Clinical Saudi Arabia	Evaluation activities – single or discrete occasions	Work Based Assessment	To assess factors contributing to medical students' learning approaches in response to WBA	Interviewed students, results presented to clinical supervisors, member checked	Nil	Peers were valued as an alternative source of feedback on their WBA Students reported peers were "honest with me and talk at my level"	Free from embarrassment or penalties Timely, increased frequency. However, supervisors less keen to place importance on peer feedback.	1	8
Aper et al 2012	196 5 of 6 Consultations skills training Belgium	Evaluation activities – single or discrete occasions	Autonomous training with pairs of students. Consultation with SP, 2nd student observes with checklist. Feedback is given by the SP and student, then they swap roles. Debrief with other student groups and physician	What is the differential impact of 3 training formats? Measures used were self-efficacy and consultation skills to test if there is a link between the two	Three factor randomised controlled trial Self-efficacy measured with survey delivered both pre and post intervention Consultation skills tested by evaluating responses to a video case pre and post intervention.	Traditional (72 students), Autonomous (60 students) and Online (64 students) Traditional model involves feedback from a SP and physician, while other alternative group had online training with individual feedback.	Autonomous training with peers had a significant positive effect on self-efficacy (both sub items and general self-efficacy) compared to traditional and online formats. Tradition and online training groups increased their skills significantly compared to the autonomous group	Peers had large differences in quality of feedback. Students need appropriate training in critical observation of clinical skills and feedback giving. Self efficacy is not directly correlated with higher cognitive performance scores	0	9
Asch et al 1998	n unknown 3 of 4 Internal medicine, paediatrics, surgery core clerkships USA	Evaluation activities – over a period of time	Peer evaluation – 3-6 peers on professional attitudes and behaviour Mid and end rotation	To enable students to recognise various attitudes and behaviours, and improve self-evaluation and evaluation of others	Analysis of feedback forms	Evaluations also made by residents, faculty, and self	"Problem" students changed their behaviour towards peers after peer feedback Most were comfortable with the process (but a few were not) Some students did not believe they could objectively evaluate their peers	Students gave more meaningful feedback than faculty or housestaff Ability to track behaviours over the year	1,3	5

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Bennett et al 2012	40 students in pairs Unknown year Clinical placements Ireland	Evaluation activities – single or discrete occasions	Peer miniCEX – one as learner, one as assessor	To determine theutility and acceptability of the miniCEX as a framework for peer feedback	Analysis of miniCEX data (both quantitative and qualitative) Survey for self-reported satisfaction	Nil	No student scored another student less than 4 out of 5 on any category. MiniCEX was a useful framework for formative peer feedback Peers identified areas they did well, areas requiring improvement, and actions for improvement 50% thought it was appropriate to be assessed by a peer.	Students liked the ability to benchmark, useful feedback, the experience in an authentic situation. Students were concerned about validity as peers didn't have qualifications nor guidance for standards.	1	7
Bosse et al 2010	69 5 of 6 Paediatric rotation Germany	Roleplay	Peer roleplaying as patient's parent 3 cases per session, 3 training sessions over 3 weeks, 2.5hrs each (9 cases total)	Comparison of peer RP and SP in acceptability and realism of scenarios	Controlled trial	Students interacting with simulated patient parent	Acceptability of the activity was very high in both groups Students in the simulation group rated the activity's worth and usefulness significantly higher	Feedback from SPs may have been multifaceted (due to training), compared to peers	1	10
Bosse et al 2012	103 5 of 6 Paediatric students Germany	Roleplay	Peer roleplay for communication skills, student practises communication skills, with roles of physician, patient or observer 9 cases total over 3 sessions	To elucidate the effects of different training methods on communication competencies.	Randomised controlled trial. Assessment with OSCE, assessors blinded. Self-efficacy measures after each session.	Control: received seminar teaching only Simulated patient: students practised with a simulated patient in the role of physician or observer	Self-efficacy: both peer and simulated patient groups had significantly higher scores compared to the control group Both intervention groups performed significantly better in the OSCE than the control group; peer roleplay group was significantly better than the simulated patient group	Playing the parent of patient role may increase empathy and understanding of the parent's perspective Peer role play helps develop communication skills	2b	10
Brazeau et al 2002	n unknown 3 of 4 Family medicine clerkship students USA	Evaluation activities – single or discrete occasions	Peer observation and feedback of OSCE stations, in addition to faculty observation and feedback	To use OSCEs for teaching		Nil	Faculty members found the process of students giving feedback to their peers educationally useful	Opportunity to discuss strengths and weaknesses Observation of different interaction styles Practise for examinations	0	2

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Burgess et al 2013	94 4 of 4 Senior clerkships Australia	Evaluation activities – single or discrete occasions	Peer formative long case – training provided for feedback (Pendelton model) and how to assess others	To assess student perception of their ability and experience of providing feedback	Survey, focus groups	Nil	95% completed questionnaire 80% confident to make a judgement 82% adequate skills for feedback 42% not confident with neg feedback 71% no further training required 90% giving fb a useful activity 41% (39 students) attended focus groups	Social discomfort in providing fb to peers (accuracy of fb, adequacy of training) Opportunity for self-reflection of clinical knowledge & skills Development of professionalism attributes, sense of responsibility to assist peers	1, 2b self report	10
Burnett and Cavaye 1980	186 5 of 6 Surgery rotation Australia	Evaluation activities – over a period of time	Peer assessment of performance on surgical clinical rotation – in groups of 6	No research question	Survey of students alongside peer assessment	Nil	Correlation with final grade r=0.991, with staff assessment r=0.993, self = r=0.990 62 of 175 students responded they were not comfortable in making peer assessments, 97 were comfortable. Students were confident that they had made a fair and responsible assessment of their peers.	Nil	1, 2b	5
Cave et al 2007	359 of 396 (91%) Year 3 (first clinical year) All students 124 standard 107 intervention A(group 2) 128 in intervention B (group 3) UK	Evaluation activities – single or discrete occasions	Students attend teaching sessions run as mini OSCE with peer, tutor and actor giving feedback, four times a year	To investigate introduction of standard assessment criteria into communication skills teaching, and their effect upon OSCE performance To investigate students' ability to self and peer assess, compared to tutors and sim patients To investigate the relationship between	Randomised trial End of year OSCE 4 x 5min communication skills stations	2 comparison arms: Students access standard assessment criteria on web, or students are given a copy of criteria	No difference in OSCE performance between groups Consultations: Peer scores were highest (mean 21.7, SD 1.8) then SP (20.5, 2.9) self (19.9, 2.4) and tutor (19.4, 2.7). Peer, self and tutor scores all correlated (self-tutor 0.40, peer tutor 0.33, self peer 0.32) but SP scores did not. No significant correlation between OSCE and teaching session	Students trained to use assessment criteria and given anchors are able to assess themselves and peers effectively.	0? Skill in peer assessment = 2b?	9

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
				communication skills teaching and the OSCE			performance.			
Chou et al 2011	42 3 of 4 Medicine, Surgery, Psychiatry/Neurology clerkships USA	Discussion based	Weekly peer group meetings with faculty facilitator during a longitudinal placement with fixed peer groups	To evaluate the program: students' perception of peer group support, and overall program satisfaction	Survey Focus groups Analysis of marks	Students undertaking regular clerkships	No difference in academic achievement. Intervention students performed significantly better (p=0.05) on a clinical performance examination	Benefits Mutual support Value of group-based reflection (venting, dealing with emotions) Implications for patient care – teamwork Learned skills for relationship building	1, 2b	10
Chou et al 2013	163 3 of 4 First clinical year USA	Evaluation activities – single or discrete occasions	Peer feedback on formative video recorded 3-station clinical skills exam with standardised patients, faculty member observes from another room.	What is the role of prior peer-learning relationships between students in delivery and receipt of feedback	Survey for student satisfaction Analysis of transcripts of videotaped encounters to determine specificity of feedback	Prior peer-learning relationships vs no shared group-work in preclinical years	No significant difference on satisfaction with feedback, or in number of feedback points. The prior peer learning group gave more corrective feedback on communication skills (p=0.014)	Hypothesised that trust (from pre-existing relationship) enhances openness to feedback	1	10

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Chunharas et al 2013	89 5 of 6 Paediatrics rotation Thailand	Roleplay	Practising SC and IM injections on each other after education session Students provide each other feedback on technique and pain level	To evaluate satisfaction with the teaching method, perceptions of confidence, feeling of empathy towards the patient, and performance of the task	Controlled trial – no randomisation. Comparison of performance scores and self-confidence ratings	Standard education and practise on a manikin	Students were significantly more satisfied compared to manikin practice alone. Both groups had significant improvement in confidence after the education. Students in intervention group performed better in giving the injection and also preparing the patient	Increased empathy.	1, 2b	8
Fornari et al 2011	93 3 of 4 Ambulatory family medicine USA	Teaching - knowledge	Students assumed the role of patients and attempted to obtain emergency contraception from a pharmacy, and then reported findings to peers	To measure change in knowledge and attitudes re: emergency contraception	Non-randomised trial – Pre and post knowledge test	Three groups: Students playing a patient role Students being taught by their peers (who played the patient role) Conventional education group (lectures)	Students who participated in the experiential learning component (being the patient) had the most marked knowledge increase. No significant different in knowledge scores between groups nor over time.	The experiential learning process through assuming the role of the patient Teaching peers aided in synthesis of knowledge, purpose to the learning (also helping peers learn), and increased responsibility towards learning	1,2b	9
Fryer-Edwards et al 2006	93 3 of 4 Medicine and surgery USA	Discussion based	"Ward Ethics": peer discussion on ethics and values based on student ward experiences facilitated by a faculty member. All students invited to the voluntary sessions	To understand faculty members' experiences	Student questionnaire Facilitator interviews	Nil	102 student evaluations. 22 (92) evaluations, 15 faculty interviews. 94% of respondents (96) rated the sessions as valuable, useful or successful. 83% felt it helped them to manage situations 96% valued faculty presence	Faculty interviews – peers could do most of the problem solving in the ethics situations themselves Students were caring and supportive of one another Readily shared strategies for coping with difficult situations	1, 2	8

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Hahn et al 1991	168 3 of 4 Clinical placements USA	Discussion based	Human Values Discussion Group – peers sharing troublesome cases, facilitated by a faculty member	Are the group discussions a more effective way to deal with stressful aspects of training than traditional methods? Do the group discussions have an impact on students' discussions with their peers?	Survey	A cohort with no Human Values Discussion Group	Discussion groups more effective than three traditional teaching settings in helping students to cope with the stresses of clinical training. HVDG comparable to standard discussions with peers. Peer discussion was viewed as more helpful than interaction with hospital staff in coping.	Provided a unique and needed opportunity for guided discussion. Increased discussions with peers, improved coping skills	1	8
Harker and Jones 1977	37 3 of 4 ENT clerkship) USA	Evaluation activities – over a period of time	Self, peer and supervisor ratings. Students receive their ratings and comments but they did not contribute to grades	To develop useable rating instrument, if students accept peer & self ratings, if staff could reliably assess students in two weeks.	Analysis of ratings	Nil	No significant association between self, peer and staff ratings Some students felt that peer rating induced a form of competition. Feedback of data to students was well received	Students may be using the assessment tool differently from staff	1	8
Kernan et al 2005	280 3 of 4 Ambulatory internal medicine, USA	Teaching - knowledge	Peer teaching conference "Student Faculty Rounds" Students gave a 30 minute interactive presentation with learning objectives	To describe the implementation and evaluation of the PAL activity	Rotation evaluation survey and subject records	Nil	Mean score for the activity was 9.2 out of 10 (though all activities rated highly) only 65% students provided learning objectives.. Most presentations rated well by faculty (83% excellent or outstanding), but 35% too broad or much too broadly focussed	Effective learning tool for the presenter Relevant topics, at an appropriate level of complexity and detail Negative comments: presentation times were unequal, preparation was time intensive, quality of presentation variable Scripting is important to ensure students are heading on the right track	1, 2b?	8

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Knobe et al 2010	160 3 & 4 of unknown Sports medicine Germany	Teaching - skills	Peer taught musculoskeletal ultrasound 9 student tutors, 30 minute introduction and 1 week of preparation time. (i.e. minimal training)	Can peers teach musculoskeletal ultrasound of the shoulder as well as experts after only brief training?	Randomised controlled trial Evaluation of knowledge and skill gain through OSCE and MCQ Student perception of teaching quality measured through a survey	Students taught by expert teachers	No difference between peer and staff groups in MCQ or OSCE. Average time to produce desired images was lower in the staff group. Student tutors themselves had significantly better results on MCQ, OSCE and time for image production than the other groups Peer tutors were rated as significantly less competent	Peer tutors were more confident and satisfied with the experience. The tutors were extremely motivated volunteers – effects may be diminished if all are forced into this model.	1, 2b	8
Knobe et al 2012	304 3 & 4 of unknown Rotation unknown Germany	Teaching - skills	Volunteer student tutors teaching spinal manipulation therapy 90 minute introduction, 2 weeks of full-time preparation, opportunity to assist Groups of 6-12 students, 8 week course (30 minutes theory, 90 mins practice each week)	Can Spinal Manipulation be taught equally to both genders by student-teachers Do female and male students assess peer teaching equally?	RCT, with MCQ and OSCE to assess learning (students as patients), tutor ratings	Students taught by expert teachers	No different in MCQ scores. Manipulative techniques were better taught by professionals than peer tutors as assessed in OSCE Peer tutors were rated significantly lower than staff group, irrespective of gender	Females responded significantly better to peer teaching than males	1, 2b	9
Konopasek et al 2014	90 t 3 of 4 Medicine, paediatrics clerkships USA	Evaluation activities – single or discrete occasions	The Group Objective Structured Clinical Experience (GOSCE), 2.5 hour session, 3-5 students per group, alternating communication skill building and clinical reasoning exercises. Immediate feedback from instructors, simulated patients and peers.	To describe the GOSCE technique and demonstrate feasibility of approach. To assess impact on self-efficacy, perceived value of task, and positive emotion to a task.	Survey: Post GOSCE with some questions measuring retrospectively to pre-intervention levels of confidence. Questions around the activity and resultant learning	Nil	Students had significantly greater confidence in communication skills, and belief that communication skills were essential and could be taught, after the intervention. 89% of students believed that feedback exchange with peers enhanced their learning of the topic, equal ratings with instructor and sim patient feedback	Students gained confidence in communication skills Students improved ability to give formative feedback on communication skills, implying better ability to self-regulate learning	1	7

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Kovach et al 2009	349 3 of 4 Internal medicine USA	Evaluation activities – over a period of time	Peer evaluation accounting for 20% of the grade in non-cognitive behaviours, and 7% of the clerkship grade	Do peer assessments of professionalism correlate with other performance measures? Do peer assessments influence honours? What are student and faculty opinions of peer assessment?	Ratings tool Student survey for opinions of peer assessment	Faculty completed identical form	Correlation of peer ratings with other tests were weak but positive (faculty r=0.29, p<0.001; NBME subject test r=0.28, clinical skills r=0.28, election to honour society r=0.24, competency exams r=0.30) 71% of students felt comfortable rating peers	Striking differences between faculty comments and peer comments about individual students Concern that peer assessment bias influences ratings (eg friends rating friends), also that anonymity of ratings should be maintained.	1	9
Kühl et al 2012	30 Year 3-56students Rotation unknown Germany	Teaching - skills	Student tutors (from years 3-6) to teach echocardiography after an intensive training course	Can student tutors effectively teach the hands-on part of focussed emergency echo?	Randomised controlled trial Pre and post 5-minute OSCE to assess skill, assessors blinded	Students taught by expert cardiographers	Both groups improved significantly after receiving training. The expert tutor group performed significantly better than the student tutor group on the post-test. There were no differences in perception of staff and student tutors.	Nil	2b	10
Lawton and MacDougall 2004	12 First clinical rotation Graduate entry program UK	Evaluation activities – single or discrete occasions	Physical examination practice in pairs with peer feedback aided by a checklist, three times over a week	To provide objective feedback to peers	Randomised trial with crossover of checklist availability, performance tested at conclusion Student questionnaire for satisfaction	No checklist (crossover – different examination)	8 of 11 performed better in the examination where they had received and provided feedback from the checklist.	Students perceived the checklist was helpful and productive. Helped provide feedback.	1, 2b	5

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Levine et al 2007	152 Year unknown Psychiatry clerkship USA	Evaluation activities – over a period of time	Anonymous peer evaluation for teamwork, with a points allocation system and feedback for those who requested it Students could vote as a group as to whether scores counted towards grades for clerkship	To determine if peer evaluations correlate with other student performance measures, and to determine what qualities students rate in their peer evaluations	Analysis of responses to a peer evaluation form, including open ended section to write comments about why students awarded those scores	Compared to board examination score, clinic score, and Individual & Group Readiness Assurance Test (self-evaluation)	Correlations between peer evaluation and other assessments were positive and significant but modest. Highest R with individual readiness score 0.4130. Not correlated with GRAT. Reasons for scoring included personal attributes, team contributions, and cognitive abilities.	Students were hesitant to provide negative feedback Many students disliked the process Peer assessment may complement traditional assessments	1	9
Lie et al 2010	188 3 of 4 Family medicine USA	Discussion based	Peer group discussion facilitated by faculty after individual written reflections	Does a written reflection and peer group discussion enhance cultural competency and reflective practice?	Survey Assessment of reflection	Nil	Cross--cultural competency improved	Peer interactions added value to the process: recognising shared concerns, deepened understanding, problem-solving in a group.	1	4
Linn et al 1975	Unknown total n 3 of 4 Clinical placements USA	Evaluation activities – over a period of time	Peer rating on a "Performance Rating Scale" and self assessment.	Describe the development of a scale for self or peer rating Comparison	Analysis of rating forms	nil	Generated 928 ratings. Factor analysis found two main factors: Knowledge Factor and Relationship Factor Test-retest was done with 54 students. Reliability was high. Modest correlation with final grades between r = 0.296 and r = 0.503	Students consistently rated themselves lower than their peer ratings. Some students did not co-operate with the peer evaluation process.	0	9
Masters et al 2013	71 3 of 4 medicine, surgery, and neurology/psychiatry USA	Teaching - attitudes	Peer to peer handoff session: tips for the clerkships at that site at the start of the second rotation	To understand the processors that students undergo and orientation elements that may help students transition to specific clerkships	Observation, transcription and analysis of content of handover sessions	Nil	Handover session rated 4.6/5 Students received advice on: Workplace culture – expectations, norms, interactions with patients and supervisors, content learning, logistics and work/life balance	Eases transition between clerkships with differing cultures and expectations	1	10

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Mauksch et al 2013	22 4 of 4 Advanced Communication elective USA across 7 medical schools	Evaluation activities – single or discrete occasions	Paired Observation and Video Editing using a Patient Centered Observation Form, with immediate peer feedback.	To test a method of continuing communication training into the fourth year of medical school	Survey to students and faculty before and after the course	Nil	Significant growth in self-confidence across all measured domains Students rated the course favourably	Feedback from peer was rated less useful than feedback from faculty	1	9
Magzoub et al 1998	34 students Year unknown Community based education in rural areas Sudan	Evaluation activities – over a period of time	Peer assessment – rating on effort, community interaction, leadership, use of subject matter knowledge, 8 raters per student	To appraise the reliability, validity and acceptability of peer assessment in community settings.	Analysis of assessment forms Interviews with students	Nil	Reliability the instrument could distinguish good from poor performance) All components of the scale were correlated moderately highly (r = 0.606 to 0.889 and significant) Peer assessment did not interfere with group-related activities	Students felt the instrument measured important characteristics of future physicians	1	9
McLeod et al 2012	32 Final year medical students UK	Evaluation activities – single or discrete occasions	Using the DOPS (direct observed procedural skills) for tutor, self and peer assessment in a simulated setting	How could the DOPS assessment tool be used in the undergraduate curriculum?	Analysis of completed DOPS forms	Nil	Self-assessment more closely aligned with tutor assessment than peer assessment. Peer assessment scores were higher than self and tutor assessment.	The DOPS tool provided immediate feedback and clear objectives	1	7
Merglen et al 2008	16 4 of 6 Elective rotation Switzerland	Teaching - attitudes	Series of workshops on "how to best profit from your clerkships", developed and taught by both students and faculty members	To create a teaching skills programme directed at peers	Programme evaluation – students' ratings, oral feedback End of workshop formative assessment – simulated teaching interaction with a "standardised peer"	Nil	High level of satisfaction with the workshops No others reported	Nil	1	7

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Mounsey et al 2006	93 3 of 4 Family medicine USA	Roleplay	Peer roleplay for motivational interviewing for smoking cessation Practise with patients encouraged over the 4 week clerkship	Are SPs or roleplay better for developing motivational interviewing skills?	Randomised Controlled Trial Assessment via videotaped interview with SP	Peers were the control group (compared to simulated patients)	No significant differences between peer roleplay and SP training	Nil	2b	9
Parish et al 2006	128 4 of 4 Ambulatory care USA	Evaluation activities – single or discrete occasions	Group video review (2 hour session with 30 minutes per person) of student-selected video segment from Year 3 clinical competency exam with SPs Session recorded in Year 3, reviewed in Year 4.	What is the educational value of individual and group review of video recorded sessions with SPs?	Questionnaire to assess experience	Individual faculty review (90 minutes per student)	80% had a positive learning experience, individual significant higher than group (p=.04) Group review students were significantly less satisfied with length of review, amount of feedback, and setting of the review. Group review would have appreciated more individual review time	Peer review allowed them to see others in same situation and learn from each other. Students with peer review were reluctant to choose weaker segments of their performance, compared to individual review students who selected more segments of perceived poor performance.	1	9
Paul et al 1998	27 students 6 of ? Junior paediatric clerkship United Arab Emirates	Evaluation activities – single or discrete occasions	Video recording of history and examination in pairs. Self critique, group critique (with instructors) Self-feedback, peer feedback, instructor feedback	Feasibility of video review (VR) for teaching and assessing clinical skills What are students' perceptions about the effectiveness of VR feedback?	11 tapes randomly selected for scoring Questionnaire on experience	Nil	95% students wanted to view standards before performing 62% comfortable with peer feedback, found it useful and constructive. 85% believed peer and instructor feedback improved their self-critique and clinical skills		1	8

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Perry et al 2010	50 trainers, 192 trainees (and 229 controls) 5 of 5 Rheumatology rotation UK	Teaching - skills	Musculoskeletal examination format (GALS – Gait, Arms, Legs, Spine) taught to group of peer trainers, who then lead a tutorial with student. Each trainer has four training sessions, one per trainee group	To determine if PAL can improve musculoskeletal examination skills using GALS for final year medical students	Controlled trial Evaluation by confidence questionnaire and OSCE. Free text comments from trainers	Control group – no peer teaching	Trainer Confidence significantly better after training Trainers had a significantly higher pass rate for the OSCE compared to trainee and control groups. There was no difference in OSCE pass rate between the control group and trainees.	Trainers: Improved learning about examination skills, increased general confidence, saw the benefits of working in a relaxed setting in small groups. Concerns: PAL is time consuming, need to be confident about subject matter. Some students not happy being taught by their peers Trainees: Preference for teaching by SpR	1,2b	11
Roche et al 1996	200 5 of 6 Drug & alcohol teaching as part of rotation Australia	Roleplay	Peer roleplays to practice smoking cessation counselling Peer roleplays (patient, doctor & observer roles) with feedback	Relative effectiveness of four methods of teaching smoking cessation	Block-randomised controlled trial Pre and post assessment, SP interview VR with blinded raters, questionnaire	Control – standard teaching presentation Audio tape with faculty feedback Videotaped roleplay with faculty feedback	Post test retention – 60% or more assessed. All three experimental groups performed better than the control group No significant difference between experimental groups. Paired analysis – audio & peer groups higher on advice giving, peer & video higher on behavioural strategies	Actual observation allows for more potent training experience. Peer feedback found to be most effective	2b	8
Schwartz et al 1994	88 Year unknown surgery clerkship USA	Evaluation activities – over a period of time	Peer learning clerkship (with problem-based learning activities); Peer evaluation	To determine knowledge gain in a PBL clerkship	Analysis of peer rating forms and comparison with other assessment scores	Tutor and preceptor ratings	Peer ratings had higher correlation with the NBME examination (.51) than tutor or preceptor ratings (significant $p<.01$)	Peers are sensitive judges of students' knowledge and skills	2b	6

Author Year	n Student year Placement type Country of study	Type of PAL	Description of PAL activity or intervention	Research objective	Study design	Comparison group	Student outcomes	Benefits/Pitfalls	Kirkpatrick level	QA score
Sharma et al 2012	127 3 of 4 General Surgery, Anaesthesiology & Pain medicine Canada	Evaluation activities – over a period of time	Team-based 360° evaluation including peers, surgeons, anaesthetists, operating theatre nurses, ward nurses and patients Assessments collated in a log-book	To develop and evaluate the 360 feedback of assessment in a clinical clerkship over a single year, focussing on feasibility and acceptability to students and assessors	Analysis of evaluation tool responses Interviews with staff, focus groups with students	Tutor ratings	1068 assessors completed 3501 forms for 127 students. The internal consistency for peer assessment was 0.930	Immediacy of feedback Multiple sources of feedback	1	11
Van Bruwaene et al 2009	20 Senior medical students Surgical Belgium	Evaluation activities – single or discrete occasions	Peer observation and feedback on laparoscopic suturing simulation Peer scoring and feedback as requested by the trainee	Can computer based video training and feedback replace external feedback by an expert?	Pre-test, 1 week post test, 4 months retention test Measured number of trials to achieve expert performance, and difference in performance scores.	Control group with expert feedback (10 students)	All students able to reach expert level on 2 consecutive attempts – no difference between groups. No difference in retention of skill between groups 1 week and 4 months later. Control group (expert feedback) performed more variably on retention testing (Levene's test = 0.008)	Students receiving peer feedback developed better problem solving skills for independent practice	2b	11
Zaidi et al 2012	60 3 of 5 Internal medicine Pakistan	Teaching - attitudes	Identified students with "positive deviance" (PD) for good performance. Students were asked to devise strategies to enhance performances of peers, then disseminate through small group sessions, 1.5 hours each for 6 week. Voluntary sessions	Report the experience of using Positive Deviance to improve performance	Evaluation via mini-CEX and 360° evaluation Focus group	Control group	PD group performed better in mini-CEX compared to control group on interviewing skills and clinical judgement The 360° evaluation also favoured the PD group.	Increased motivation to learn clinical skills and see patients Replication of behaviours of PD students by the rest of the group (to do more and see more) Increased time spent seeing admitted patients	1,2a, 2b	8

Table 2.4 Quality appraisal of included studies using criteria from Buckley et al. 2009

Study	Year	Research question	Study subjects	'Data' collection methods	Completeness of 'data'	Confounding variables acknowledged	Analysis of results	Conclusions	Reproducibility	Prospective	Ethical issues addressed	Triangulation	Total Score /11
Al-Kadri et al	2013	1	1	1	1	0	1	1	0	0	1	1	8
Aper et al	2012	1	1	1	1	1	1	1	0	1	1	0	9
Asch et al	1998	0	1	1	0	0	0	0	1	1	0	1	5
Bennett et al	2012	1	1	1	0	0	0	1	1	1	0	1	7
Bosse et al	2010	1	1	1	1	1	1	1	1	1	1	0	10
Bosse et al	2012	1	1	1	1	1	1	1	1	1	1	0	10
Brazeau et al	2002	0	1	0	0	0	0	0	1	0	0	0	2
Burgess et al	2013	1	1	1	1	1	1	1	1	1	1	0	10
Burnett and Cavaye	1980	0	1	1	1	0	1	1	0	0	0	0	5
Cave et al	2007	1	1	1	1	1	1	1	0	1	0	1	9
Chou et al	2011	1	1	1	1	1	1	1	1	1	0	1	10
Chou et al	2013	1	1	0	1	1	1	1	1	1	1	1	10
Chunharas et al	2013	0	1	1	1	1	1	1	1	1	0	0	8
Fornari et al	2011	1	1	0	0	1	1	1	1	1	1	1	9
Fryer-Edwards et al	2006	0	1	1	1	0	1	1	1	0	1	1	8
Hahn et al	1991	1	1	1	1	0	1	1	1	1	0	0	8
Halder	2012	0	1	1	1	0	1	1	1	1	0	0	7
Harker and Jones	1977	1	1	1	1	0	1	1	1	0	0	0	7
Kernan et al	2005	1	1	1	1	0	1	1	1	0	0	1	8
Knobe et al	2010	1	1	1	1	1	1	1	0	1	0	1	9
Knobe et al	2012	1	1	1	1	1	1	1	0	1	1	0	9
Konopasek et al	2014	1	1	1	1	0	0	1	1	1	0	0	7

Study	Year	Research question	Study subjects	'Data' collection methods	Completeness of 'data'	Confounding variables acknowledged	Analysis of results	Conclusions	Reproducibility	Prospective	Ethical issues addressed	Triangulation	Total Score /11
Kovach et al	2009	1	1	1	0	1	1	1	1	0	1	1	9
Kühl et al	2012	1	1	1	1	1	1	1	1	1	1	0	10
Lawton and MacDougall	2004	0	1	0	1	0	0	1	0	1	0	1	5
Levine et al	2007	1	1	1	1	0	1	1	1	1	0	1	9
Lie et al	2010	1	1	0	1	0	0	0	1	0	0	0	4
Linn et al	1975	0	1	1	1	1	1	1	1	1	0	1	9
Masters et al	2013	1	1	1	1	1	1	1	1	1	1	0	10
Mauksch et al	2013	0	1	1	1	1	1	1	1	1	1	0	9
Magzoub et al	1998	1	1	1	1	1	1	1	1	1	0	0	9
McLeod et al	2012	1	1	1	1	0	0	1	0	1	1	0	7
Merglen et al	2008	0	1	1	1	0	1	1	0	1	0	1	7
Milani et al	2013	0	1	1	1	0	1	1	1	1	1	0	8
Mounsey et al	2006	1	1	0	1	1	1	1	1	1	1	0	9
Parish et al	2006	1	1	1	1	1	1	1	0	1	1	0	9
Paul et al	1998	1	1	1	1	1	1	0	1	1	0	0	6
Perry et al	2010	1	1	1	1	1	1	1	1	1	1	1	11
Roche et al	1996	1	1	1	1	0	1	1	1	1	0	0	8
Schwartz et al	1994	1	1	1	0	0	1	0	1	1	0	0	5
Sharma et al	2012	1	1	1	1	1	1	1	1	1	1	1	11
Van Bruwaene et al	2009	1	1	1	1	1	1	1	1	1	1	1	11
Zaidi et al	2012	1	1	1	1	0	1	1	0	1	0	1	8

A score of "1" indicates that the criterion has been met within the paper. A score of "0" indicates that the criterion was not met, or not mentioned within the paper.

Table 2.5 Number of studies in each PAL type; contribution to learner, clinician educator and patient benefits

			Recipient of benefit											
			Learner								Clinician Educator			Patient
Type of PAL	total N	Studies reporting results classified higher than Kirkpatrick Level 1 N	Topic content & metacontent	feedback	teaching skills	Empathy	Problem solving	Reflection	Interpersonal interactions	confidence, motivation	teaching skills	additional information on performance	enjoyment	Communication and procedural skill
Facilitated discussion between peers	4	2	2	0	0	0	2	2	3	0	0	0	1	0
Role-playing a patient for a peer	6	5	4	0	0	2	0	0	0	3	0	0	0	1
Peer teaching														
Content knowledge	3	2	3	0	0	1	0	0	1	1	1	0	0	0
Psychomotor skills	4	4	4	0	0	0	0	0	0	2	0	0	0	0
Attitudes and approaches to learning	3	1	3	0	1	0	0	0	0	1	0	0	0	0
Peer evaluation														
Discrete episodes	14	6	4	9	2	0	0	0	2	2	0	0	1	0
Over a period of time	9	3	0	5	0	0	0	0	2	0	0	3	0	0

Benefits for learners

The benefits of PAL for learners were numerous, and are listed below.

Ability to reflect

Students described a greater capacity to reflect on their practice and deal with emotions through taking part in a discussion group focusing on students' experiences of a clinical placement. In two studies, a facilitator was used to encourage open sharing and discussion, which helped students to vent or deal with emotions (Chou et al., 2011; Fryer-Edwards, Wilkins, Baernstein, & Braddock, 2006).

Confidence (or self efficacy)

Engaging more deeply in topic material led to students reporting being more confident about their own abilities, or their familiarity with the topic area, usually as a result of having taught it to someone else (Halder, 2012; Knobe et al., 2010; Perry et al., 2010). Additionally, participating in a role-play with peers increased students' confidence with the skill they performed (Hans Martin Bosse et al., 2012; Chunharas et al., 2013; Milani et al., 2013).Taking part in an activity to evaluate peers helped students to gain confidence in their ability to accurately assess peers on a skill (Aper et al., 2012; Konopasek et al., 2014; Mauksch, Farber, & Greer, 2013).

Motivation to participate

One study reported that students were more motivated to participate in clinical placements as a direct result of the PAL intervention. Highly successful students became role models for their peers. Through this interaction, the larger group of students reported being more motivated to be involved on clinical placements when they had someone encouraging them to do so (Zaidi et al., 2012).

Problem solving

Discussion groups enabled students to share dilemmas encountered during clinical placements, including diagnostic decisions and issues of ethics. Students were able to collaboratively problem solve, with minimal clinician input (Chou et al., 2011; Hahn et al., 1991). In a study of laparoscopic suturing training methods, there was little difference in the suturing performance of the two groups immediately following the teaching intervention. However, when re-assessed after four months, the peer taught group had superior suturing skills compared to the expert taught group. Van Bruwaene et al. (2009) therefore suggested that the group which received peer feedback gained greater problem solving skills, as they were less dependent on expert feedback.

Evaluative judgement

Evaluative judgement is related to the ability to self-evaluate, but also extends to the evaluations of others, and understanding the underlying standards of performance (Nicol, Thomson, & Breslin, 2014). Students in several studies reported that, through engaging in an assessment and/or feedback activity, they were able to make judgements on the quality of others' work, through gaining a better understanding of quality (Burgess, Roberts, Black, & Mellis, 2013; Parish et al., 2006). Explicit criteria helped the students to develop this ability (Bennett, Kelly, & O'Flynn, 2012; Cave et al., 2007).

Feedback

By engaging in peer assessment, students were provided with more feedback than they would have received otherwise, and from a different perspective (Al-Kadri, Al-Kadi, & Van Der Vleuten, 2013; Asch et al., 1998; Bennett et al., 2012; Brazeau, Boyd, & Crosson, 2002; Chou, Masters, Chang, Kruidering, & Hauer, 2013; Harker & Jones, 1977; Konopasek et al., 2014; Kovach et al., 2009; Lawton & MacDougall, 2004; Linn, Arostegui, & Zeppa, 1975; McLeod, Mires, & Ker, 2012; Paul et al., 1998; N. Sharma, Cui, Leighton, & White, 2012). Several studies highlighted the immediacy of the peer feedback as an advantage compared to commonly delayed feedback from a clinical supervisor (McLeod et al., 2012; N. Sharma et al., 2012; Van Bruwaene et al., 2009).

Navigation of placements

Students reported that PAL was useful to help them navigate placements and maximise learning opportunities, in both formal teaching sessions, and informal peer-led sessions (Masters, O'Brien, & Chou, 2013; Merglen, Agoritsas, & Nendaz, 2008; Zaidi et al., 2012). Here, the benefit of articulating learning strategies also aided the students who were reflecting on their experiences, as well as their peers who could adopt similar strategies in their own placements.

Responsibility to peers

By participating in peer assessment, students reported a sense of responsibility to their peers' development and progress (Burgess et al., 2013; Burnett & Cavaye, 1980). This was described as a reflexive process, where students became familiar with the concept of being reviewed by a peer (Schwartz, Donnelly, Sloan, & Young, 1994).

Supportive environment

The co-creation of a supportive environment was of benefit to students. This was reported to occur across a range of PAL activities, including the discussion of common clinical

dilemmas (Chou et al., 2011; Fryer-Edwards et al., 2006; Hahn et al., 1991), in peer teaching sessions, where students presented work and discussion was facilitated by a tutor (Halder, 2012), and also in assessment activities (Al-Kadri et al., 2013). Reasons cited for feeling safe and supported including being free from embarrassment (Al-Kadri et al., 2013), that students were friendly (Halder, 2012), and caring for each other (Fryer-Edwards et al., 2006).

Communication skills

Role-playing as a patient was reported to improve students' advice giving and formulation of behaviour strategies for smoking cessation, as opposed to the standard lecture format used for this topic (Roche et al., 1996). Students reported perceiving peer role-play and feedback as useful for developing their communication skills, though it was hypothesised that peers would tend to focus more on clinical aspects than simulated patients in the comparison group (Hans M Bosse et al., 2010). Students also reported that a Group Objective Structured Clinical Experience, where feedback was obtained from the simulated patient, facilitator and students, increased their confidence in communicating with patients (Konopasek et al., 2014).

Procedural skills

Some studies measuring the impact of PAL on procedural skills found that peer teaching was at least the equivalent of expert tutelage (Knobe et al., 2010; Perry et al., 2010). However, both Kühl et al (2012) and Knobe et al (2012) reported that the gains for students taught by peers rather than experts were significantly lower, though both groups had improved from their baseline, pre-intervention scores. Students who were designated teachers benefited more from a PAL intervention, outperforming their fellow students whom they had taught (Knobe et al., 2010, 2012; Kühl et al., 2012; Perry et al., 2010). Two studies involving peer role-play included the practice of a procedural skill, such ophthalmoscopy (Milani et al., 2013) or injection skills (Chunharas et al., 2013): in these studies, students who were required to practise the skill with a peer performed better than those who did not.

Education skills

Improved educational skills, such as feedback and the ability to teach, were reported as effects of PAL (Merglen et al., 2008). Many studies did not include training in education-related skills prior to the study, even when peer teaching was the main activity (Halder, 2012; Kernan et al., 2005; Masters et al., 2013). Some studies included student training on the subject they were to teach (Knobe et al., 2010, 2012; Kühl et al., 2012; Perry et al.,

2010). The effect of previous peer-learning relationships on feedback was examined by Chou et al (2013), who found that those who had been exposed to peer-learning were able to provide more specific corrective feedback.

Empathy

Students reported that they developed a deeper understanding of the patient experience. This was achieved through role-playing patients with their peers (Hans Martin Bosse et al., 2012; Chunharas et al., 2013; Fornari et al., 2011). Students additionally developed empathy for each other through the sharing of experiences in peer discussion groups (Chou et al., 2011; Fryer-Edwards et al., 2006; Lie, Shapiro, Cohn, & Najm, 2010).

Rapport building

Discussion groups were reported to develop rapport between students (Chou et al., 2011; Fryer-Edwards et al., 2006), as students were able to interact in a non-threatening environment where they were not required to compete with one another.

Benefits for clinician educators

Clinician educators were also a group who reported benefits from a PAL process. Clinicians were able to build upon some less frequently used educational skills, such as facilitating performance discussions and giving feedback (Brazeau et al., 2002; Halder, 2012).

In the case of peer assessment, additional information about student performance was gained, as a way to complement the educator's appraisal of student performance. This was particularly useful when students were rating each other on professional qualities, which clinicians were not always able to directly observe due to time constraints. It was also hypothesised that students may exhibit different behaviours when not in the presence of seniors (Asch et al., 1998; Kovach et al., 2009; Levine et al., 2007; Magzoub, Abdelhameed, Schmidt, & Dolmans, 1998).

The data on the correlation between peer appraisals and other measures of performance were equivocal. When peer and educator ratings were compared, there were a range of weak but significant scores from r= 0.28 to r = 0.33 (Cave et al., 2007; Kovach et al., 2009; Levine et al., 2007). Two studies did not identify a significant correlation (Harker & Jones, 1977; Schwartz et al., 1994), though Burnett and Cavaye (1980) found a strong correlation of r = 0.99. McLeod et al (2012) simply noted that peer ratings were consistently higher than tutor ratings of performance. Correlations between peer ratings and other tests of knowledge or performance were significant but weak, with board examination correlations of r = .37 (Levine et al., 2007) and r = 0.28 (Kovach et al.,

2009). Schwartz et al (1994) found a stronger correlation of r = 0.51 with knowledge gain in a board examination, using the difference calculated from pre- and post-clerkship scores. Linn et al (1975) found that peer ratings of knowledge had an r = 0.50 correlation with students' final grades, while Burnett and Cavaye (1980) calculated a r = 0.99 correlation. While peer assessment may provide additional information on performance, any attempt to replace educator assessments with peer ratings should proceed with caution.

Efficiency in teaching and time saving is a frequently speculated advantage of PAL (Al-Kadri et al., 2013; Peets et al., 2009; Roberts et al., 2009) however there was no evidence across the included studies that workload was reduced for faculty. In many situations, experts' time was still required to facilitate discussion or train the peer teachers. What was reported however was that the nature of clinician educator involvement changed to a more satisfying educational interaction (Fryer-Edwards et al., 2006). An example of this was that tutor enjoyment and involvement in peer-led presentations increased after shifting the responsibility for the preparation of materials to the students, and the clinician's role was to oversee and participate in the discussion (Halder, 2012).

Benefits to patients

No included studies were designed to detect improved patient outcomes. One study (Chunharas et al., 2013) did include patients however, in examining the impact of PAL on students' abilities. After a standard education session on administering injections to children (involving both didactic information and the chance to practise with a manikin), the intervention group were supervised in practising their injection skills on a peer. Both control and intervention groups were then assessed on their ability to administer an injection to a paediatric patient. The intervention group were more likely to satisfactorily prepare the child and administer the injection itself, and this difference was statistically significant. However, a patient-based (or patient's parent) score was not included, and the trial was not blinded. This amounts to a small amount of evidence for the direct effect of PAL based activities on patient satisfaction and patient outcomes.

Caveats in forming strong conclusions based on this evidence

Alongside the largely positive effects of PAL, there were some common pitfalls identified amongst the included studies. These were presented as conditions necessary for PAL to result in productive outcomes for the various stakeholders in clinical education.

Firstly, clear standards or guidelines for the PAL activity were needed, and students highlighted this transparency led to meaningful interactions (Bennett et al., 2012; Kernan

et al., 2005; McLeod et al., 2012). This included specific tools for peer assessment and feedback. Lawton & McDougall (2004) found that 8 of 11 students performed better on an examination if they had received feedback from a peer using a checklist (rather than freeform feedback).

Despite the positive reports of peer based feedback on performance, there were still concerns from both students and educators that peer feedback was inaccurate (Al-Kadri et al., 2013; Bennett et al., 2012). Peer feedback and assessment were commonly not well aligned with performance judgement by others, as reported earlier (under benefits for clinician educators). Some studies proposed that the lack of alignment between peer assessment and expert assessment could be due to assessment of different dimensions of student performance on the same rubric (Harker & Jones, 1977), or not understanding the standards by which they were marking their peers (Bennett et al., 2012; Paul et al., 1998).

Self-efficacy was suggested to be a crucial element in learning (Aper et al., 2012), which may contribute to improved health outcomes (Konopasek et al., 2014). While studies examining self-efficacy found it to be higher as a result of PAL activity (Hans Martin Bosse et al., 2012), this was not necessarily correlated to improved cognitive performance (Aper et al., 2012).

Generally, students felt comfortable being assessed by their peers, but not all did. Kovach (2009) reported that 71% of students felt comfortable grading their peers in a summative assessment. Some students refused to take part in peer assessments (Linn et al., 1975), whilst others were hesitant to give negative feedback about other students (Levine et al., 2007). Students reported feeling self-conscious about revealing their own deficits to their peers (Parish et al., 2006), leading to a less honest appraisal of observed performance.

Expert involvement was still greatly valued. Where there was a comparison between peer and senior tutors, the senior tutors were the preferred teachers (Perry et al., 2010) or givers of feedback (Mauksch et al., 2013; Parish et al., 2006). Students perceived their peer teachers as less competent compared to experts (Knobe et al., 2010, 2012). Expertise was hypothesised to still be necessary for teaching complex skills such as echocardiography (Kühl et al., 2012).

Discussion

This review examined the reported effects of same-level peer assisted learning on clinical placements for pre-registration medical trainees. While there have been several reviews of PAL in recent years (Burgess et al., 2014; Speyer et al., 2011; Yu et al., 2011), this study captured data from the increasing number of studies recently undertaken and published.

Many studies were of high quality, though were largely based on students' self-report of satisfaction and knowledge gain. The analysis revealed information about the broader effects of PAL on students and educators, and identified common pitfalls and suggestions for the implementation of PAL.

It was clear that there were benefits of PAL for learners other than gaining content knowledge and technical skills. The effects identified in this review largely aligned with the previously hypothesised benefits of PAL as listed in Table 2.6 (Lincoln & McAllister, 1993; Topping, 1996). A model of benefits is presented in Figure 2.3: learners themselves, their peers, their educators and their future patients are all potential beneficiaries of PAL. Though all elements are grounded in the empirical data, the amount of supporting evidence varies. There was little evidence for the impact of PAL on patient outcomes, which would add greater weight to the argument for the use of PAL. Some proposed benefits (metacognitive awareness, higher self-disclosure and professional identity formation) were not mentioned within the included studies. Burgess et al (2014) also identified the development of some of these "professional" qualities, however their review was restricted to peer tutors only.

Table 2.6 Benefits of PAL: supported by this review as compared to benefits hypothesised in the literature

Benefits of PAL supported by this review	Ability to reflect Collegial relationships with peers (i.e. supportive, rapport building) Lowered anxiety Student ownership of activity Compatibility with adult learning theory (active participation) Scaffolded exploration Immediate feedback Application of skills and knowledge (communication and procedural) Deep learning, improved retention
Benefits of PAL not previously hypothesised, identified through this review	Problem solving Empathy for fellow students and patients Evaluative judgement Navigation of placements Greater clinician satisfaction with education interactions Patient benefits – improved care from medical students*
Benefits of PAL not identified within this review	Metacognitive awareness Higher self-disclosure Professional identity formation Reduced clinician educator input; increased teaching efficiency

* = weak supporting evidence

(Lincoln & McAllister, 1993; Sevenhuysen et al., 2013; Topping & Ehly, 1998)

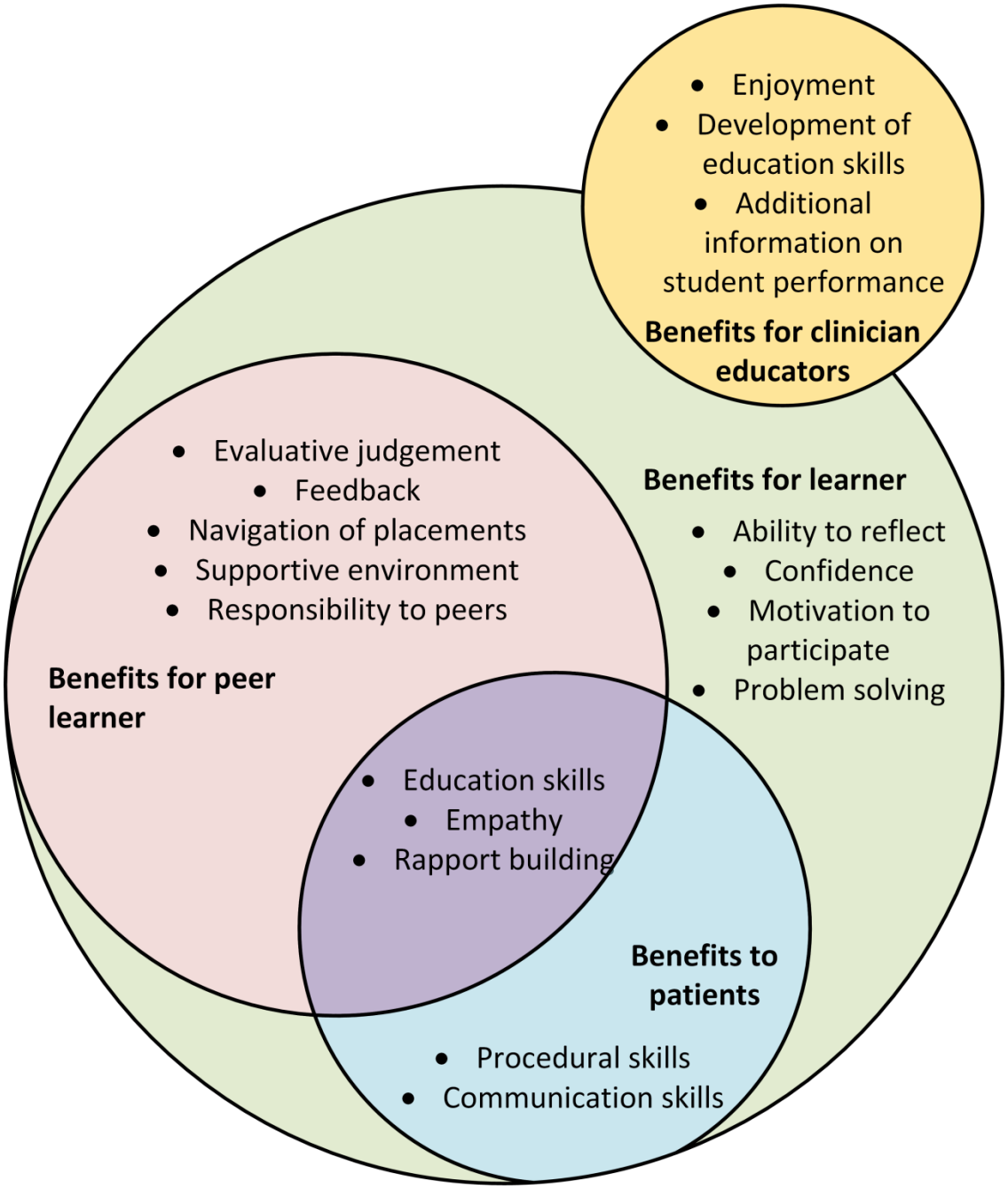

Figure 2.3 Demonstrated benefits of PAL to stakeholders

Few clinician educator outcomes relating to PAL were identified in this study. This may be due to a lack of the measurement of outcomes or that there are, indeed, few effects of PAL on clinician educators. The reported correlation of peer and clinician educator or external assessments ranged from weak to very strong; this may be due to differing study design, constructs measured, and the stakes of the assessment. Speyer et al 's (2011) systematic review focussed on the reliability and validity of peer assessment, however were also unable to draw conclusions about the reliability, given the heterogeneous nature of studies. The commonly proposed benefit of improving efficiencies for clinician educators was not

supported by this review, in line with a recent trial of PAL with physiotherapy students, which measured the associated workload for clinician educators (Sevenhuysen et al., 2014). However, Sevenhuysen et al (2014), as with many of the studies in this review, introduced the PAL intervention for the first time. This may mean that, over time, increasing familiarity with the PAL method may result in eventual time savings. Longitudinal studies of an implemented PAL program may be required to confirm this, and further investigation of clinician educator outcomes may be warranted to explore the effects of PAL for this group.

Several studies in the review introduced a tool, form or other explicit framework for students to engage in a PAL interaction (such as criteria for giving each other feedback). This may have contributed to the utility of the PAL interaction. Stegmann et al (2012) have demonstrated in an RCT in a simulated setting, that the provision of a framework for how to interact with peers was associated with more favourable outcomes than just allowing peer interaction on their own. This suggests that expert input into PAL activities, through provision of guidance and supervision, or forms and checklists, will make any planned peer interaction more useful.

Limitations

The papers included in this study represented the 'organised models' of PAL that have been implemented in clinical education. It is likely that much of the PAL undertaken in clinical environments occurs outside formal settings, as has been described previously (Kommalage, Thabrew, & Kommelage, 2011; Tai, Haines, Canny, & Molloy, 2014), and therefore we cannot measure the effects of initiatives or interactions we are unaware of. We did attempt, however, to collect and analyse a broader range of activities and their effects, so more studies were included rather than excluded, and older papers were not excluded.

The majority of papers included contained a large component of self-report, which is known to be more subject to bias. Though self-report may be a valid form of measurement for dimensions such as self-efficacy, the benefits as reported by learners in these studies would ideally have been further explored by external assessment, and potentially in experimental (i.e. randomised controlled trial) conditions. Patient and long-term outcomes were not extensively examined within the included studies. Favourable outcomes in these areas may also assist with the argument for the implementation of PAL.

The systematic review methodology also has its limitations: by using a defined set of search terms, papers which discuss the same topic of peer learning in different terms will not have

been detected in the search. The process of screening and excluding papers, whether carried out by one or more reviewers (even when using a decision guide) may result in the omission of relevant papers. This was mitigated through the hand searching of reference lists of included papers for additional references. Eva (2008) additionally argues that, in a quasi-experimental field such as medical education, the biases may in fact be constant (e.g. results are in favour of the novel educational method) and as such, a pooled analysis is also likely to be in favour of the intervention. We specifically searched for and identified pitfalls within the included studies to ensure a balanced review.

Conclusion

This review identified the effects of same-level PAL aside from improving students' content knowledge and procedural skills. The included studies suggested that PAL assists learners to develop evaluative judgement, teaching skills and collaborative skills. Some benefits for clinician educators and patients were also uncovered, which warrants further investigation. The additional value that same-level PAL could contribute to learning in the clinical environment, developing qualities required for a doctor in the workplace, suggests that PAL could be integrated across all clinical placements. Both clinician educator and student training would be required to ensure the educational potential of PAL is harnessed, and this may extend to exposing students to a curriculum on educational principles and skills in both their pre-clinical and clinical years. Including learning outcomes relating to the ability to interact appropriately with peers and assessment of students' involvement in PAL activities is also likely to encourage uptake of PAL. The more widespread use of PAL would enable higher-level outcomes (i.e. the impact of PAL on collaboration, teaching skills, practice development and patient care) to be more readily measured in the future, thus providing an even stronger evidence base for the use of PAL.

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Summary

This chapter commenced with a definition of PAL, an exploration of the theoretical basis for PAL for medical students in the workplace environment, and a summary of the types of PAL activities reported in the literature. The pre-existing uses of PAL in medical education were then enumerated, with supporting evidence for its efficacy as a teaching and learning method, and students' perceptions of their experiences. Through this work, it was determined a gap existed in the literature: there was less information available on the uses and benefits of same-level PAL in clinical education. This supporting evidence was critical to justifying a research project and thesis on the use of same-level PAL in clinical education. A systematic review of the literature on same-level PAL in clinical medical education was conducted, which established that the benefits to students included improved professional skills, and that there were also benefits for clinician educators, and patients which warranted further investigation. This chapter therefore justifies the need for a program of research within same-level clinical PAL, and highlights the questions that are still largely unanswered in the literature.

Research Questions

This research aims to examine the phenomenon of PAL in the clinical learning environment, as enacted by third year medical students in the Monash University MBBS course. A series of research questions were therefore developed, arising from the literature on PAL in the clinical setting:

- What are the effects of same-level PAL in clinical medical education? (partially answered through the systematic literature review)
- What are students and educators' attitudes to PAL in clinical medical education? Do they find it helpful for learning?
- What types of and how often are PAL activities undertaken on clinical placements?
- What are the facilitators and barriers to PAL specific to the clinical environment
- Do students' PAL practices in the clinical environment change over time? If so, how do they change?

To address these questions, a suite of research methods were required. The development of the individual studies generated additional specific research questions, which accompany the research methods. The methods and underpinning methodology will be explained in Chapter 3, commencing with the epistemic stance of the researcher.

Chapter 3
Methodology & Methods

"it is much less worrying to concern oneself with the correct details of method and methodology than to tangle with the philosophy of science."

(Chamberlain, 2000, p. 293)

Chapter 3 Methodology & Methods

Introduction

This research was designed according to the five research questions outlined Chapter 2. The underpinning theories of knowledge, knowing, and learning were crucial to formulating the research strategies, and therefore the project design and specific methods. Of particular concern was the need to investigate and represent not only the perspectives of the students, but also educator perceptions and experiences of peer assisted learning.

This chapter discusses firstly the conceptions of knowing, or epistemology, in relation to the study design, and gives an overview of the informing methodological traditions. The theoretical framework for the project is then outlined, and hence the overall morphology of the research. Detail is then provided about the specific methods used within each of the phases. Finally, an overview of the specific data analysis methods is presented.

Epistemology

Epistemology is defined by the Oxford dictionary as "The theory of knowledge, especially with regard to its methods, validity, and scope, and the distinction between justified belief and opinion." (Oxford University Press, 2015)

Within a constructivist paradigm, an individual's knowledge is constructed through their own experiences and understanding of their experiences. Therefore, multiple perspectives may arise from a single event, experience, or teaching moment[13]. That knowledge and learning is developed through experience has already been discussed in Chapter 2 Background, with relation to the learning undertaken by medical students, especially in relation to peer learning. However, this constructivist understanding has implications for the research project design: a single quantitative method of investigation, or investigation of a single perspective, is unlikely to be able to fully investigate the phenomenon of peer learning.

A pragmatic use of methodologies

The research aims were unlikely to be met simply by observing students, nor only by asking them to self-report on their PAL experiences. To ignore the clinician and educator perspective would also develop a one-sided view of peer learning in clinical medical education. Additionally, whilst academics within medical education value qualitative work, many of those who do the on-the-ground teaching are clinicians, and therefore, scientists,

[13] This may be how peer learning has come about: different experiences and interpretations of a single teaching event may lead to various students emphasising different components of the teaching

based in a quantitative empiricist paradigm where statistical analyses and international, multi-centre randomised controlled trials are privileged. To bridge the often-large gap between educationalists and clinicians (Yardley, Brosnan, & Richardson, 2013), a mixed-methods approach to the project was taken. This entailed incorporating techniques from both quantitative and qualitative research traditions, keeping the deep and rich narrative of qualitative work (Bazeley, 2013), but understanding the target audience in the 'real world' would be more likely to accept this work if supported by a quantitative approach, and the opinions of experts in the field, who have authority and position in the hierarchy.

A mixed-methods study must, by default, involve transgression of methodological boundaries. Bazeley (2013) suggests that a pragmatic approach to research should use methodologies to inform and guide the development of the methods, rather than adhering strictly to the 'rules' in a sort of methodolatry[14] which privileges the methodology over the subject and intent of the research. Patton (1999, p. 1208) recognises that "the important challenge is to match methods appropriately to empirical questions and issues, and not to universally advocate any single methods approach for all problems". The following section briefly outlines ethnography and the case study methodology. These are the two research methodologies from which strategies and methods were adopted for this project.

Ethnography

Ethnography is steeped in anthropological tradition: up until recent times, keen anthropologists would embark on a 'prolonged field study' as a 'rite of passage' (Rist, 1980) to become part of, and study, a tribe, culture, or people that was foreign to their own[15]. These methods were adopted by the Chicago School of Sociology and applied to local social issues and phenomena (Reeves, Peller, Goldman, & Kitto, 2013). The word ethnography comes from the Greek *ethnos*, (folk, people, nation) and *graphos*, I write: the study and recording of human cultures. The researcher is the research instrument (Pope, 2005). The immersion afforded by long periods of contact enables the researcher to develop a full picture of all the customs and understandings of a culture. The primary forms of data collection in this methodology include field notes, interviews, focus groups, and reflective memos (Bazeley, 2013), and analysis commences after some time in the field (Rist, 1980).

[14] The term "methodolatry" is also used in quantitative paradigms to indicate the deference to the double-blinded RCT. In qualitative fields it privileges methodological concerns (i.e. staying true to the methods) over a pragmatic approach which answers the question asked (Chamberlain, 2000).

[15] Reeves et al (2013) write that this attitude to the "other", where "foreign people" could be easily categorised and their motivations and workings explained to "the world" through the interpretation of largely white people, was closely linked to the colonialism associated with the British Empire.

Ethnography has been used in the field of medicine for over 50 years (Atkinson & Pugsley, 2005). *Boys in White*, a seminal study of medical student culture, was undertaken by Becker, Geer, Hughes & Strauss (1961) in the late 1950s. The authors claim that their study had "no design", and instead sought to understand "what medical school did to medical students other than giving them a technical education" (Becker et al., 1961, p. 17). Being completely without aim, a number of researchers spent multiple years within a single medical school, experiencing on-campus teaching, pre-clinical teaching, and a number of different placement types, to cover the entire medical school experience. Their findings focussed on the development of medical students' conceptions of roles and responsibilities, their views of patients, and perspectives on their future practice. The benefit of this method of research is that the researcher "is in a position to make sense of the otherwise invisible aspects of medical school culture, of the hidden curriculum of medical instruction" (Atkinson & Pugsley, 2005, p. 233). It is therefore an appropriate choice for the study of peer learning, something which seemingly 'unofficially' occurs, and importantly, to explore it from the lived experiences of those involved, that is, students and educators.

This project does not go so far as to immerse the researcher in medical students' clinical placement undertakings for a year or more at a time. Aside from the scope being impractical for a 'three year' doctorate degree[16], the data generated would be so much to make it an insurmountable analysis task within the confines of the doctorate. This collection of data (and imposition on participants) without a clear plan for analysis could be seen as ethically unsound, as the time burden on all groups may outweigh the potential benefits of the project. It could be therefore said that we did undertake a type of "hit and run" or "blitzkrieg ethnography" (Rist, 1980). Rist (1980) criticised this as being contradictory to the fundamentals of ethnography: building rapport, familiarity, trust and insight requires not only time, but a relationship to be built between the subjects of the ethnography, and usually a single researcher. However, given the previous experiences of the researcher as a medical student, the cultural 'gap' between researcher and research subjects was likely to be reduced. The proposed length of the observational component enabled for rapport and trust to be gained. This component of the project therefore provides the depth of inquiry, whilst other methods gain insights from a broader range of stakeholders.

[16] Monash University now offers PhD enrolments of three years and three months. Completion prior to three years and six months is considered timely; candidates prior to 2015 were offered a four-year enrolment (Monash University, 2015b).

The Case Study

Case studies are an empirical method in social science research, where "the focus is on a contemporary phenomenon within some real-life context" (Yin, 2003, p. 1). It is anticipated that different peer groups may behave differently, hence a case study approach could examine multiple groups. The aim of a case study is to explore a phenomenon, then generate and expand on theories, to illuminate the subject, place, organisation or *thing* that is being studied. Case studies may be single or plural, nested within a larger structure, or holistic (examining a phenomenon as a whole). The purpose is not to pool data, but to identify similarities and differences, both between groups, and also between theory and data.

Yin (2003) suggests that the type of study done is dependent on what the aims of the research are: to investigate the 'how' and 'why', that is, the explanation that underpins as phenomenon, requires a case study, or investigative history. Conversely, if the purpose of the study is to explore an area and quantify the "who, what, where, how many, or how much", then a survey is more appropriate.

As an empirical research method, strict protocol is important in a case study for replication and consistency where more than one researcher is involved (researcher triangulation). Data triangulation is also important, with multiple sources or instances of a phenomenon explored. This can involve observation of a number of people, or examining documentary evidence. Interviews and focus groups can also be forms of data collection in a case study. This method therefore allows for the study of specific groups, such as a medical curriculum conducted at a single university.

The entire research project could be construed as a single case study, exploring the phenomenon of PAL within a single course at a single university. The broader range of methods chosen, including the use of quantitative methods and quantification of PAL undertaken during clinical placements, somewhat precludes this study from being wholly a case study in itself. It does borrow, however, from Yin's (2003) concept, in that this study will enable theory building about and for the use of PAL in clinical medical education. The project design will outline all stages of the project, including the case study which comprises Phase 2.

Project design

Biggs Constructive Alignment as a Framework

This research project examined PAL through the framework of Constructive Alignment, an outcomes-based, common sense approach to education: students' learning activities should enable them to achieve the intended learning objective, and the assessment they undertake should be able to measure if they have achieved that learning objective(Biggs, 1996, 1999). Constructive Alignment relies on the notion that "what the student does is actually more important in determining what is learned than what the teacher does" (Biggs & Tang, 2007; Shuell, 1986, p. 429). The constructive element of Constructive Alignment refers to constructivist theory, that is, learners construct their skills or knowledge through participating in activities. The alignment component indicates the correspondence of learning activity and assessment task to a specific learning outcome. This consistency of message of what is to be learned, what is taught, and what is assessed should result in deeper learning, and signals to learners that the content of the course is important.

Constructive Alignment therefore necessitates taking a broad perspective when considering what contributes to student learning: related intended learning outcomes, teaching and learning activities, and assessment tasks must be identified within a curriculum to ascertain *what* students might be learning. The focus is primarily on the students' activities; educators' inputs and perceptions are also important, but ultimately, learning is dependent on the students. Constructive Alignment is commonly used as a framework to construct a curriculum, however its principles can also be used when analysing and evaluating an educational program, through developing a curriculum map (Harden, 2001). Ross & Cameron (2007) recommended that PAL be implemented with constructive alignment in mind, ensuring drivers, objectives, learning activities and assessments match up, and suggested the use of curriculum mapping to gain clarity of how PAL might operate to improve students' learning. Robley, Whittle, & Murdoch-Eaton (2005) also employed curriculum mapping to determine the alignment of a curriculum with respect to generic skills. For something dispersed throughout the curriculum, such as PAL in the research context, this approach therefore allows for the identification of gaps and missing elements, rather than just what is there. Through incorporating student and educator perspectives, the hidden curriculum (i.e. unintentional outcomes) may also be identified.

It could be argued that adopting this encompassing approach to studying PAL precludes detailed investigation, as opposed to, for instance, a narrative inquiry into learners' PAL experiences, which results in detailed accounts of what PAL is and how PAL is experienced

by students. However, given the research project arose from a practical problem, and intended to arrive at practical conclusions which could inform an educational intervention involving PAL, including the broader context in which PAL is used was considered crucial. Constructive alignment was therefore chosen as the overarching framework to guide the research questions and study design, to gain a complete picture of PAL practices within the Monash University MBBS curriculum, with a particular focus on the clinical opportunities for PAL.

Study overview

As per the study aims, this research intended to investigate the effects of PAL in a broader setting, and within the local context, both students' and educators' opinion of PAL, what types of PAL were done in the clinical environment, how it was useful, and what the barriers and motivators to PAL were. While there were four distinct study methods within this research, these methods overlapped the categories of curriculum within the framework, and additionally, extended through the three phases of the research. To orientate the reader, the methods will be outlined in relation to the framework firstly, then expanded on in greater detail according to the study phase, following the flow of Figure 3.1.

Framework

The intended PAL curriculum was investigated through mapping the PAL elements within the pre-clinical curriculum. Interviews with educators in the clinical environment on their intended use of PAL were also conducted.

The enacted curriculum was explored through an observational study. This component used ethnographic methods in the form of a case study of Year 3 medical students at a single clinical school, across a number of hospitals.

The perceived curriculum was elicited from the Year 3 medical students through a survey on peer learning, and also through the case study, which also included focus groups and 'on the fly' interviews with students and educators.

Phases

The research was initially divided into two phases, which were intended to be undertaken in an iterative fashion, with the results of the first phase being used in the development and execution of the second. Phase 1 included the curriculum mapping and an initial survey to enable the pinpointing of activities suitable for observation. Phase 2 involved the case study; interviews with educators and students, and focus groups with students. The

results from Phase 2 (observational study) strengthened the findings generated in Phase 1 (scoping survey), and provided explanations for identified trends. On the completion of data collection and preliminary analysis for Phase 2, it was realised that an additional round of interviews with senior/expert educators involved in the curriculum would further strengthen the study, with the opportunity to extend the reach of the findings through comparison with their own experiences of peer learning in clinical education. It was also recognised that the case study design, especially to the biomedical world, does not allow for sweeping generalisations to be made as a conclusion. Phase 3 in its final format also incorporated an additional year of student surveys. Phase 3 therefore served the function of reinforcing the findings in both the intended and perceived curriculum categories, providing additional perspectives on the place of PAL within the curriculum overall.

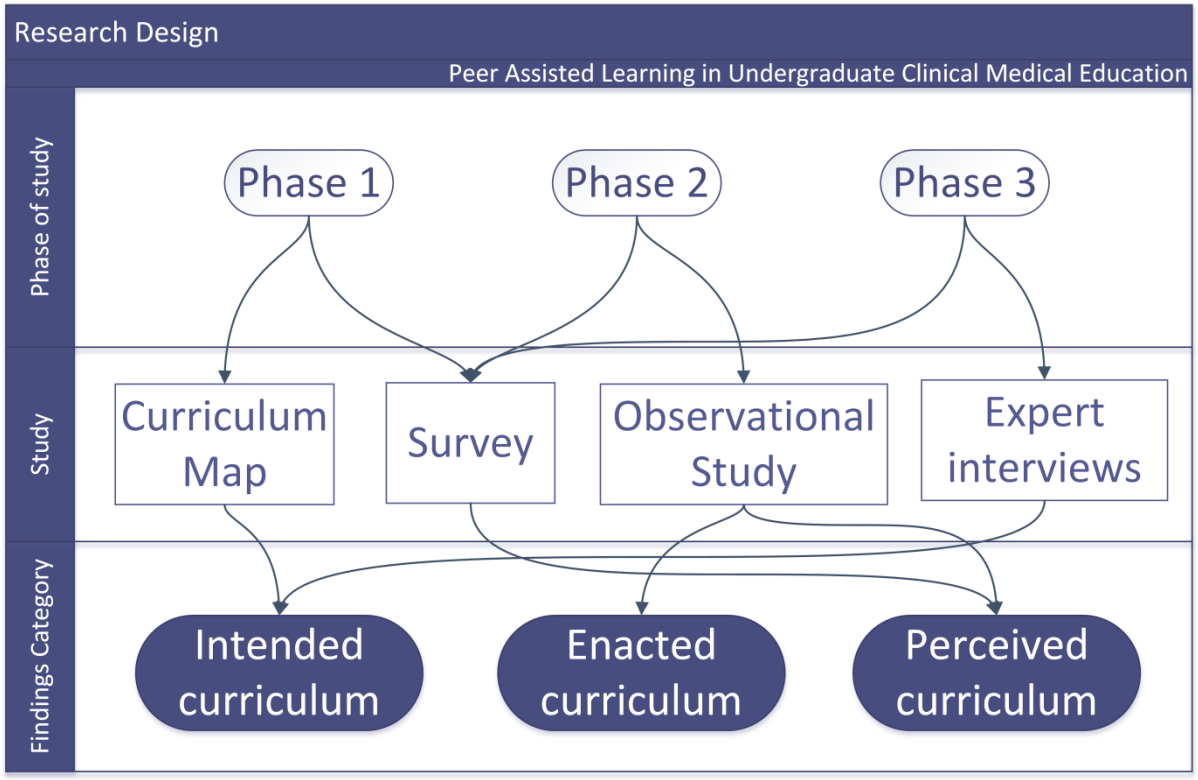

Figure 3.1 Design of research project

Phase 1

This phase was designed to ascertain the level of PAL already occurring in the Monash University MBBS curriculum, through two studies: generating a map of the formal pre-clinical (university-based) and clinical curricula (intended curriculum), and an exploratory survey (enacted and experienced curriculum within the clinical setting).

The aims of this phase were to:

- Identify PAL activities within the Year 3 Monash University MBBS curriculum

- Describe the perspectives and experiences of Year 3 medical students using PAL in the clinical placement setting

Curriculum mapping

The Monash University MBBS program has a fully integrated lecture-PBL hybrid curriculum, for which Harden (2001) suggests that curriculum mapping is necessary to demonstrate where teaching skills and concepts are situated within the course. A distinction should therefore be made between curriculum mapping, as an exercise, and the curriculum map, an object which is the product of such an investigation. This curriculum map of the Monash MBBS belongs to the latter category, as a created object which investigates only the intended curriculum. To fully characterise PAL as experienced by medical students, a broader approach using similar techniques is required: the remainder of the research project serves in this regard. This document analysis represents the initial work, done to confirm the theoretical presence of PAL.

To create a map of the curriculum, objectives, activities and perceptions are categorised into topic areas, analogous to the "declared, delivered and learned" categories. A fourth category, assessment, can also be included (Robley et al., 2005). Mapping of a curriculum involves collecting documents relating to it such as study guides and objectives (declared), lecture materials (delivered), examinations and assessment forms (proxies of learning), then methodically synthesising and recording all elements. Student perceptions are generally attained through survey, focus group or interview. As this is an exploratory map of the intended PAL curriculum (the aim being to identify PAL activities within Year 3 pre-clinical and clinical settings), only documentary evidence was deemed necessary to complete the map.

Staff involved in producing study guides for the course were contacted for access to current study guides, which included details of learning objectives, learning activities, assignments and their assessment criteria, and examinations.

Overall course objectives were accessed via the Monash University website course finder, where there is public access to all course (Monash University, 2012a) and unit objectives(Monash University, 2012b).

Search terms used for all documents were: peer, learning, teaching, cooper*, collab*. Activities requiring group work were also identified within the documents.

Resultant information was entered into a Freemind mind map to develop a visual representation of PAL in the curriculum.

Learner Survey

In order to sharpen the researcher's focus to what types of PAL activities take place in clinical education, where they occur, and how they are valued, a survey was conducted in 2012. This online survey captured an overview of the PAL practices of Year 3 students. Survey items were drawn from the literature, including locations and types of PAL activities and perceived benefits and challenges/drawbacks of PAL.

The survey was developed and reviewed by the research team, with JT writing the original survey items based on the literature review. These items were then expanded on by the research team, and the wording of questions was refined to reduce ambiguity in meaning. The initial and final forms of the survey are available in in Appendix A.

The survey was uploaded onto SurveyMonkey, where all Year 3B students (i.e. from Monash Clayton, Gippsland and Malaysia campuses) were invited to participate, with the chance of winning a movie double pass. This survey was re-administered to successive cohorts of Year 3B students in 2013 & 2014, to gain sufficient numbers to undertake statistical tests on the quantitative components. This included a psychometric analysis of the tool.

Psychometric analysis

At the conclusion of data collection, analysis of the psychometric properties of the appropriate survey items was undertaken to investigate validity and reliability.

A factor analysis was undertaken on the Likert scale items in the survey (i.e. the questions under headings Advantages, Disadvantages, and Experiences of Learning in the Clinical Environment). This was performed using the statistical program STATA/IC 11.0, where the command "factor" was used to achieve a principal factor analysis, including all Likert scale items (i.e. variables var143 to var173), and limiting the number of factors to 10. Appendix B contains the STATA outputs for the factor analysis, and the variable-item key.

In total, 91 responses were available for factoring involving all three areas whilst 138 responses total were available for only the Advantages and Disadvantages. Both of these analyses revealed that there were two main factors, which corresponded with the item enquiring about an advantage of peer learning, or about a disadvantage of peer learning. A third factor indicated some preference for expert teaching.

Two scales were then developed according to the factor analysis. The scale "advantages" contained 15 items, and had a Cronbach's alpha of 0.92, with an average inter-item covariance of 0.38. Since the clinical learning environment questions also loaded onto this

first factor, an alternate "advantages" scale was developed including variables 166, 168, 170 and 172. This scale had 19 items, with a Cronbach's alpha of 0.927 and average inter-item covariance of 0.361.

The "disadvantages" scale was comprised of 8 items initially, with a Cronbach's alpha of 0.755, and average inter-item covariance of 0.306. Adding the questions about the clinical environment, which also loaded principally on this factor, (variables 171 and 173) to form a 10-item scale reduced the reliability co-efficient to 0.746, whilst inter-item covariance was 0.242. Items 167 and 169 loaded onto a smaller third factor, which also contained smaller loadings from clinical learning environment items, which were included in the "advantages" or "disadvantages" scales.

It was therefore established that sections on PAL advantages and disadvantages did measure two different constructs (which were not necessarily opposing). The third section on the clinical learning environment did have some links with the previous two sections, however the correlation was not as clear for some items. Future studies could use only the advantages and disadvantages portions alone to examine attitudes to PAL, with some confidence that the responses would accurately represent students' views on these areas. Alternatively, this third factor may represent an additional aspect of PAL which requires further investigation and survey development to be fully captured (A. Field, 2013).

Phase 2

Observational study

This phase used case study methods (Yin, 2003) to investigate students' and tutors'[17] experiences of PAL. The initial unit of analysis was an allocated peer group within a clinical placement, with one student forming an "origin" or anchor point. Interactions within the group, as well as between tutors and patients were included. This approach aimed to capture all interactions that embody or encourage learning. End of day/session/task interviews were also conducted to complement the researcher's earlier observations, enabling a triangulation of observational and self-report data.

Taking a nested case study approach (within the larger case study, the research at a single university), comparison groups of students and their tutors were observed and interviewed. This ethnographic approach was used to gain a deeper understanding of what types of PAL students use on their placements, and how students and clinical supervisors perceived PAL.

[17] i.e. those in the clinical environment directly responsible for delivering bedside education to students in small group sessions. These are usually consultant medical practitioners, or senior registrars in training.

The aims of this phase were to:

- Describe the frequency and nature of PAL activities on Year 3 MBBS clinical placements
- Explore students' experiences of PAL activities to identify the features of successful PAL interactions during clinical placements
- Explore clinical supervisors' experiences of PAL activities to identify the features of successful PAL interactions during clinical placements

The two clinical sites chosen were part of the same health network. Hospital A is a small, general hospital of 229 beds, situated in the outer suburbs of Melbourne, while Hospital B is a large tertiary hospital (640 beds) in metropolitan Melbourne, with numerous speciality units. Both are acute hospitals, however Hospital B treats more complex patients of higher acuity. The environment in which students learn is therefore different: the opportunity for participation in general ward activities at a Year 3 level is higher at Hospital A. Students at Hospital B may receive less supervision on wards, therefore increasing the potential for PAL to be employed.

Recruitment

Students undertaking their placements at the selected health network were oriented to the research project in a lecture. All students addressed in the lecture were invited to complete the survey that was also used in Phase 1. This was intended to gather broader information about students' PAL practices, in addition to the observation component. Students interested in being observed for the observational component were invited to contact the researcher via the clinical site support staff. One group of students from each site volunteered to be observed.

Data collection

Two groups of students, comprising five individuals each, were observed for two weeks in total, once in August and once in October to capture differences in their behaviour, a total of four weeks of observation (Table 3.1). The time separation captured potential changes in learning behaviours, and also afforded the opportunity to observe students in different environments, as students' rotations were four to six weeks in duration.

Table 3.1 Schedule of Observations

		Week 1	Week 2	Week 3	Week 4	Week 5
Hospital A	Survey	Observation		Educator interviews if unable to schedule during observation weeks		
Hospital B			Observation			
	Week 6	Week 7	Week 8	Week 9	Week 10	
Hospital A	Initial data analysis			Observation		Survey
Hospital B	Hypothesis generation				Observation	

Specific activities were prioritised for observation, including bedside encounters and tutorials (i.e. those activities that were reported as key locations for PAL in Phase 1). Observations entailed shadowing a particular student (the 'anchor') from the group for half a day to a day at a time. This anchor was chosen pragmatically on the basis of their intended attendance at placements, and the activities that they intended to engage in, e.g. ward rounds, outpatient clinic, clerking patients independently or in a group, bedside tutorials, and classroom tutorials. Depending on student activities, different students were shadowed to gain exposure to a broader complement of potential student activities. On some days, no students were available for observation.

Access to students' activities was moderated by the students themselves, the clinical staff, tutors and patients. Whilst most were amenable to the presence of the researcher as observer, there were notably two instances where access was not granted. One tutor declined observation of a Mini Case Record[18] session, where students were undertaking one of their assessment tasks, worth a small percentage of their overall grade. A student also expressed a wish to not be observed during their Emergency Department placement, as they felt the researcher's presence would be too intrusive, compared to on the ward.

Field notes were taken to record students' activities and interactions. Chronological notes were written in a small reporter size (approximately A5) notebook in pen, describing location, type of activity, and actions of students. Where possible, verbatim dialogue was captured via these written notes. Timestamps were recorded throughout activities in order to examine time spent on activities. Students and tutors were referred to by initial within the field notes, both to maintain confidentiality, and also to increase speed of writing. Audio recorded interviews after tasks or activities and at the end of each day (where possible) were conducted with both the students and their tutors to understand motivations for the use and perceptions of PAL. For students, these were freeform in nature, depending on the day's activities, while tutors had a more structured interview,

[18] The Mini Case Record is based on the Mini-CEX, or Mini Clinical Evaluation Exercise, designed to be an objective measure of clinical encounter performance, with ratings on both technical and professional skills (Norcini, Blank, Arnold, & Kimball, 1995). Year 3 students are required to complete a total of eight Mini Case Records over the year; the first two are formative, and the remaining six count towards their end-of-year mark.

adhering to the interview guide contained within Appendix D. Discussions the researcher had with students outside of their formal learning activities (e.g. in the student common room) were also audio recorded where consent was given. Field notes were transcribed into word processing documents by the researcher. Some audio recordings were transcribed by the researcher; the interviews were sent for transcription by an external service and checked against the recordings for accuracy by the researcher.

To gain a perspective on how (if at all) PAL practices had changed during the course of the year, students were invited to participate in a focus group at the conclusion of the observations. This was designed to encourage students to reflect on what types of PAL and how they had engaged in PAL over the full year, how different clinical contexts may have influenced PAL, and also contrasting the opportunities to their preclinical (university-based) experience. The focus group schedule is available in Appendix E. A follow-up survey was also distributed at the conclusion of the year, however this clashed with the students' examination preparation, thus the few unique responses gathered at this point were combined with the pre-observation survey data.

Consent

Consent was a prominent ethical issue in this component of the research project. While it was relatively straightforward to explain the project to students and tutors, and to obtain consent for observation, the research allowed for varying levels of consent to be given. Students and tutors could agree to be observed and have field notes taken regarding their activities at a minimum; they could also consent to being audio recorded a) formally during interviews and b) informally or 'on the run' whilst on the wards, away from patients. Students could also consent to participate in interviews without being audio taped (where the researcher would take notes on the interview as best as possible), and separate to this was an option for participating in the reflective audio-taped focus groups. This design ensured that students could participate at the level they felt comfortable at.

Verbal patient consent was considered sufficient for the purposes of the research, as no patient information was being collected, and they were not the focus of the observations. The inconvenience to the patient's care by undertaking a full explanation, with written information form and a written consent form, was deemed to be higher than acceptable for research which was not focussed on the patient, and offered little direct return. Hence, a verbal explanation of the researcher's intentions, made by one of the clinical staff or the student if no staff member was present, prior to the researcher entering the patient area, was considered the most appropriate method of gaining patient consent.

Phase 3

This phase was introduced at a later stage in the research (in the third year of the program of research; 2014). It contained two studies, with two purposes: administering the same survey as in 2012 and 2013 to strengthen the quantitative findings by providing sufficient power for statistical tests, and interviews with expert educators, to ensure that educators' perspectives on PAL were adequately represented within the research, and act as a form of triangulation. This phase added rigour to the study through the triangulation of findings from the previous phases, and testing the credibility of the empirically generated framework.

The aims of Phase 3 were to:

- Explore students and educators' attitudes to PAL in clinical medical education (i.e. perceptions of the impact of PAL on learning)
- Determine facilitators and barriers to using PAL in the clinical environment

Expert interviews

The Phase 2 observational study was undertaken to investigate PAL activities medical students engaged in on their placements. This enabled strengthening of the emergent theory around how students engage in PAL, and the development of a framework of practical (implementable) PAL activities. These findings were then triangulated with an additional group of stakeholders, for the purposes of ensuring credibility and internal validity (Mays & Pope, 2000; Shenton, 2004). Since this group, as expert clinician educators, had had extensive experience delivering student clinical placements, this component of the research could also be viewed as a type of member checking *and* inviting broader comment from colleagues involved in medical education (Fereday & Muir-Cochrane, 2006). This type of triangulation, with initial data collection from students, and member-checking not only with students but also staff, has previously been conducted to improve credibility and transferability (Al-Kadri et al., 2013). It is different to a Delphi panel process, where participants are drawn from a broader pool of experts, cross-institutionally, nationally or internationally, and multiple rounds of clarification and consensus are undertaken to develop an expert-informed model (Srinivasan et al., 2011). Here, participants were drawn from the same local context in which the other phases of the study were undertaken, and individual interviews were conducted. This ensured that findings remained contextually appropriate. Collecting a broader range of views from clinician educators outside the study setting may also have allowed comparisons and contrasts, however were beyond the scope of this project.

Local clinical education leaders were purposively recruited and interviewed regarding their reflections on the findings. Experts were identified within the Monash University MBBS: both academic curriculum leaders (who had previous clinical education experience) and hospital-based clinical "deans" were interviewed. These leaders were considered by the research team to be experts, as they had supervisory, co-ordination and managerial roles in the construction and operation of medical students' clinical placements. Their experience also meant that they had many cohorts of medical students pass under their gaze. Equally, all expert educators had been involved in the preparation and professional development of the clinical teaching staff. Therefore, these 'expert educator' participants in Phase 3 had had exposure to what seemed to work for PAL, and did not seem to work on medical clinical placements, from both the learners' and educators' points of view, from within the same context as the preceding study phases. This experience allowed for refinement of the PAL model, through exposure to findings from the previous Phases. Their commentary and explanations were then incorporated into the development of strategies to enhance PAL in the clinical setting.

For the expert interviews, a short interview schedule was developed based on the findings of the previous phases (Appendix F). In addition to this, a presentation of the findings to the experts was developed (Appendix G). This enabled the experts to comment on the findings, and to provide their own experiences of using PAL with students, as well as commenting on barriers to the implementation of PAL.

Survey

The survey used in Phase 3 was the same survey used in Phases 1 & 2: again, it was administered online using the Qualtrics platform. The chance to win a double pass movie voucher was offered to all participants who completed the survey. The survey was administered at two time points in the year: for the month of April 2014, and the month of August 2014. This was done to attempt to gain sufficient responses to conduct a time-based analysis of peer learning. However, the number of students who completed the survey at both time points was insufficient for this purpose. Therefore, the data from the two time points were again combined, removing duplicate entries using the unique anonymous identifiers that students created to allow for the matching to occur.

Ethical approval

The research did involve human subjects. Therefore, ethical approval was sought from the appropriate overseeing body for each phase of the research. All letters of approval are contained within Appendix C.

Phase 1: Initial ethics approval for the survey component was granted on 28 August 2012 by Monash University, Project number CF12/2429 - 2012001312.

Phase 2: The observational study was approved by Monash Health HREC, Ref 13167L on 10 July 2013. An amendment to include the Moorabbin site was approved 8 August 2013, as the initial application had only anticipated students attending at the Hospital A and Hospital B sites. This ethics application also received approval from Monash University (Reference CF13/2174 - 2013001117) on 31 July 2013, as a result of the Memorandum of Understanding between the two organisations, which allows for approval from both bodies.

Phase 3: An amendment to the initial Monash University application was approved on 5 February 2014 for the additional survey conducted in 2014. The expert interviews were covered under the Phase 2 ethics application which detailed the procedure for interviews with educators who were involved with the Year 3 curriculum.

Analysis methods

Qualitative

Qualitative methodologies have been previously discussed at the beginning of this chapter. At this point a justification is presented on why one type of qualitative data analysis was chosen over another. At project conception, given the research questions and aims, two key analytical methods for qualitative data were considered for use, Grounded Theory and Thematic Analysis. Grounded Theory, a popular[19] qualitative methodology, has several schools of thought (e.g. Glaser (2002), Strauss & Corbin(1990), and Charmaz (2006) have different perspectives). Whilst they all contain the "constant comparative method" of analysis, how to "properly" conduct grounded theory analysis varies. The key concept to Grounded Theory is that, instead of the research superimposing their preconceived notions and conceptual frameworks onto the data, the data itself should generate the theory, hence its "grounding" within the data (Bazeley, 2013). Analysis should also occur iteratively alongside data collection, with hypotheses arising from the data being tested through further data.

Despite the inductive and iterative nature of Grounded Theory holding appeal, the number of phases of research within this study, the timeframe in which they were to be conducted, and the desire for results which are more practical than theoretical[20], a more flexible and

[19] And often misunderstood, and therefore misused by novice researchers (Chamberlain, 2000)
[20] But pragmatically, also to avoid having to choose and justify using the methods of a particular grounded theory school, as this would detract from time better spent developing the project and analysing the data

pragmatic approach was taken, Thematic Analysis as proposed by Miles, Hubermann & Saldana (2014). They describe the main components of qualitative data analysis as a cyclical process stemming from the collection of data, ensuring that appropriate means are selected for the questions asked. Analysis then comes from a combination of data condensation (a process of selecting and coding, or 'simplifying, abstracting and transforming' (Miles et al., 2014, p. 12), data display (organising data to allow conclusions to be drawn), and conclusion drawing and verification (developing meaning and testing it for plausibility). Unlike Grounded Theory, Thematic Analysis acknowledges the impact of existing knowledge on the framework used for data collection, and analysis procedures, and relies on theories and constructs external to the research project to aid in the development of conceptual and theoretical coherence (Miles et al., 2014).

Thus, throughout the thesis, qualitative data analysis follows the Miles, Huberman & Saldana (2014) school, with iterative rounds of analysis. Both the field notes and audio files were imported into NVivo (QSR International Pty Ltd, 2012). An initial set of codes were identified, which were then discussed and refined with supervisor EM. Themes, containing a composite of codes, were developed in concert with EM, and, where additional clarity was required, presented to the other supervisors (BC and TH) to achieve consensus. Further description of the qualitative data analysis process is contained within the submitted and/or published papers that form the results chapters.

While the analysis of data that were *present* in the dataset was relatively straightforward, absences of data were also identified through the comparison of the codes and themes to key elements of educational learning theories, including workplace based learning. For example, observation of expert performance (i.e. modelling of clinician performance and demonstration of skill) is seen as key to apprenticeship based learning (Lave & Wenger, 1991). However, this was seldom seen in the observations made for this thesis. The conclusion drawn therefore was that, in a model for the development of evaluative judgement, in addition to what *was* observed to aid in the understanding of practice standards, activities absent from the dataset were also highlighted

Managing subjectivity

Qualitative work should be judged according to criteria arising from a qualitative paradigm: the criteria used in quantitative research cannot be simply transplanted, and subjectivity, while accepted, still needs to be explored (Bradbury-Jones, 2007). Patton (1999) describes a range of elements through which the quality and credibility of qualitative analysis can be optimised, including methods of data collection and analysis, the

credibility of the researcher, and also the philosophical beliefs underpinning the enquiry.. The thesis has so far dealt with the first and last elements, through detailing the methods (Chapter 3) and revealing the researcher's beliefs on learning and research methods (Chapters 1, 2 & 3). Researcher credibility and what has been done to manage the impact of the researcher is the focus of this section, as ultimately, "the trustworthiness of the data is tied directly to the trustworthiness of the researcher who collects and analyzes the data" (Patton, 1999, p. 1205).

In qualitative research, the influence of the researcher themselves cannot be denied, and particularly the researcher as instrument in the observational phase (Bazeley, 2013; Yin, 2003). Miles, Huberman & Saldana (2014) point out that not only a) the researcher may have an effect on the research site, but b) that the site may also have an effect on the researcher. These biases can be difficult to untangle. The reflective component of the Introduction chapter provides the reader with an insight into the author's experiences with PAL, including the author's preliminary hypothesis about what might be working and lacking in the current MBBS program when it comes to fostering peer learning. This may aid the reader to draw their own conclusions on the author's bias, or influence on the research. However, this alone was likely to be insufficient in tempering the researcher's biases towards PAL, given the researcher's previous favourable PAL experiences, and the inclusion of qualitative data requiring researcher interpretation.

A range of strategies were therefore also used throughout the research project to ensure the positive bias of the main researcher towards PAL did not overly influence the collection or analysis of data. Firstly, to develop methodologically sound qualitative data collection and analysis techniques, the author of this thesis attended an ethnographic methods course which aimed to equip researchers with a suite of practical qualitative methods, including observational and interview techniques. During the observational phase, the main researcher, who made the observations and subsequent field notes and interviews, also recorded a written reflection or debrief at the conclusion of each day's observations, of thoughts and feelings at the time. A reflective discussion was then held with the main supervisor, EM, midway through the first set of observations, in order to guide and focus the remainder of the observations. These reflections served to monitor subjectivity throughout the observational phase (Bradbury-Jones, 2007). The involvement of the supervisory team in the qualitative data analysis, as described above, also acted as a "check" for interpretation of events and data. The triangulation of multiple data sources (observations, interviews, focus groups, survey data, educator data) and iterative nature of the project also added to the trustworthiness of findings.

Quantitative

Quantitative analyses were used primarily for the data arising from the survey, which has been previously described. Analyses were chosen based on the question and data type, and the reasons for interrogating the data. This section will therefore proceed through each of the question categories and the type of analysis associated with it (A. Field, 2013).

Quantitative data from the survey was collated in Microsoft Excel, which was used for basic calculations and graphs. STATA (IC) 11.0 was used for any demographic, Likert scale type and frequency data. Cross tabulation, statistical analyses and regression techniques were required, which are not adequately handled by Microsoft Excel. Techniques are outlined below, according to the type of data.

Numerical data

Few questions asked for numerical data; only age and frequency of participation were collected on a continuous scale. For age, a mean and standard deviation were reported. A mean was also reported for frequency of participation, where students nominated the number of occasions that they engaged in specific activities related to PAL (e.g. observing a peer perform an assessment). Because activities could only be positive numbers, they were considered count data. Therefore, to compare the differences between males and females, negative binomial regression was used.

Categorical data

Respondents were asked to nominate the source of initiation, and location for each PAL activity. The survey allowed choosing one or more of a range of options (self, peer and tutor for the source of initiation, with a wider range of options for the location). This information was collapsed into three categories for each: only self, only others, and both for the source of initiation, and informal, formal and both for the location of PAL activity. The χ^2 (chi-squared) statistic was then used to compare the proportion of respondents in these collapsed categories between genders.

Likert type data

Likert type response data were treated as ordinal data: that is, they were numerical, and could be ordered, but the increments between response categories were not regular in nature, that is, the data could not be scalar. This was the case for both the "utility of PAL activity" (1 = not at all useful to 5 = extremely useful) and "perceived advantages and disadvantages of PAL" (1 = strongly disagree to 5= strongly agree). Therefore, simple statistical tests such as a Student's T-test were inappropriate under these conditions. Ordinal

logit regression was used to detect differences between genders for these items. The percentage of respondents who rated the item as 4 or 5 on the scale was calculated and presented.

Summary

This chapter intended to prime the reader to the methodological framings and methods of data collection and analysis across the three phases of research. A short section on epistemology and methodology was followed by a detailed overview of the study design, which comprised three phases and four separate but interlinked and iterative methods of research.

The methods chapter aimed to provide further clarity on the epistemological position of the author: that knowledge is constructed from experience, and experience can involve both individuals and groups. There can therefore be multiple perspectives of a single phenomenon, such as PAL. To investigate PAL in the clinical setting, a number of different viewpoints must therefore be consulted (i.e. both students and staff). To ensure that these perspectives were appropriately investigated, the framework of Biggs' Constructive Alignment was applied as an overlay to the research methods and phases. A pragmatic multi-study approach was therefore adopted, with methods chosen to suit the research questions, and analysis techniques chosen to suit the type of data collected.

The following chapters present the results of the research program, according to the research methods used. Each chapter will build upon the findings of the previous, culminating in a combined discussion of how these results compare to current understandings of PAL in undergraduate medicine, and the implications for practice.

Chapter 4
Curriculum Map

Chapter 4 Curriculum Map

Introduction

This chapter presents the curriculum map of PAL within the Monash University MBBS degree, constructed as a result of the Phase 1 scoping exercise. For such an integrated curriculum, a map was vital to identify the precise location of PAL activities (Harden, 2001). The number of different types and configurations of PAL entailed a complexity which required a mapping exercise (Ross & Cameron, 2007). The transparency that curriculum mapping produces is said to enable both students and educators to see what is expected (Harden, 2001), and in this case, confirmed that PAL existed in the curriculum as a formal learning activity. The methods used for the construction of the PAL Curriculum Map are detailed in Chapter 3 – Project Design, Phase 1.

Results

The resultant map of PAL related learning objectives, teaching and learning activities, and assessments are presented in Figure 4.1. PAL appeared in all five years of the course, as learning objectives, learning activities, and through some assessments. Instances of peer learning appearing in the curriculum are depicted in the map according to these categories. There were 12 learning outcomes related to PAL, 20 situations in which PAL was part of a learning activity, and 10 forms of assessment that contained a PAL element. Notably, there are no assessments relating to PAL in Year 1 of the course, and assessment of PAL in later years is related to larger clinically based tasks or activities, rather than focussing on the process of PAL and the ability to work with others. PAL activities within the campus-based years (Years 1 and 2) occur mainly within tutorial situations, with some project work, while in the clinical years (Years 3-5), there is a reduction in the types of explicit learning activities containing PAL.

PAL was occasionally explicit within the written documentation as a learning objective, "you can also expect to learn from […] your fellow students" (Year 5 study guide), however the majority of PAL was implied through what has been identified as the products of PAL, e.g. "work effectively and communicate constructively within small groups" (Year 2 course objectives). Pre-clinical (Years 1 and 2) objectives particularly focussed on the ability to co-operate, communicate, and be part of a team, while clinical (Years 3-5) objectives not only emphasised teamwork and collaboration (but with other health professionals) but also interpersonal and professional skills.

PAL activities identified in the curriculum included peer teaching, roleplay, observation, feedback, and collaboration and sharing of information. Peer teaching was largely reserved for the final year of the course, both for teaching peers at the same-level, and also junior students. Roleplay, observation and feedback was used largely within the clinical skills teaching in the pre-clinical years, whilst scenario practice was also a feature in Year 4 as part of expected "unstructured learning activities". Peer collaboration was identified as a feature of case-based or problem-based learning in Years 1-3, throughout the assignments set in the pre-clinical years which required group work, and in participation in discussion activities in Years 4 and 5.

Discussion

Previous curriculum mapping exercises have investigated a range of topics, including generic skills (Robley et al., 2005), cultural competency (Wachtler & Troein, 2003), occupational and environmental medicine (Hege, Nowak, Kolb, Fischer, & Radon, 2010) and graduate competencies (Wong & Roberts, 2007). These studies used, in addition to the document analysis (where appropriate), interviews or surveys with students and staff. Hege (2010) also observed lectures and tutorials, whilst Wong (2007) asked residents to log their individual learning experiences. The current study may be the first to map the presence of a learning modality within a curriculum, as, to the knowledge of the researcher, there have been no previous studies mapping PAL in a medical curriculum.

Through the map it could be seen that specific learning objectives relating to PAL were not made explicit: as has been demonstrated in Chapter 2 - Background, professional, interpersonal, communication and collaboration skills are developed through the use of PAL, rather than PAL itself being an endpoint. Whilst there are possibilities for PAL, the map demonstrates that further detail could enhance the use of PAL. Activities of teaching, roleplay, and collaboration were identified, but little peer assessment was identified (despite the use of observation and feedback in tutorials).

Modifications to the curriculum to improve PAL could be made. The standards or guidelines for roleplay, observation and feedback within the pre-existing activities are unknown. Simple feedback guidelines such as Pendleton's four-step model (2003) could be immensely valuable to guide practice. In addition to observation and feedback, peer assessment has been proposed as a useful means of promoting discussion around assessment standards, and motivation to continue to participate and improve performance (Boud et al., 2001; Ladyshewsky, 2013; Nicol & Macfarlane-Dick, 2006). Competency in being an educator is being recognised as an increasingly important for medical

professionals (Confederation of Postgraduate Medical Education Councils, 2009; Page, 2011; Royal College of Physicians and Surgeons of Canada, 2014), and should be explicitly included in a medical curriculum. Including learning outcomes, activities, and assessments on teaching and learning with peers could contribute to the development of medical students' education skills. Development of these education skills in the campus-based years might better prepare students to "hit the ground running" in enacting PAL in the clinical environment.

Overall, there were very few learning outcomes, learning activities, or assessments relating to PAL: they were all able to be contained on the equivalent of two A4 pages in a mind-map format. This represents a small fraction of the 1345 pages of combined Monash MBBS study and unit guides from which these PAL activities were drawn. This may signal to both students and those who deliver the curriculum, that PAL is *not* intended to be a major means of learning. Particularly, the lack of assessment on how well students participate in PAL may also reduce the status of PAL: students who are strategic in their activity selection are unlikely to undertake PAL if they do not need to demonstrate their competence in it. The phenomenon of "assessment drives learning" is well noted within medical education (Al-Kadri et al., 2013). Biggs (1996) also notes the importance of explicit and aligned learning outcomes and activities: the map demonstrates that there is little alignment of outcomes, activities and assessments.

It should also be noted that this Curriculum Map set out to investigate the intended, and therefore, formal PAL curriculum only: as outlined in Chapter 1 Introduction – A Personal Experience of PAL, there are many co- and extra-curricular opportunities to engage in PAL, with varying degrees of structure. This includes individually organised study groups, larger events such as the VESPA case nights (which has a student organising committee who sets objectives for the cases studied), programs arranged by the medical students' society, and the Student Mentorship Program (Raghunath et al., 2011). Most of these foster not only within-year (or same-level) peer learning, but also cross-year (near peer) learning. That these opportunities for PAL are positioned as external to the intended, formal, curriculum, is likely to impact on both learners' and educators' perceptions of PAL. Further formal integration and support for these activities may aid in both learners and educators perceiving PAL as a common and useful learning tool.

Figure 4.1 Curriculum Map of PAL in the Monash University MBBS

- Peer Assisted Learning in the Monash MBBS Course (Clayton)
  - Year 1
    - Assessment
      - nil
    - Learning outcomes
      - Course objectives
        - MED1011: "Work cooperatively with health professionals (nurses, GPs) and trainees (nurses) to achieve specified tasks"
        - MED1022: "Work cooperatively with other health professionals and trainees to achieve specific tasks"
    - Learning activities
      - Rural week
        - "understand the importance of teamwork and collaboration in caring for people with complex or chronic conditions"
      - Lectures
        - "appreciate what constitutes effective team learning"
      - Year 1 Health, Knowledge and Society tutorials
        - Small group work to present topics to the tutorial
          - Peer collaboration
          - Peer tutoring
      - Year 1 Clinical Skills tutorials
        - Roleplay - History taking, breaking bad news, dealing with the angry patient
          - Peer feedback
          - Peer observation
        - Peer physical examination
      - Year 1 Case Based Learning tutorials
        - Division of tasks
          - Co-operative learning
        - Sharing information
          - Peer collaboration
          - Peer tutoring
  - Year 2
    - Assessment
      - "Year Two Rural Project: 6.25% "
      - "Year Two Special Project Case: 6.25%"
    - Learning outcomes
      - Course objectives
        - MED2031: "work effectively and communicate constructively within small groups in the planning, development and implementation of teamwork tasks, with individual and group responsibilities and adherence to project timelines;"
        - MED2031: "apply constructive critiques to verbal and written presentations."
        - MED2031: "work cooperatively with peers to achieve specified tasks;"
    - Learning activities
      - Year 2 Student Project Cases
        - Group research & presentation on an assigned topic
          - Peer collaboration
          - Co-operative learning
      - Year 2 Rural Placement
        - History taking and summarising a history
          - Peer observation
        - Group work on an assigned issue/topic
          - Co-operative learning
          - Peer collaboration
      - Year 2 Community Service Project
        - Working with peers and senior colleagues
          - Peer collaboration
      - Year 2 Clinical Skills tutorials
        - Roleplay - history taking, summarising a history, examination skills, summarising an examination
          - Peer observation
          - Peer feedback
      - Year 2 Problem Based Learning tutorials
        - Division of tasks
          - Co-operative learning
        - Sharing information
          - Peer collaboration
          - Peer tutoring
  - Year 3
    - Assessment
      - "completion of a clinical skills logbook"
      - "Integrated clinical appraisal activity: 10%"
      - "Portfolio: Satisfactory completion (Hurdle requirement for progress to Year 4)."
    - Learning outcomes
      - Course Objectives
        - MED3051: "demonstrate ability to work in multi-professional teams"
        - MED3051: "communicate clearly, considerately and sensitively with peers, patients, relatives, doctors, nurses, other health care professionals and the general public;"
    - Learning activities
      - Communication skills
        - Peer observation
        - Peer feedback
      - Practice Case Presentations
        - Peer observation
        - Peer feedback
      - Clinical Skills Logbook
        - Patient interview
          - Peer observation
          - Peer feedback
      - Tutorial Groups
        - Peer assessment
      - Problem Based Learning
      - Clinical Skills Tutorials
      - Pathology Group Work
  - Year 4
    - Assessment
      - PIA (Pre Intern Assessment)
        - Professionalism (includes interactions with colleagues/peers, collaborates in team)
        - Approach to learning and development: "participates in collaborative learning"
      - Learning activities
        - Collaborative learning
          - "you can also expect to learn from nursing staff, allied health staff, from patients, as well as from your fellow students."
        - Modules
          - Module 9: Injury: acute management & prevention
            - Student seminar - userful learning topic for peers
          - Module 5: Delirium
            - Interprofessional learning/teamwork
          - Module 25: Becoming a Clinical Teacher and Leader
            - Teaching younger students
    - Learning outcomes
      - Module 25: Becoming a Clinical Teacher and Leader
        - Objectives:
        - 1. Plan a learning and teaching session;
        - 2. Implement a learning and teaching session;
        - 3. Communicate clearly and concisely with the key players;
        - 4. Delegate tasks to key players;
        - 5. Provide appropriate performance feedback to group members;
        - 6. Monitor level of achievement of outcome statements/objectives;
        - 7. Evaluate personal performance using multiple data sources;
        - 8. Be aware of the gendered dimensions of your leadership and teaching style.
  - MBBS course guide
    - Assessment
      - WH, GP: Professional Behaviours Appraisal (hurdle)
        - "Repect for Peers"
      - WH/CH: Contemporary Issues presentation (group mark 5% of unit)
        - "To work collaboratively with other students in small groups to research, discuss and prepare selected contemporary issues for presentation and dissemination to the year 4C classes."
      - WH: Focus Group & Directed Activities Participation (hurdle)
        - "Participates collaboratively"
      - CH: Case study reports (x2; makes up 10% of unit mark)
        - "To practice the skills of formal oral presentations to peers and colleagues, including the use of visual aids such as overhead projection or computer generated slides (e.g. PowerPoint) or to practice the skills of formal written presentations to peers and colleagues including the correct use of common English and Medical terminology"
    - Learning outcomes
      - General expectations (GP)
        - Behaviour: "Thoughtful and informative for peers and teachers. Active concern for welfare of peers and teachers so immediately notifies any affected individuals of situation and ensures smooth running of all activities."
        - Participation: "Carries out all directed activities in a way that supports individual and group learning."
      - Course Objectives
        - "Recognise the principles of team-work, and the role of doctors in clinical teams."
        - "Demonstrate appropriate communication, and interpersonal and professional skills for hospital and community clinical settings"
    - Learning activities
      - Psych: Tutorials
        - "Professional behaviour a. What was the experience like for students to see the patient? b. What models of professional behaviour have they seen?"
      - Unstructured learning activities
        - Practice scenarios wtih peers
          - Peer observation
          - Peer feedback
    - Learning outcomes
      - are capable of leadership and yet are comfortable working as a team member
      - maintain high standards throughout their professional life by a commitment to life-long learning and teaching

Summary

This exercise has identified the extent to which PAL features in the five years of the MBBS course (the formal, intended curriculum). Learning objectives, teaching and learning activities, and assessment relating to PAL were identified. Activities contained within the curriculum included peer teaching, roleplay, observation, feedback, and collaboration and sharing of information. While most pre-clinical PAL was found in the classroom activities, in the clinical years, PAL was largely represented in learning outcomes as professional behaviours such as teamwork.

The relatively small number of PAL activities, especially the lack of assessment on PAL, and the availability of PAL activities outside the curriculum, suggest that the strategic integration of PAL throughout the intended curriculum may result in not only in students and educators using more PAL, but perceiving it to be useful for learning.

The results of this mapping exercise support the hypothesis that PAL is less structured in the clinical years (especially Year 3), and that further work is required to characterise and subsequently improve PAL on clinical placements. The mapping exercise also confirmed that PAL in the pre-clinical curriculum exists, but is sporadic. Given the increasing emphasis on 'doctor as educator' in the medical education literature, the scarcity of objectives and sessions relating to learning and teaching skills was surprising. By establishing this, a basis for the remainder of the program of research has been formed.

Chapter 5
Student survey

Declaration for Thesis Chapter 5

Declaration by candidate

In the case of the publication in Chapter 5, "*A study of medical students' peer learning on clinical placements: what they have taught themselves to do*", the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Led conception of the study, formulated study tools, undertook data collection, was main analyser of data both quantitative and qualitative, drafted and prepared the manuscript for publication	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Elizabeth Molloy	Contributed to the conception of the study, undertook qualitative data analysis, assisted in the drafting of the manuscript	n/a
Ben Canny	Contributed to the conception of the study, contributed to quantitative data analysis, assisted in the drafting of the manuscript	n/a
Terry Haines	Contributed to the conception of the study, undertook quantitative data analysis, assisted in the drafting of the manuscript	n/a

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's Signature: [redacted] **Date:** 20 August 2015

Main Supervisor's Signature [redacted] **Date:** 20 August 2015

*Note: Where the responsible author is not the candidate's main supervisor, the main supervisor should consult with the responsible author to agree on the respective contributions of the authors.

In the case of the publication in Chapter 5, "*Gender matters: students' perceptions of peer learning in clinical education*", the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Led conception of the study, formulated study tools, undertook data collection, was main analyser of data, drafted and prepared the manuscript for publication	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Elizabeth Molloy	Contributed to the conception of the study, contributed to data analysis, assisted in drafting of the manuscript	n/a
Ben Canny	Contributed to the conception of the study, contributed to data analysis, assisted in drafting of the manuscript	n/a
Terry Haines	Contributed to the conception of the study, undertook data analysis, assisted in drafting the manuscript	n/a

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's Signature: [redacted] **Date:** 20 August 2015

Main Supervisor's Signature [redacted] **Date:** 20 August 2015

*Note: Where the responsible author is not the candidate's main supervisor, the main supervisor should consult with the responsible author to agree on the respective contributions of the authors.

Chapter 5 Student survey

Introduction

The student survey, developed in 2012, was intended to act as a scoping tool to determine the extent to which Year 3 MBBS students were undertaking PAL activities as part of their clinical placements. Since PAL was not clearly linked to the stated learning objectives for the year level, this was a vital step prior to the commencement of an observational study. Therefore, it partially satisfied the requirement for data on "enacted" PAL. The survey was also a tool by which student perceptions and opinions of PAL activities could be collected; the "perceived" PAL.

A study of medical students' peer learning on clinical placements: What they have taught themselves to do

Participants for the study survey were initially invited from the 2012 Year 3 MBBS cohort alone. This section comprises the published paper which resulted from these responses. It gives an overview of the PAL activities that students independently participated in, their perceptions of the utility of PAL, including its effects on their learning.

This paper was published in the *Journal of Peer Learning* in 2014, and is presented in its published format within this thesis.

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A study of medical students' peer learning on clinical placements: What they have taught themselves to do

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A study of medical students' peer learning on clinical placements: What they have taught themselves to do

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ABSTRACT

Peer assisted learning (PAL) is implemented in many undergraduate medical programs, largely in classroom-based learning. There is relatively less knowledge about the use of PAL in clinical education environments. This study explores how PAL is experienced and perceived by Year 3 medical students who are new to the clinical environment. Students across urban/metropolitan sites, rural sites, and an international site (Malaysia) were invited to participate in a cross-sectional survey; 54 of a potential 415 students responded. We found that students are already using PAL on their clinical placements and can see its value. PAL not only occurs in structured events within the curriculum, such as Problem Based Learning (PBL) or bedside tutorials, but also in unstructured and student-prompted ways, such as debriefing cases at lunch time, observation of practice on the ward, and self-selected study groups outside clinical placement. These PAL activities in the clinical environment are yet to be mapped within the literature. Importantly, contrary to previous studies, PAL was not reported to increase competition amongst students and a drive for social acceptance was not reported to hinder honest peer-to-peer feedback. Despite the "organic" episodes of PAL on clinical placements, students reported that they needed more PAL education and training. Students are reticent to judge their peers' performance, not because of social pressures, but due to a lack of confidence in knowing performance targets. Observational research is suggested as a way to further explore these trends and to inform development of helpful PAL strategies for learners.

INTRODUCTION

Medical programs worldwide are largely built on experiential workplace-based learning (Brown & Zimitat, 2012; Gallagher, Carr, Weng, & Fudakowski, 2012). In these "clinical years," students spend a proportion of their time in groups on ward-based attachments. Students' learning experiences have been reported to vary according to placement type (i.e., secondary vs tertiary hospital), the type of unit they are attached to (surgical, medical, or subspeciality), patient throughput, workload, and the skill and experience of all unit staff (consultant, registrar, resident and/or intern) (Bianchi, Stobbe, & Eva, 2008; Raghunath, Tai, & Zimmerman, 2011; Worley, Prideaux, Strasser, March, & Worley, 2004).

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Students across the spectrum of health professions report that they do not receive enough feedback on their learning and performance in clinical placements (Gallagher et al., 2012; Worley et al., 2004). Peer assisted learning (PAL) has the potential to increase the value of hours spent on clinical placements by providing students with supplementary observation and feedback on their performance. Studies in some health professions have demonstrated that this also allows busy clinical staff to prioritise and redistribute their workload across patient care, teaching, and administration, therefore increasing workforce capacity (Ladyshewsky, 1995; Sevenhuysen et al., 2013).

The term PAL encompasses a range of learning activities involving peers. This includes collaborating on tasks, teaching or tutoring, giving feedback, assessing work, and monitoring or observation (Topping & Ehly, 1998). PAL is increasingly used in medical education, with many programs implementing Problem Based Learning (PBL) (Kassa, Abu-Hijleh, Al-Shboul, & Hamdy, 2005; Machado, Machado, Grec, Bollela, & Vieira, 2008; Papinczak, Young, Groves, & Haynes, 2007) and peer assessment components (Asch, Saltzberg, & Kaiser, 1998; Macaulay & Nagley, 2008; Kovach, Resch, & Verhulst, 2009). Common areas of use in the preclinical years include anatomy (Chen et al., 2009; Evans & Cuffe, 2009; Gukas, Miles, Heylings, & Leinster, 2008; Hendelman & Boss, 1986; Johnson, 2002; Vasan, DeFouw, & Compton, 2011; Weyrich et al., 2008; Wilson, Petty, Williams, & Thorp, 2011; Yeager & Young, 1992) and clinical skills teaching (Amorosa, Mellman, & Graham, 2011; Dickson, Harrington, & Carter, 2011; Field, Burke, McAllister, & Lloyd, 2007; Knobe et al., 2010; Perry, Burke, Friel, & Field, 2010; Perera, Mohamadou, & Kaur, 2010; Salerno-Kennedy, Henn, & O'Flynn, 2010; Tolsgaard et al., 2007).

Both educators and students have expressed reservations about using PAL in the clinical environment despite peer-assisted learning being a feature of the pre-clinical learning environment (Krych et al., 2005; Lincoln & McAllister, 1993; Weyrich et al., 2008). Students may not be able to teach or give feedback effectively. This may be due to a lack of knowledge or a lack of explicit training in teaching and feedback delivery. A common concern is that PAL may be disruptive, place strain on friendships and relationships between the students, and engender competition.

PAL has largely been successful in both preclinical environments and clinical environments, with those using PAL showing equal or better performance in examinations (Bosse et al., 2010; Koles, Nelson, Stolfi, Parmelee, & DeStephen, 2005; Nnodim, 1997; Peets et al., 2009; Tolsgaard et al. 2007;), though there have been some studies to the contrary (Knobe et al., 2012; Heckmann et al., 2008, Walsh et al., 2011). Hospital-based PAL reported in the literature mainly takes the form of peer assessment as peers spend more time together, enabling them to make judgements on a broader range of observed professional behaviour as compared to their clinical supervisors (Arnold, Willoughby, & Calkins, 1981; Dannefer et al., 2005; Kovach et al., 2009; McCormack, Lazarus, Stern, & Small, 2007).

There are also speculated practical benefits to using PAL in clinical medical education (Ross & Cameron 2007, Secomb, 2008). Resources may be conserved through the appropriate use of expert tutors. Students may save time through collaboration and sharing knowledge instead of replicating their

peers' efforts. PAL may supplement experiential learning where knowledge is created through participation with others. This phenomenon is explained by sociocultural learning theory (Lave & Wenger, 1991; Rogoff, 2009; Yardley, Teunissen, & Dornan, 2012). Learning with peers (as opposed to learning from experts) can also provide a safer learning environment where the relative lack of status and hierarchy is thought to lower the stakes of engaging in practice and performing in front of others (Chou et al., 2011; Lincoln & McAllister, 1993). Working in groups while receiving less direction from seniors may also build self-directed learning skills, trust, evaluative judgement, and the ability to partake in productive team work (Ten Cate & Durning, 2007; Wood, 2003). These qualities, which are necessary for becoming an effective, independent medical practitioner (Confederation of Postgraduate Medical Education Councils, 2009), may be developed through using PAL in clinical medical education.

Alongside affordances for learning experiences, such as exposure to cases and motivated supervisors, and learning events, such as ward rounds, bedside tutorials, or family/case meetings, the engagement and motivation of the student is integral to effective workplace learning. Students' motivations to do well and maximise their learning mean that they are likely to only engage in what they perceive to be productive activities, or in fact, assessable activities (Greenstock, Molloy, Fiddes, Fraser, & Brooks, 2013; Newton, Billet, Jolly, & Ockerby, 2009). Medical students' workplace learning experiences have been examined previously; however, these studies did not focus on PAL (Daelmans et al., 2004; Dornan, Boshuizen, King, & Scherpbier, 2007; Worley et al., 2004). Understanding students' perception and experiences of PAL is important when considering how to successfully implement activities that encourage peer observation, discussion, feedback, and teaching in clinical education.

Aims

This study seeks to describe the perspectives and experiences of Year 3 medical students who are using PAL. In particular, this study investigates how PAL is initiated, where and how frequently it occurs, if it is seen as useful and why, and the incentives for and constraints to PAL in the clinical environment.

METHODS

Ethics approval

This project was approved by the Monash University Human Research Ethics Committee, approval number CF12/2429 – 2012001312.

Design

This was a cross-sectional survey.

Participants and setting

Research participants were Year 3 students in the Medical Program at Monash University where the Bachelor of Medicine, Bachelor of Surgery (MBBS) program entails five years of study. The first two years are campus-based and contain PAL-oriented activities, such as PBL and group assignments. Years 3–5 are hospital-based with lectures and tutorials. Students are placed at a number of metropolitan and rural sites in Victoria and at the Johor Bahru

campus in Malaysia. Unlike other health professions' clinical attachments, medical students are not allocated a single day-to-day supervisor for the duration of the placement. Students are assigned to groups within a clinical site, with group rotating attachments to clinical teams (e.g., general medicine, acute surgery, oncology). Some tutorials (e.g., clinical bedside) are given on a regular basis by one staff member, others are once-off or a short series delivered by a range of clinicians in the appropriate fields. Aside from compulsory tutorials and assignments, there are also optional PAL activities, which are study groups supported by the faculty (Kam, Mitchell, Tai, Halley, & Vance, 2010; Raghunath et al., 2011). Course objectives over the five years include items such as "work cooperatively with peers to achieve specified tasks," "participate collaboratively," and "understand the importance of teamwork and collaboration in caring for people with complex or chronic conditions." While PAL outcomes are encouraged, PAL itself it not emphasised in the curriculum.

Measurements

The survey collected basic demographic data, frequency counts, rating scale scores, and open text responses on PAL (see Appendix for survey). Constructs measured through this survey were i) previous participation in PAL activities, ii) self-reported utility of PAL activities for meeting learning needs, iii) cue to action for participation in PAL activities, iv) perceived advantages and disadvantages of participating in PAL activities, and v) overall learning and teaching patterns.

Survey questions were developed by the investigating team based on the research aims and analysis of the PAL literature. In particular, the benefits and drawbacks to peer assisted learning were sourced from Krych et al. (2005), Weyrich et al. (2008), and Lincoln and McAllister (1993). Item wording was drafted by JT on the basis of the literature and discussed with the research team. Wording underwent several iterations for clarity. For participation in PAL activities, a weekly frequency was used to differentiate between hypothesised heavy and light PAL users. Respondents were given three options for who initiated the PAL episode: themselves, a peer, or a tutor. A variety of locations for PAL occurrences were listed for students to choose from. These locations were based on JT's experience as a medical student and supervisor and included a combination of both formal (e.g., tutorial) and informal (e.g., common room) settings. Utility of the PAL episode was collected on a 5–point scale from *not useful at all* to *extremely useful*. No intermediate points were labelled. Finally, a free text response on why the PAL episode was useful was employed to allow a breadth of replies. Aside from PAL activities, the survey also asked students who they found gave them the most clinical teaching over the past week. The survey offered a set list of potential teachers ranging from peers and consultants to nurses and patients. Students were also asked who they felt they learned the most from and why this was so. This enabled data collection about how PAL was situated within teaching structures at the hospital.

The survey was entered into Survey Monkey and was piloted by the researchers prior to distribution. It remained available online for one month.

Procedure

Students were invited to complete the survey through postings to their electronic noticeboard and by the medical student society in their weekly bulletin. A "Year level" response was included to enable exclusion of students from other year levels who inadvertently responded to the survey. A double pass movie voucher was offered as an incentive to participate and was awarded to a randomly selected student who completed the survey.

Respondents

Of 68 responses, there were 54 respondents who were in Year 3 and had completed at least part of the survey, giving a response rate from the Year 3 cohort of 13%. The mean age was 22.17 (range 19-34, SD = 3.17). Twenty-two were male and 32 female.

Analysis

Quantitative analysis was performed with Stata/IC 11.0 and Microsoft Excel 2010. Qualitative analysis was undertaken with NVivo 9(QSR International Pty Ltd, 2010). Two researchers (JT and EM) independently interrogated the data using Thematic Analysis (Miles & Huberman, 1994). The codes were compared and discrepancies in analysis were referred to research team members TH and BC for discussion until consensus was achieved. The codes were condensed into themes to represent how students experienced PAL in the clinical setting within a sociocultural model of learning (Lave & Wenger, 1991).

RESULTS

Are students using PAL, and in which contexts?

Forty-six students responded to the questions "who do you learn the most from" and "who did you get the most clinical teaching from" (Figure 1). The majority of teaching came from tutors and registrars, with a significant minority from peers and near peers. Yet students found their learning came almost equally from near peers, registrars, tutors and themselves. When asked "why did you learn the most from this person?", 35 provided an answer. The most common response related to the students' preference for senior staff input because of their expertise (10 responses), while five reported a heavy reliance on themselves.

Students who reported they learned the most from their peers gave the following reasons: the information was at an appropriate level, they received support from their peers, and they were able to organise extra practice sessions together. Near peers also featured strongly, as they have "more time compared to the rest to teach me. Also, he/she knows more than me" and "they are still sort of a peer but without being a friend so there is no awkwardness about giving negative criticism."

Students reported using all PAL activities at least once a week (Table 1). The most frequent PAL activity was "I discussed a case with a peer," and the least frequent was "a peer demonstrated a skill to me." The majority of students reported that PAL activities were useful for their learning. The most useful activity identified was being taught by a peer about a topic (87% responded with a score above 3 on a scale of 1 = *not at all useful* to 5 = *extremely useful*). The least useful activity was "I gave feedback to a peer on their performance

or knowledge" (57%). Episodes of PAL were most commonly self-initiated (335 of 473, 71%). Overall, only 58 episodes (12%) were prompted by an educator's request and 80 (17%) were peer initiated.

The locations of PAL activities (Figure 2) were varied. Students were asked to select all locations that they had undertaken the 10 types of PAL activities identified in the survey. Of the 1020 instances, the most PAL occurred on the wards (304, 29.8%). Non-clinical locations, such as the student common room (179, 17.5%) and non-bedside tutorials (139, 13.7%), were also prominent venues. The bedside tutorial (151, 14.8%) was also a relatively common place for PAL to occur.

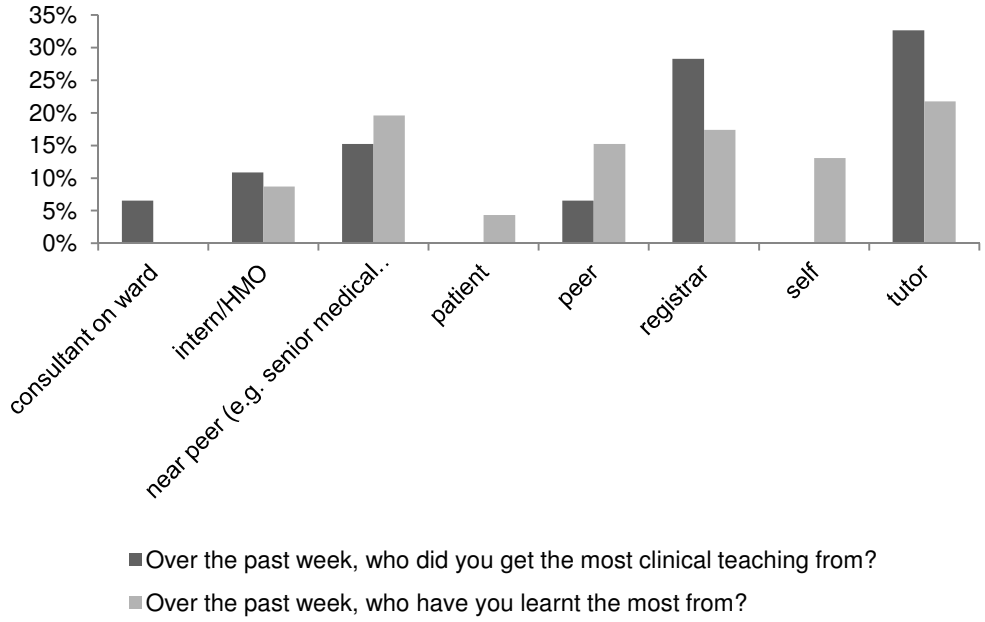

Figure 1. Reported clinical teaching vs learning.

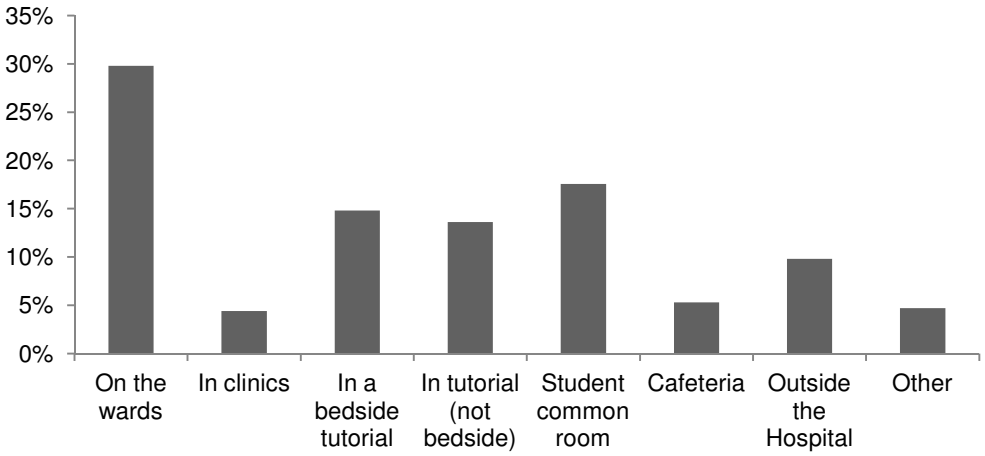

Figure 2. Reported PAL locations.

Table 1
PAL activity frequency, utility, and reasons for partaking

	Frequency of PAL activity (per week)	Utility of PAL activity for learning needs[a]	N	Reason for partaking in the activity			N
				I chose to do it (%)	I was asked to do it by a peer (%)	I was asked to do it by an educator (%)	
I observed a peer performing a history/examination	3.31	70%	47	34 (64)	6 (11)	13 (25)	53
I was observed by a peer performing a history/examination	2.43	85%	47	37 (70)	3 (6)	13 (25)	53
I taught a peer about a topic	2.24	86%	45	29 (59)	16 (33)	4 (8)	49
I was taught by a peer about a topic	2.96	87%	46	41 (84)	5 (10)	3 (6)	49
I demonstrated a skill to a peer	1.26	69%	35	21 (57)	10 (27)	6 (16)	37
A peer demonstrated a skill to me	1.11	72%	36	23 (64)	5 (14)	8 (22)	36
I gave feedback to a peer on their performance/knowledge	2.15	57%	44	30 (61)	13 (27)	6 (12)	49
I received feedback from a peer on their performance/knowledge	1.83	81%	42	33 (72)	9 (20)	4 (9)	46
I discussed a case with a peer	3.65	77%	44	51 (100)	0 (0)	0 (0)	51
A peer discussed a case with me	3.37	74%	43	36 (72)	13 (26)	1 (2)	50
Total	24.31			335 (71)	80 (17)	58 (12)	

Note. [a]Responses were measured on a scale of 1 = *not at all useful* to 5 = *extremely useful*, with no intermediary descriptors used for points 2, 3 and 4. In the above table, responses greater than 3 were pooled.

Do they find it useful?

Reasons for the utility of PAL (or lack thereof) were explored through free text responses. Pooled codes for all types of PAL with at least three references are presented with frequencies in Table 2.

Table 2
Reasons for utility of PAL

Reasons why PAL is useful (code level)	Total
Repetition and practising	28
Receiving feedback	25
Teaching reinforces learning	18
Organising information for others makes it clearer for myself	17
Different perspective	15
New different or other technique or knowledge	15
Complementary knowledge	13
Reveals gaps	13
Comparison with own performance	11
Interesting	10
Providing feedback to others	10
Aimed at an appropriate level	8
Higher stakes than practice or revision alone	6
Relating information to a case	6
Efficient learning style	5
Aids memory	4
Increased concentration	4
Tutors do not comprehend student standards	4
Gain teaching experience	3
Peers more accessible	3

The three most frequently coded items were "repetition and practising," "receiving feedback," and "teaching reinforces learning." Female students' top reason for investing in PAL was "receiving feedback," while for males the most popular reason was "repetition and practising." Three key themes describing how PAL is useful to learners were abstracted from the codes: "Rehearsal," "To Teach is to Learn," and "Judgement Building." Two main themes emerged as to why students felt PAL was not useful: "I'm not qualified to judge," and "I have no framework for PAL." The themes and supporting quotes are explained in Table 3.

The majority of students agreed that PAL had many advantages when asked to rate statements on a rating scale of 1 = *strongly disagree* to 5 = *strongly agree*, though some students agreed that there were also disadvantages to PAL (Table 4). Thirty-six (78%) students agreed or strongly agreed that PAL "allows me to measure my progress against my peers." Other items with high

agreement were “is less threatening,” “allows me to express myself/let down my guard,” “gives me extra time to increase my understanding,” and “improves my teaching skills.” Statements that received the least agreement were “increases confidence and self-esteem” (25, 54%), “improves my leadership skills” (25, 54%), “improves my communication skills” (25, 54%), “improves my decision making” (24, 52%), and “provides emotional support” (23, 50%).

For PAL disadvantages, the statements which gained the most agreement (agree or strongly agree) were “my peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of practice)” (20, 43%), “I cannot trust my own judgement about my peers’ knowledge or performance” (19, 41%), and “I feel uncomfortable giving my peers constructive feedback about their performance (i.e. identify negative aspects of performance)” (19, 41%). Students least agreed with “peers focus on aspects of my performance that I feel are not key to improvement” and “it increases strain on friendships” (9, 20%).

When asked about learning in the clinical environment, 45 (98%) students agreed or strongly agreed with “teaching a concept to a peer helps me to understand the concept,” and 43 (93%) with “I learn well from a recognised expert.” Only 14 (30%) agreed or strongly agreed with “supervisors understand my learning struggles.”

DISCUSSION

PAL has been proposed as a useful adjunct to traditional didactic teaching for many years and has been studied in workplace learning situations (Lave & Wenger, 1991). The advantages of PAL have been described within a sociocultural framework: a shared vocabulary and experience can make a task easier to understand than if someone with a much greater skill level attempted to communicate the same instructions or guidance (Rogoff, 1990). A student who is less experienced may be able to garner assistance and prompting from a peer who has already attained those functions to achieve the same outcome or skill (Vygotsky, 1978).

It is unsurprising that students report using PAL on their clinical placements and find it to be of benefit, given that students are encouraged to use PAL in other formal aspects of their learning (e.g., PBL). Students in this study valued PAL as a learning strategy and recognised that PAL could augment their learning. Their reasons for investing in PAL activities were largely aligned with previous reporting, including gaining extra practice (Perera et al., 2010) and needing to know material better in order to teach it (Fornari, Fletcher, Herbitter, Boden, & Gold, 2011; Knobe et al., 2010; Peets et al., 2009). Students also cited improving the accuracy of their self-reflection and evaluation, and receiving additional feedback as reasons to use PAL. While almost 30% of PAL occurred in tutorials (where it was likely instigated by staff), the remainder occurred organically in informal settings, away from the supervisor’s gaze, such as on the wards and in the student common room. This finding is similar to a previous report of informal PAL (Kommalage & Thabrew, 2011) where meetings were student initiated and formed to meet the requirements of the students themselves.

Table 3
Themes arising from qualitative responses

Reasons why PAL is useful	
Rehearsal Students described that the ability to rehearse in front of an audience was beneficial to their learning. Having a peer there created a situation where they had some pressure both to prepare for a task and to perform a task, but the stakes were not too high. By association, the alternative audience, the clinical supervisor, was deemed to carry more threat to the learning experience because of their experience.	*"Repetition is a good teacher"* *"This helps me perform my history/exam under some sort of pressure which is good practice for OSCEs"* *"Less stressful environment enabling the basic presentation cases to be developed before presentations in front of hospital teams."* *"More pressure to perform well and treat it like an exam"* *"Peers are usually much nicer than tutors etc so you dont get as stressed"*
To Teach is To Learn Twice[1] Students felt that having to teach a subject or a skill forced them to have a thorough understanding of the topic/practice area. It also helped them to clarify and organise their own knowledge. By positioning themselves as a source of knowledge, students also gained valuable teaching skills and reported that it gave them novel insights into the demands of a clinical supervisor.	*"[PAL] Helps me consolidate my knowledge because I need to explain it in a clear and concise way"* *"Teaching reinforces everything in my mind. It's the most effective way of learning!"* *"Teaching reinforces my own knowledge - and explaining while demonstrating further tests this knowledge."* *"Understand the "assessors" point of view, experience in giving feedback in a constructive way"*
Judgement Building Students found that interaction with peers helped them comprehend the task or skill required of them, while also gaining information about their own performance in comparison to the required standard. This occurred both when the student was positioned as the learner (doing and being watched by a peer) and the teacher (observing a peer and providing commentary about the quality of the performance). Working with peers seemed to heighten students' sense of standards of practice and how their own work or that of others stacked up against these markers.	*"Able to see objectively what I can improve upon because I can see similarities and differences in how we take histories/perform exams."* *"It helped me compare with what I would do and identify what I need to do"* *"Can give more appropriate feedback to students as we have a better understanding of third year expectations. Also, helps critique own performance internally."* *"Exposed areas that i dont understand well (you cant teach a topic well until you understand it)"* *"Very useful in knowing where I was going wrong and also reinforcing what I was doing right"*
Reasons why PAL is not useful	
I'm not qualified to judge Despite referring to PAL as a method to improve their capacity to evaluate performance and form judgements, students also reported there were situations where they did not have the appropriate knowledge or skills to be able to comment on another students' performance. Where there was a feeling of inadequacy for judgement, there was a preference for expert tutor input to validate good practice or pull up poor practices to guide improvement.	*"Sometimes I am not sure if I myself know the correct technique"* *"I do not have enough knowledge to enable the peer to understand thereby getting both of us confused"* *"Only useful if I was knowledgeable on the topic they were demonstrating and had learnable feedback to give them. If I didn't, it was more confidence building congratulating them on their knowledge"* *"Sometimes my friend is not sure he/she knows the correct technique. It will be better if a tutor/lecturer can guide us more often"* *"Unless there is feedback from tutors one find it hard to discern "good" skills from "poor" skills.*
I have no framework for PAL Students also felt that PAL was a nebulous concept and had a preference for more familiar, traditional learning and assessing opportunities that they understood well and were therefore more comfortable with.	*"Would prefer to have a more structured approach targeted to exams"* *"Useful only because a bedside tutor was present, otherwise I would not gain benefit from observing a peer"* *"Sometimes my friend is not sure he/she knows the correct technique. It will be better if a tutor/lecturer can guide us more often"*

[1] Attributed to Joseph Joubert (Ten Cate & Durning 2007)

Table 4
PAL advantages and disadvantages

PAL Advantages	**%[a]**
Is less threatening	70
Increases confidence & self-esteem	54
Reassures me that I am at an appropriate stage of learning (on the right track)	65
Allows me to measure my progress against my peers	78
Provides emotional support	50
Allows me to ask 'dumb' questions that I might not be willing to ask of an expert	67
Allows me to express myself/ let down my guard	70
Gives me extra time to increase my understanding	72
Gives me different strategies and perspectives on how to learn material	67
Improves my communication skills	54
Improves my teaching skills	74
Improves my decision making	52
Improves my leadership skills	54
Helps me to reflect on my learning	65
Increases my respect for peers	67
PAL Disadvantages	
I cannot trust my own judgement about my peers' knowledge or performance	41
I cannot trust my peers' judgement about my knowledge or performance	35
Peers focus on aspects of my performance that I feel are not key to improvement	20
It encourages unhealthy competition	24
It increases strain on friendships	20
It reduces opportunities to hear feedback or receive teaching from experts (i.e., supervisor)	39
My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of practice)	43
I feel uncomfortable giving my peers constructive feedback about their performance (i.e., identify negative aspects of performance)	41
Learning in the clinical environment	
Peers understand my learning struggles	67
Supervisors understand my learning struggles	30
I learn well from someone closer in skill level/knowledge to myself	50
I learn well from a recognised expert	93
Teaching a concept to a peer helps me to understand the concept	98
Explaining/teaching a concept to an expert helps me to understand the concept	59
Teaching a skill to a peer a skill helps me to perform the skill	85
Demonstrating a skill to an expert helps me to perform the skill	82

Note. [a]Percentage reporting agree or strongly agree

Importantly, students did not feel that PAL increased the strain on their friendships, nor did it create unhealthy competition. This result contrasts with the findings of a previous study where peer assessment affected friendships or resulted in "tit-for-tat" marking for grades (Papinczak, Young, & Groves, 2007). Antagonism among peers is therefore not a concern when PAL activities are formative and designed to improve performance (Ladyshewsky, 2013; Paquet & Marchais, 1998); students in this study were more comfortable with peers than tutors.

Students are already using PAL in a limited capacity and report it makes a contribution to their learning, though their concerns on the ability to judge others' performance and give appropriate feedback need to be addressed. Therefore, interventions to improve PAL should target the quality and perceived usefulness of PAL; that is, students' capability to engage in meaningful PAL activities. This may include workshops on how to teach and give feedback to peers in a clinical environment (Ladyshewsky, 2013). Formal teaching will also validate PAL as a supplementary source of information and means for improvement that works in conjunction with traditional teaching methods. In keeping with sociocultural theory, role modelling and encouragement of PAL by senior staff may also motivate reluctant students to participate, (Lave & Wenger, 1991). Lastly, individuals' learning preferences and perceived activity worth also influence engagement in workplace based learning (Greenstock et al., 2013; Newton et al., 2009). Assessment-focussed students may also benefit from explicating the link between PAL and assessment outcomes, such as communication skills and teamwork. Thus, constructive alignment can also be applied to graduate attributes (Biggs, 1996).

Limitations

This study had several limitations. The total number of respondents comprised approximately 13% of the total Year 3 cohort, which is less than previously reported overall response rates for online surveys of medical students (Grava-Gubins & Scott, 2008). Students who have had positive experiences of PAL are potentially more willing to complete the survey, even though the survey was couched as being about learning habits in general rather than peer learning specifically. The survey was also based on students' self-report. While all reported numbers seem within a reasonable range, students may have exaggerated their involvement in peer learning activities, even though the survey was not linked to any evaluative activity contributing to their grades.

CONCLUSION

Medical students in this study reported that they value and use PAL as a learning strategy in clinical education. They reported using PAL over 20 times a week on average (approximately four times a day), despite the fact that these activities were not mandated or prompted by an educator, nor contained in a course guide as part of the formal curriculum. Students highlighted a number of positive effects, including the ability to practice with less pressure and opportunities to build their own evaluative judgement, even when taking on an observational role. This finding challenges the pervading culture of workplace experiential learning where it is said that people "learn through doing." Importantly, students indicated that PAL does not impact on their friendships within the cohort, a frequently cited barrier

to implementing PAL programs. However, students alluded to the nebulous nature of PAL and the lack of formal guidance on PAL strategies in the clinical environment. Further investigation of PAL in the medical clinical environment is required to develop it as a useful learning strategy. Accessing patterns of engagement through observational studies and seeking the experience and opinions of educators/supervisors as well as students would help to further understand its potential.

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APPENDIX

Survey questions

What is your age? _____ years

What is your gender?
□ Male □ Female □ Other

What is your enrolment type?
□ Local student
□ International student

What was your course entry?
□ School leaver
□ Graduate entry

What is your current clinical site?

[list of Year 3 clinical sites]

Peer assisted learning is defined as "people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching" (Topping, 1996). Peer assisted learning is a term which encompasses a number of different learning methods, including but not limited to: peer tutoring, peer collaboration, peer feedback, and peer assessment. This survey is going to ask you about your peer assisted learning experiences on your clinical placements.

Over the past week, who have you **learnt** the most from?

□ peer
□ near peer (e.g. senior medical student)
□ intern/HMO/resident
□ registrar
□ consultant
□ tutor
□ patient
□ nursing staff
□ allied health
□ self
□ other (please write below)

Please explain your answer?

_____

_____

_____

Who do you get the most **clinical teaching** from?

□ peer
□ near peer (e.g. senior medical student)
□ intern/HMO/resident
□ registrar
□ consultant
□ tutor
□ patient
□ nursing staff
□ allied health
□ self

For each type of learning activity, please complete the following table on your learning activities in the past week

	How many times?	Why did you participate in this activity?	Where did it happen? (you may select more than one option)							
	Please enter a whole number.		On the wards	In clinics	In a bedside tutorial	In a tutorial (not bedside)	Student common room	Cafeteria	Outside the hospital	Other
I observed a peer performing a history/ examination		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I was observed by a peer performing a history/ examination		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I taught a peer about a topic		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I was taught by a peer about a topic		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I demonstrated a skill to a peer		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑

	How many times?	Why did you participate in this activity?	Where did it happen? (you may select more than one option)							
	Please enter a whole number.		On the wards	In clinics	In a bedside tutorial	In a tutorial (not bedside)	Student common room	Cafeteria	Outside the hospital	Other
A peer demonstrated a skill to me		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I gave feedback to a peer on their performance/ knowledge		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I received feedback from a peer on my performance/ knowledge		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
I discussed a case with a peer		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑
A peer discussed a case with me		❑ I chose to do it ❑ I was asked by a peer ❑ I was asked by an educator	❑	❑	❑	❑	❑	❑	❑	❑

How useful was this type of PAL for your learning needs?

	Please rate each item					Why was this form of PAL useful?
	Not useful at all	A little useful	Moderately useful	Very useful	Extremely useful	Please explain your rating.
I observed a peer performing a history/examination	❍	❍	❍	❍	❍	
I was observed by a peer performing a history/examination	❍	❍	❍	❍	❍	
I taught a peer about a topic	❍	❍	❍	❍	❍	
I was taught by a peer about a topic	❍	❍	❍	❍	❍	
I demonstrated a skill to a peer	❍	❍	❍	❍	❍	
A peer demonstrated a skill to me	❍	❍	❍	❍	❍	
I gave feedback to a peer on their performance/knowledge	❍	❍	❍	❍	❍	
I received feedback from a peer on my performance/knowledge	❍	❍	❍	❍	❍	
I discussed a case with a peer	❍	❍	❍	❍	❍	
A peer discussed a case with me	❍	❍	❍	❍	❍	

The literature reports a number of benefits and drawbacks to peer assisted learning (Krych et al., 2005; Lincoln & McAllister, 1993; Weyrich et al., 2008). Based on your own experience on clinical placements, please rate to what extent you agree with the following statements.

Reported Advantages – Compared to traditional teacher-led learning, PAL …

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Is less threatening	❍	❍	❍	❍	❍
Increases confidence & self-esteem	❍	❍	❍	❍	❍
Reassures me that I am at an appropriate stage of learning (on the right track)	❍	❍	❍	❍	❍
Allows me to measure my progress against my peers	❍	❍	❍	❍	❍
Provides emotional support	❍	❍	❍	❍	❍
Allows me to ask 'dumb' questions that I might not be willing to ask of an expert	❍	❍	❍	❍	❍
Allows me to express myself/ let down my guard	❍	❍	❍	❍	❍
Gives me extra time to increase my understanding	❍	❍	❍	❍	❍
Gives me different strategies and perspectives on how to learn material	❍	❍	❍	❍	❍
Improves my communication skills	❍	❍	❍	❍	❍
Improves my teaching skills	❍	❍	❍	❍	❍
Improves my decision making	❍	❍	❍	❍	❍
Improves my leadership skills	❍	❍	❍	❍	❍
Helps me to reflect on my learning	❍	❍	❍	❍	❍
Increases my respect for peers	❍	❍	❍	❍	❍

Reported Disadvantages – Compared to traditional teacher-led learning, PAL IS NOT USEFUL because

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I cannot trust my own judgement about my peers' knowledge or performance	❍	❍	❍	❍	❍
I cannot trust my peers' judgement about my knowledge or performance	❍	❍	❍	❍	❍
Peers focus on aspects of my performance that I feel are not key to improvement	❍	❍	❍	❍	❍
It encourages unhealthy competition	❍	❍	❍	❍	❍
It increases strain on friendships	❍	❍	❍	❍	❍
It reduces opportunities to hear feedback or receive teaching from experts (ie supervisor)	❍	❍	❍	❍	❍
My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of performance)	❍	❍	❍	❍	❍
I feel uncomfortable giving my peers constructive feedback about their performance (i.e. identify negative aspects of performance)	❍	❍	❍	❍	❍

Based on your experience of learning in the clinical environment, please rate the following statements

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Peers understand my learning struggles	❍	❍	❍	❍	❍
Supervisors understand my learning struggles	❍	❍	❍	❍	❍
I learn well from someone closer in skill level knowledge to myself	❍	❍	❍	❍	❍
I learn well from a recognised expert	❍	❍	❍	❍	❍
Teaching a concept to a peer helps me to understand the concept	❍	❍	❍	❍	❍
Explaining/teaching a concept to an expert helps me to understand the concept	❍	❍	❍	❍	❍
Teaching a skill to a peer a skill helps me to perform the skill	❍	❍	❍	❍	❍
Demonstrating a skill to an expert helps me to perform the skill	❍	❍	❍	❍	❍

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Gender matters: students' perceptions of peer learning in clinical education

The student survey was also administered in 2013 and 2014. While the 2013 data served to situate the observed students' activities amongst those of the greater student population, it was also recognised that a larger sample was required to detect differences between sub-populations. Trends in the 2012 data suggested that male and female students had differing opinions on the utility of PAL. The data from all three years, 2012-2014, were demographically similar. Therefore, all survey data were pooled to increase the statistical power of the analyses undertaken. This section describes the results arising from the pooled data, in the form of a paper submitted for publication in *Focus on Health Professional Education*.

Abstract

Background

Peer-assisted learning (PAL) is an increasingly used learning method, with demonstrated equivalence to conventional teaching methods in students' knowledge and skill gain. Despite this, student satisfaction with PAL is varied. There are few investigations of gender as a factor influencing students' perceptions of peer-assisted learning. Less is known about gender's influence on participation in PAL.

Method

This study investigated the influence of gender on students' attitudes towards, and participation in, PAL activities. 191 students in their first clinical year completed a self-report questionnaire over three years, which included questions on engagement in specific PAL activities, and the advantages and disadvantages of PAL.

Results

Male and female students' reported similar participation rates in PAL activity. Female students were more likely to report that observing others undertake a history or examination was useful to their learning. Female students were also more likely to report that PAL provided a 'safe' learning environment, allowing them to take more time, let down their guard and ask questions.

Conclusion

Variation in students' attitudes when introducing PAL activities may affect their uptake. Gender is unlikely to be the sole factor affecting perceptions of PAL, but it may have an impact on readiness to engage and patterns of engagement. The perceived relative safety of PAL identified in this study, when contrasted to recent reports of bullying and harassment

within medical training in Australia, may suggest that education of clinicians and students on PAL and bullying may be warranted to improve learner experiences both pre and post-registration.

Introduction

Peer assisted learning (PAL) is a frequently used learning method for medical students. Defined as 'people from similar social groupings, who are not professional teachers, helping each other to learn and by so doing, learning themselves' (Topping & Ehly, 1998), PAL occurs in both formal, organised situations such as the classroom (e.g. clinical skills teaching) and informally, as an adjunct to the curriculum (Kommalage et al., 2011). Student performance after learning from peers has been shown to be equivalent to that of those who received conventional teaching, for both knowledge gain and skills (Yu et al., 2011). When students acted as tutors, professional attributes were also developed. Student satisfaction with PAL has generally been high (Cushing, Abbott, Lothian, Hall, & Westwood, 2011; Weyrich et al., 2008) though some students have been less satisfied, preferring to participate in conventional learning sessions (Hulsman, Harmsen, & Fabriek, 2009). It is therefore plausible that universal incorporation of PAL activities into education curricula may not benefit some student groups, and that a more targeted approach is required.

One factor that may influence whether students prefer, engage in, or benefit from the introduction of formal PAL activities in education curricula is gender (Kassab, Abu-Hijleh, Al-Shboul, & Hamdy, 2005). Research in this area has tended to focus on preferences and engagement but has not directly addressed the issue of benefit. Knobe et al (2012) found that female medical students were more satisfied with their peer tutors than males. However, Kassab et al (2005) reported female medical students were less satisfied with their peer tutors, despite more readily engaging in teamwork activities. Papinczak et al (2007) did not detect a difference in the marks given to peers based on gender, in a PBL-based peer assessment activity. There is little clarity provided by research that has directly addressed the issue of gender as a factor influencing engagement in peer learning. More distantly-related research has examined the impact that gender has had on the medical student experience at the pre-clinical and clinical levels. Babaria et al (2011) described how male students were reported to dominate the classroom, with greater levels of aggressive behaviour. Lempp & Seale (2006) also highlighted a range of gender inequalities perceived by medical students in clinical environments, including a lack of female role models and gender stereotyping of students to ascribe attributes and future specialities. One could hypothesise a range of impacts that these factors may have on student proclivity towards

PAL. These relationships will remain unknown without further research directly addressing this issue.

Aim

This research aimed to investigate the influence of gender on students' self-reported attitudes towards and participation in PAL activities.

Methods

Design

This was an analytic, cross-sectional survey, conducted with three successive cohorts of Year 3 medical students.

Participants and setting

We engaged research participants from three successive cohorts of Year 3 Bachelor of Medicine/Bachelor of Surgery students from 2012-2014 (i.e. in their first clinical year) across the 15 clinical campuses of a single university. Students spend the first two years attending lectures, tutorials and practical sessions at a university campus. Many learning activities in these pre-clinical years employ PAL to achieve knowledge and skill gain. Years three to five are spent on clinical placements. Learning outcomes in these years may require aspects of PAL to be employed (e.g. communication with colleagues), however activities do not explicitly require the use of PAL, nor is PAL mandated.

The first clinical year, year three, was specifically targeted as students spend the entire academic year at one clinical site, rotating through medical and surgical placements in an allocated student group of five or six students. They spend one day a week in didactic classroom sessions, and attend tutorials on the other days, including those for problem based learning and bedside teaching. Outside of these times, students are expected to participate in ward-based activities according to their rotation, such as outpatient clinics, ward rounds, and operating theatre lists. There are additional optional peer-learning activities, such as mentoring by final year students (Raghunath et al., 2011). Given the flexible nature of this first clinical year, students therefore have ample opportunity for self-directed learning, including learning with peers.

Procedure

All students were invited to participate. Invitations were issued through the University online teaching system, as a news announcement. Where possible, students were also addressed in person on a day where they attended lectures. A researcher (JT) explained the

purpose of the project and handed out leaflets containing the URL for the survey. The explanatory statement was contained in the first page of the online survey. Consent was implied through the return of the survey. The chance to win a double movie pass was offered as an incentive for students who completed the survey. This was randomly awarded to a student who had supplied their contact details in a separate, non-linkable form. The survey remained open online for one month at approximately the same time each year, in the second semester, when students had settled into their placements.

Instrument

A four-page survey on peer learning developed and described by Tai et al (2014) was used. The survey was constructed based on the research aims. The survey was written by JT and reviewed by the research team, who examined each question for clarity and intended meaning. Several items were then re-written to ensure the desired information was collected. The investigators' past experiences of the types of PAL interactions that occur during clinical placements was crucial to the development of the first part of the survey. The survey also drew from the published medical and higher education literature reporting on the advantages and disadvantages of PAL (Krych et al., 2005; Lincoln & McAllister, 1993; Weyrich et al., 2008). The survey asked students to report their experiences of ten separate PAL activities. The weekly frequencies of the activities were recorded, while the self-perceived utility of each activity for the student's learning was scored on a scale of 1 (not useful at all) to 5 (extremely useful) with the intermediate points not being labelled. In addition, students were also asked to indicate who had initiated the activity, and the location of the activity. The second part of the survey sought information about the advantages and disadvantages of PAL, and students' experiences of learning in the clinical environment. A Likert-type scale of 1 (strongly disagree) to 5 (strongly agree) was used for this part of the survey.

Analysis

Data were analysed using Microsoft Excel 2010 (Version 14.0.7140.5002) and Stata/IC 11.0. Analyses were conducted to detect differences between male and female respondents, according to the question and resultant data type:

Frequency of participation: Ten survey questions asked students to nominate the number of occasions that they engaged in specific activities related to PAL (e.g. observing a peer perform an assessment). These data were treated as count data and were compared between males and females using negative binomial regression.

Source of initiation: Respondents were asked to nominate the source of initiation for each PAL activity. These were classified as self-initiated, initiated by others (tutor or peer), or both. The χ^2 statistic was used to compare the proportion of respondents nominating each source of initiation between the genders.

Location of occurrence: Participants were able to choose more than one location from a list (on the wards, in clinics, in a bedside tutorial, in a tutorial (not bedside) student common room, cafeteria, outside the hospital) for the occurrence of each of the PAL activities. Responses to the location question were re-coded into three categories: formal (only in tutorials), informal (wards, clinic, student common room, cafeteria, or outside the hospital) and both (any combination). The χ^2 statistic was then used to compare the proportion of respondents in the three collapsed categories between the two genders.

Utility of PAL activity: Likert-type responses categories used to scale responses to utility questions (1 = not at all useful to 5 = extremely useful) were held to be ordinal data. Ordinal logit regression was used to detect differences between genders for these items. The percentage of respondents who rated the item as 4 or 5 on a scale of 1-5 was calculated and presented.

Perceived advantages and disadvantages: Likert-type responses categories used to scale responses to perceive advantages and disadvantages questions (1 = strongly disagree 5 = strongly agree) were held to be ordinal data. Ordinal logit regression was used to detect differences between genders for these items. The percentage of respondents who rated the item as 'agree' or 'strongly agree' was calculated and presented.

Results

Demographics

In total, 191 responses (16%) were gathered over the three years. Respondents' median age was 21 (range 19-47, mean 21.83), 24 students did not list their age. 88 (46%) identified as male, 22 (12%) were enrolled as international students, and 31 (16%) were graduate entry students. The survey respondents were approximately representative of the overall medical student population at Monash, which, for the years the survey conducted, was 55% male, 18% international students, and 22% graduate students.

Self-report of specific PAL activities

Frequency of participation

The total frequency of PAL activity ranged from 3 to 67 times per week (Table 5.2), with the average total being 21.42 episodes. There were no statistically significant differences in PAL frequency between males and females overall or for individual activities. Both males and females reported observing a peer performing a history or examination as the most frequently undertaken activity (3.26 and 3.36, p = 0.518), while demonstrating a skill to a peer was the least frequently undertaken activity (0.81 and 1.00, p = 0.416)

Location of occurrence

Students reported on the location of PAL activity (Table 5.1). The majority of students undertook PAL in both formal (e.g. tutorials) and informal (e.g. on wards, in the student common room, the cafeteria) settings, with no differences between males and females (χ^2=3.58, p=0.167).

Table 5.1 Reported location of PAL activity

	male	female	Total	
formal settings	4	7	11	
informal settings	13	7	20	
both formal & informal settings	56	72	128	
Total	73	86	159	χ2=3.58, p=0.167

Source of initiation

The majority of reported PAL activity was self-initiated (Table 5.2), however a number of students reported that their involvement in PAL activities was through other student, or tutor invitation. There were no statistically significant differences in PAL initiation between genders.

Utility of PAL activity

Students perceived the most useful PAL activity was 'I was taught by a peer', with 79% awarding a rating of 4 or 5, where 1 = not useful at all and 5 = extremely useful. The activities 'I taught a peer about a topic' (77%) and 'I received feedback from a peer on my performance/knowledge' (76%) were also perceived as useful by both genders. For the PAL activity 'I observed a peer performing a history or examination', females were significantly more likely to find it useful than males (p= 0.008). However, this activity was

the second least useful of all listed activities, with 'I gave feedback to a peer on their performance/knowledge' being the least useful item for both males and females (47%).

Perceived advantages and disadvantages to PAL

While male and female students agreed on the majority of PAL advantages (Table 5.3), several differences between males and females were identified: while 80% of female students agreed or strongly agreed with the statement that PAL 'allows me to ask 'dumb' questions that I might not be willing to ask of an expert', only 61% of males did (p=0.01). There were also differences for 'allows me to express myself/let down my guard' (females 75%, males 58%, p= 0.03), 'gives me extra time to increase my understanding' (females 78%, males 63%, p=0.01) and 'helps me to reflect on my learning' (females 75%, males 56%, p= 0.03). Female students agreed most with the statement 'allows me to measure my progress against my peers' (84%), while males agreed most with the statement that PAL 'improves my teaching skills' (81 %), though gender differences were not detected in the responses to these items.

The only PAL disadvantage for which there was a statistically significant gender difference in agreement was 'peers focus on aspects of my performance that I feel are not key to improvement' (females 9%, males 28%, p= 0.04). Both males and females agreed least with the statement 'it encourages unhealthy competition' (17% for males and females, p= 0.54). Female students agreed most with the statement 'I cannot trust my own judgement about my peers' knowledge or performance' (49%), while male students were most concerned that 'My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of practice)' (44%).

Gender differences in agreement for some statements about learning in the clinical environment approached statistical significance. While 41% of male students agreed that 'supervisors understand my learning struggles', only 24% of female students also agreed (p=0.07). Other statements for which differences approached statistical significance were 'I learn well from a recognised expert' (males = 92%, females = 85%, p = 0.06) and 'Demonstrating a skill to an expert helps me to perform the skill' (males = 87%, females = 78%, p = 0.06). However, almost all students (females 91%, males 95%, p=0.20) agreed that 'teaching a concept to a peer helps me to understand the concept.

Table 5.2 PAL activity frequency, utility and reasons for partaking

	Frequency of PAL activity				N	Utility of PAL activity for learning needs*				N	Reason for partaking in the activity†				
	Male	Female	Total	p value nbreg		Male	Female	Total	ologit P>|z|		Self-initiated (%)	Initiated by others (%)	Initiated by self and others (%)	p value χ^2	N
I observed a peer performing a history/examination	3.26	3.36	3.33	0.518	155	43%	65%	55%	0.008**	146	58 (48)	25 (21)	30 (25)	0.065	120
I was observed by a peer performing a history/examination	2.30	2.20	2.27	0.873	155	65%	79%	73%	0.197	145	64 (57)	25 (22)	18 (16)	0.220	113
I taught a peer about a topic	2.17	1.81	1.97	0.180	155	76%	78%	77%	0.642	135	50 (42)	25 (22)	24 (21)	0.254	115
I was taught by a peer about a topic	2.10	2.63	2.39	0.088	155	82%	77%	79%	0.955	144	69 (64)	10 (9)	15 (15)	0.476	107
I demonstrated a skill to a peer	0.81	1.00	0.91	0.416	155	57%	67%	62%	0.458	116	40 (37)	21 (20)	10 (9)	0.871	107
A peer demonstrated a skill to me	0.81	1.12	0.97	0.130	155	55%	62%	59%	0.141	121	42 (41)	20 (19)	5 (5)	0.183	103
I gave feedback to a peer on their performance/knowledge	1.84	1.79	1.84	0.720	155	43%	49%	47%	0.553	135	45 (41)	30 (27)	15 (14)	0.691	110
I received feedback from a peer on my performance/knowledge	1.73	1.64	1.71	0.757	155	75%	77%	76%	0.742	134	58 (54)	16 (15)	10 (9)	0.602	108
I discussed a case with a peer	2.87	3.26	3.08	0.378	155	70%	66%	68%	0.443	137	82 (73)	2 (2)	18 (16)	0.409	113
A peer discussed a case with me	2.56	3.18	2.89	0.125	154	60%	64%	62%	0.102	138	62 (54)	17 (15)	22 (19)	0.891	115
Total	20.46	22.11	21.42	0.323											

* Responses were measured on a scale of 1 = not at all useful to 5 = extremely useful, with no intermediary descriptors used for points 2, 3 and 4. In the above table, responses greater than 3 were pooled.

†students were able to choose from 'I chose to do it', 'a peer asked me to do it' and 'a tutor asked me to do it'. Responses have been recoded; those who did not select any of the three are not represented in the table but can be calculated from the total number of students responding.

** indicates statistically significant difference between genders

Table 5.3 Perceived PAL advantages and disadvantages

% reporting agree or strongly agree	N	Male	Female	Total	ologit P>|z|
Perceived PAL Advantages					
Is less threatening	140	66%	74%	70%	0.22
Increases confidence & self-esteem	140	55%	64%	60%	0.31
Reassures me that I am at an appropriate stage of learning (on the right track)	140	55%	64%	60%	0.39
Allows me to measure my progress against my peers	140	80%	84%	82%	0.65
Provides emotional support	139	50%	64%	58%	0.24
Allows me to ask 'dumb' questions that I might not be willing to ask of an expert	140	61%	80%	71%	0.01**
Allows me to express myself/ let down my guard	140	58%	75%	67%	0.03**
Gives me extra time to increase my understanding	140	63%	78%	71%	0.01**
Gives me different strategies and perspectives on how to learn material	140	69%	82%	76%	0.24
Improves my communication skills	140	50%	62%	56%	0.37
Improves my teaching skills	140	81%	79%	80%	0.43
Improves my decision making	140	47%	49%	48%	0.91
Improves my leadership skills	140	66%	51%	58%	0.12
Helps me to reflect on my learning	140	56%	75%	66%	0.03**
Increases my respect for peers	139	60%	68%	65%	0.58
Perceived PAL Disadvantages					
I cannot trust my own judgement about my peers' knowledge or performance	140	39%	49%	44%	0.70
I cannot trust my peers' judgement about my knowledge or performance	140	33%	42%	38%	0.56
Peers focus on aspects of my performance that I feel are not key to improvement	139	28%	9%	18%	0.04**
It encourages unhealthy competition	140	17%	17%	17%	0.54
It increases strain on friendships	139	36%	25%	30%	0.78
It reduces opportunities to hear feedback or receive teaching from experts (i.e., supervisor)	140	41%	34%	37%	0.54
My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of practice)	140	44%	37%	40%	0.35
I feel uncomfortable giving my peers constructive feedback about their performance (i.e., identify negative aspects of performance)	140	28%	34%	31%	0.59
Learning in the clinical environment					
Peers understand my learning struggles	94	64%	67%	66%	0.38
Supervisors understand my learning struggles	94	41%	24%	31%	0.07
I learn well from someone closer in skill level/knowledge to myself	94	41%	53%	48%	0.24
I learn well from a recognised expert	94	92%	85%	88%	0.06
Teaching a concept to a peer helps me to understand the concept	94	95%	91%	93%	0.20
Explaining/teaching a concept to an expert helps me to understand the concept	94	64%	60%	62%	0.24
Teaching a skill to a peer a skill helps me to perform the skill	94	77%	85%	82%	0.79
Demonstrating a skill to an expert helps me to perform the skill	93	87%	78%	82%	0.06

** = statistically significant difference

Discussion

This study investigated students' perceptions of PAL on clinical placements. Unlike previous studies of gender-based PAL perceptions, this study did not focus on a particular

PAL-based intervention (Kassab et al., 2005; Knobe et al., 2012), affording a broader picture of students' PAL activity and perceptions of utility. Both male & female students used PAL similarly frequently throughout the week, however there were differences in their perceptions of PAL utility, which might be due to a range of previously described phenomena.

Gender stereotypes have been expressed by medical students previously (Lempp & Seale, 2006), and may also apply in this setting. Male students have been reported to be dominating and aggressive in tutorials (Babaria et al., 2011; Wayne, Vermillion, & Uijtdehaage, 2010). A concomitant reluctance to appear vulnerable may have led to lower agreement with the statements 'allows me to ask 'dumb' questions that I might not be willing to ask of an expert', 'Peers focus on aspects of my performance that I feel are not key to improvement', and 'helps me to reflect on my learning'. Conversely, it has been demonstrated that females value modesty, and humility, while downplaying their competence, even to the extent to self-assessing themselves as performing more poorly than they actually are (Blanch, Hall, Roter, & Frankel, 2008; Rees, 2003). These traits might cause women to value their peers' input more in the belief that anything will help them to improve. If women have had more experience with being a bystander and observing another student's performance in tutorial situations, it may be that their capacity to learn from observation is heightened through practice, resulting in the significantly higher rating for the utility of observing a peer in this study.

Female students' preference for a PAL environment may also be influenced by their experiences in other learning situations. Humiliation of vulnerable students in tutorial settings has been previously reported, which was noted to be both gender and racially based (Lempp & Seale, 2006). Wayne et al (2010) found that a specific emphasis on the psychological safety of the situation resulted in more female students volunteering to act as a leader, a more exposed role than being a group member. Differences in feedback to students from tutors based on gender have also been identified. Carney et al (2000) reported that female preceptors gave less feedback to female students than male students, and the dyad that resulted in the most feedback was male preceptors and male students. Rees (2003) also reported trends that preceptor-student dyads with different genders gave lower marks on portfolios, suggesting that tutor gender may also have an effect on classroom experiences. Given the complexity of workplace learning and the paucity of feedback within standard learning environments, PAL activities with the promise of a safe environment and feedback from a range of sources might be preferable.

Gender cannot be the only factor impacting on attitudes towards learning. We would have liked to further investigate other factors such as culture, race, and social standing in an intersectional model, as suggested by Tsouroufli et al (2011). There were suggestions in the data that students from culturally diverse backgrounds may experience PAL differently, however the group sizes and survey instrument precluded analysis. We hypothesise also that previous learning experiences may also impact on medical students' attitudes to peer-assisted learning. Blackman (2004) identified that not only gender, but undergraduate performance and type of course studied were factors in clinical performance of graduate entry medical students; this may extend to PAL activities. Similarities between feedback in music or athletic performance and medicine have been previously drawn (Watling, Driessen, van der Vleuten, & Lingard, 2014). Participation in sports teams or ensemble music playing (i.e. successful team ventures) may also lead to a greater appreciation of PAL, and the ability to work in groups. These factors could be further explored in a more expansive survey.

The findings of this study also align with recent media reports of bullying and sexual harassment within the medical profession in Australia (Ivory & Scott, 2015). Sixty-seven percent of students overall agreed that PAL "Allows me to express myself/ let down my guard", and this may be indicative of the need to be more cautious around senior staff. This is consistent with reported cases of bullying not being restricted only to female students or doctors (Medew, 2015), and supports the suggestion that there is a need for widespread anti-bullying and gender equality policy and training (Low, 2015). Reducing conscious and unconscious biases (whether they be gender or otherwise based) for both students and clinicians may contribute to an environment more conducive for learning.

Strengths and limitations

This study was conducted at a single university over three cohorts of medical students. Therefore, all students had a similar pre-clinical experience of PAL. However, students are placed in a range of clinical environments including rural and metropolitan generalist hospitals, and larger tertiary teaching hospitals. Some students also have the opportunity to spend time at an international campus. This represents a wide range of clinical placement experiences.

We have identified that there are some gender differences in students' perceptions of PAL. This information may be helpful for educators and clinicians wishing to encourage the use of PAL, as a different strategy may be required for male and female students. We are aware however that such a binary analysis is unlikely to include all the complexities included in

an intersectional approach. Future studies should examine the impact of multiple factors upon student preference for learning with peers, and the extent to which targeted PAL curriculum initiatives, including repeated exposure from early in the pre-clinical setting, influences learning approaches over time.

Conclusion

PAL is a useful adjunct to traditional teacher-led learning opportunities in clinical medical education. This study supports the existence of gender related differences in the perception of PAL, which may impact on students' willingness and ability to learn from PAL activities. Male students may find undertaking observational roles less useful, and may find appearing vulnerable in front of their peers more challenging than their female peers. Female students may identify greater advantages to PAL as a result of their previous learning experience, both positive and negative. These findings should inform educators' strategies for encouraging PAL. Gender is likely just one of many factors impacting on students' experiences; future studies using an intersectional framework to examine the factors impacting on student PAL experience are recommended, and both student and educator biases could be explored.

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Ethical approval

The project was approved by the Monash University Human Research Ethics Committee, approval number CF12/2429 – 2012001312 and Monash Health, Project number 13167L

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Summary

Students' perceptions of PAL in the clinical environment were elicited through a survey of Year 3 (first clinical year) students in the years 2012-2014. The results of this survey, and discussion on the findings, have been presented in the form of two papers, one published, the other submitted for publication. Whilst the second paper focuses on gender-based differences in PAL perception, it supports and echoes the first paper's premise that PAL does occur, and is perceived as useful to a large proportion of Year 3 medical students.

This work confirmed that PAL activities were taking place on clinical placements, and while approximately one third of PAL was occurring in formal, tutorial settings, there was an even larger amount of PAL occurring informally. Students in all three cohorts reported that PAL fostered their own deeper learning, and allowed them to rehearse and practice in a lower stakes environment than in front of clinical supervisors. They did however raise concerns about the ability of peers to accurately comment on performances.

While the preliminary data did not detect significant differences between genders in the perception of PAL activities, the subsequent pooling of three years' data detected differences in the perceptions of PAL, where females were more likely to agree that PAL provided a safe learning environment.

The frequency with which PAL occurred (an average of 21 times per week) confirmed that PAL represented a key part of students' experiential learning on clinical placements. The specific PAL activities reported by students, and the perception of facilitators and obstacles to PAL, primed the research for the observational study. The following chapter reports on the outcomes of the observational study, in three sections: firstly, the pilot conducted to ensure feasibility, then the findings on students' activities and their perceptions of using PAL in the clinical environment, and lastly, on the manner in which PAL contributed to the development of more than their medical knowledge and procedural skills.

Chapter 6
Observational Study

Declaration for Thesis Chapter 6

Declaration by candidate

In the case of the publication in Chapter 6, "*Identifying opportunities for learning: an observational study of medical students' use of peer assisted learning on clinical placements*", the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Led conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Elizabeth Molloy	Contributed to the conception of the study, undertook qualitative data analysis, assisted in drafting of the manuscript	n/a
Ben Canny	Contributed to the conception of the study, contributed to data analysis where consensus was required for coding and interpretation, assisted in drafting of the manuscript	n/a
Terry Haines	Contributed to the conception of the study, contributed to data analysis where consensus was required for coding and interpretation, assisted in drafting of the manuscript	n/a

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's Signature: [redacted] **Date:** 20 August 2015

Main Supervisor's Signature [redacted] **Date:** 20 August 2015

*Note: Where the responsible author is not the candidate's main supervisor, the main supervisor should consult with the responsible author to agree on the respective contributions of the authors.

In the case of the publication in Chapter 6, "*Building evaluative judgement through peer-assisted learning: opportunities in clinical medical education*", the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Led conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

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Chapter 6 Observational study

Introduction

The literature review on PAL in clinical education highlighted that most of the published evidence consisted of learner self report of satisfaction and efficacy. The observational study was conceived as a way of examining students' PAL activities in the clinical setting, beyond participant self-report. This therefore required an approach whereby actual student activity was recorded. In the tradition of ethnography, and as detailed in Chapter 3, it was determined that a direct observational approach[21] would not only satisfy this requirement, but enable the researcher to also interview the observed students about their participation in such activities, close to the event (Miles et al., 2014). These sampling methods fulfilled the goals of the research, as outlined in the introduction: not only to define PAL activities that students participated in on clinical placements, but to also uncover students' perceptions and motivations for undertaking them. However, it was not entirely known if such a study were practical. This chapter firstly reports on the pilot work done by the researchers, then goes on to present and discuss the findings, in the form of two papers submitted for publication. A PAL Activity Matrix is then presented, giving a range of suggested activities, both supervised and independent, that students can undertake in pairs or small groups during clinical placements. The matrix translates the research findings into a practical guide for implementing PAL in a clinical environment.

Pilot study

A pilot of the observational component of Phase 2 was conducted to ensure feasibility. It was surmised that the researcher, JT, having previously been a medical student, knew instinctively how to "act" as a medical student and be an unobtrusive observer. However, despite attending a course on qualitative research, including data collection through interviews and observations, it was possible that these data collection techniques were not appropriate for the clinical environment. The pilot was undertaken to ensure that the techniques would capture the desired data, and that a solo researcher could record all relevant data in an efficient and timely manner.

Participants

Monash University places its medical students across a number of health networks within metropolitan Melbourne. A clinical site which was not intended to be used in the actual

[21] As opposed to video ethnography, where recordings of activities are studied rather than the activities themselves

study was chosen to ensure the intended research site was not contaminated, nor exhausted. The researcher was familiar with this location as she had previously worked at that hospital. A general medical unit was chosen for its likelihood of having several medical students attached. Additionally, the largely ward-based activities were likely to contain more observable PAL moments, as students were able to remain in groups[22].

Data collection tools

Prior to the pilot, a data collection template was developed in consultation with the research team (see Appendix D) to promote easy capture and analysis of the data. This included a range of attributes for each learning moment (or PAL interaction) that had space for both predetermined data (e.g. type of activity, location, initiator) and also free description. A short schedule for the end-of-day interview was also developed. Copies of these were printed and taken, along with an exercise book for freehand observations, to the hospital site. An audio recorder was also prepared, in the case of conversations between students that occurred away from patients.

Consent and ethical approval

The researcher approached the clinical school and unit, requesting a shadowing opportunity to trial the feasibility of the outlined research methods. Written permission was granted from the clinical school and clinical unit where the pilot observations were planned. Formal ethics approval was not sought as no data were to be collected for research purposes.

Results

The pilot study was conducted in April 2013. Students attached to a general medical unit were shadowed for half a day. The researcher (JT) therefore attended medical handover, part of a ward round, a bedside tutorial, in addition to the time students spent on the ward. An expert observational researcher (EM) also attended for one hour, to gain first hand information from the students on how their time was structured, to determine if the planned research timetable was feasible.

What emerged from the Pilot was that peer learning moments were not as clear-cut as the data collection template had anticipated, and that data was better collected by the recording

[22] As opposed to surgical rotations, where frequently only one student is allowed into an operating theatre, or the Emergency Department, where students are paired with a senior clinician for more one-to-one supervision.

of field notes at the time of the events occurring[23]. Recording both field notes and audio files was found to be possible, though the use of the audio recording device was limited given the mobility of the students, and concerns with inadvertently recording patient details or activity.

The pilot of the observational study was determined to be a success. After modification to the data collection methods (i.e. abandoning the data collection template – see Appendix D, and using the audio recording mainly for interviews, and in areas away from patients), the full observational study then commenced.

Results from the full observational study are contained within the following sections of this chapter, which are presented in the format of two papers. The chapter then introduces the PAL activity matrix, which was constructed from the observed instances of PAL activity, and the activities that were reported to be useful by students and clinician educators.

Identifying opportunities for learning: an observational study of medical students' use of peer assisted learning on clinical placements

This section presents an overview of the observational study. It is presented as a paper submitted for publication in *Teaching and Learning in Medicine*. It describes the initial empirical findings on how PAL is used, and the main barriers and motivators for its use, and provides general suggestions for the implementation of PAL in the clinical environment.

Abstract

Phenomenon

Peer assisted learning (PAL) is frequently employed and researched in pre-clinical medical education. Fewer studies have examined PAL in the clinical context: these have focussed mainly on the accuracy of peer assessment, and potential benefits to learner communication and teamwork skills. Research has also examined the positive and negative effects of formal, structured PAL activities in the clinical setting. Given the prevalence of PAL activities during preclinical years, and the unstructured nature of clinical placements, it is likely that non-formal PAL activities are also undertaken. How PAL happens formally and informally, and why students find PAL useful in this clinical setting, remains poorly understood.

Approach

[23] This largely occurred while standing around a bedside, walking down a hallway or otherwise being relatively mobile. The researcher's prior experience as an intern, having to stand and write patient notes whilst on a fast-moving surgical ward round, was immensely useful in this way

This study aimed to describe PAL activities within the context of clinical placement learning, and to explore students' perceptions of these activities. An ethnographic study was conducted to gather empirical data on engagement in clinical placement learning activities, including observations and interviews with students in their first clinical year, along with their supervising clinicians. Thematic analysis was used to interrogate the data.

Findings

On average, students used PAL for 5.19 hours per week in a range of activities, of a total of 29.29 hours undertaking placements. PAL was recognised as a means of vicarious learning, and had greater perceived value when an educator was present to guide or moderate the learning. Trust between students was seen as a requirement for PAL to be effective. Students found passive observation a barrier to PAL, and were able to identify ways to adopt an active stance when observing peers interacting with patients. For example, learners reported that the expectation that they had to provide feedback to peers after task observation, resulted in them taking on a more critical gaze where they were encouraged to consider notions of good practice.

Insights

Students use PAL in formal (i.e. tutorial) and non-formal (e.g. peer observation and feedback on the ward; discussion during lunch) situations in clinical education and find it useful. The educator is crucial in fostering PAL through providing opportunities for learners to practice together, and in helping to moderate discussions about quality of performance. Student engagement in PAL may reduce passivity commonly reported in clinical rotations. Further directions for research into PAL in clinical education are identified along with potential strategies that may maximise the benefits of peer to peer learning.

Introduction

Medical students spend a significant proportion of their educational experience undertaking clinical placements (Dornan et al., 2014). The hospital or clinic can be a challenging learning environment, relying on different skills to classroom learning (Godefrooij, Diemers, & Scherpbier, 2010). While clinical staff and tutors facilitate students' learning in the clinical environment, students may also receive assistance from their peers. Clinicians are expected to contribute to the education of the future generation of doctors, which often comes as an unrecognised addition to an already heavy clinical workload (Joyce, Stoelwinder, McNeil, & Piterman, 2007; Secomb, 2008). Peer Assisted Learning (PAL) may help students make the most of their clinical placements, without

additional clinician burden (Lincoln & McAllister, 1993; Sevenhuysen et al., 2013). Given the extensive use of PAL in preclinical settings, students may already be primed to employ PAL to help them achieve their learning goals.

PAL has been defined as "people from similar social groups, who are not professional teachers, helping each other to learn and by so doing, learning themselves." (Topping & Ehly, 1998, p. 1). In practice, PAL may take many forms including students teaching each other, collaborating on a piece of work, discussing cases, situations, or dilemmas, observing another student's performance and providing formative feedback, or summative assessment in the form of a grade. While the 'patient as educator' has been gaining momentum in recent literature (Kent & Molloy, 2013; Rees, Knight, & Wilkinson, 2007), peers have been recognised as an educational tool in medicine for many decades (Burnett & Cavaye, 1980; Harker & Jones, 1977; Linn et al., 1975). PAL is now a regular feature of preclinical education, most commonly in problem based learning (Azer, 2005), clinical skills teaching (M. Field, Burke, Lloyd, & McAllister, 2004; Khaw, Tonkin, & Kildea, 2011; Tolsgaard et al., 2007; Weyrich et al., 2009) and gross anatomy teaching (Evans & Cuffe, 2009; Gukas et al., 2008; Krych et al., 2005), where students have been shown to perform as well as, or better than, their conventionally teacher-educated classmates. Speculated benefits of PAL include learners developing communication and teamwork skills, and forming collegial relationships with other students (Lincoln & McAllister, 1993).

Relatively fewer published studies exist on the use and value of PAL in the clinical setting. The more practical learning methods and outcomes of clinical placements (Godefrooij et al., 2010) may stymie the use of PAL in these situations, and learning strategies may not directly transfer to the clinical environment (Dornan et al., 2005). The role of peers is less explicit in non-formal, workplace-based learning, compared to carefully structured classroom activities (Bennett, O'Flynn, & Kelly, 2014). The use of PAL may also be dependent on the experience, skill and preference of the clinical supervisor responsible for students' learning on the placement, and the requirements of the placement.

Peer assessment has been used successfully during clinical placements (Dannefer et al., 2005; Kovach et al., 2009; Lurie, Lambert, Nofziger, Epstein, & Grady-Weliky, 2007; McCormack, Lazarus, Stern, & Small, 2007; Schönrock-Adema, Heijne-Penninga, van Duijn, Geertsma, & Cohen-Schotanus, 2007). Students valued feedback from their peers, but were divided as to whether their peers should be identified, and whether peer assessment should count towards final grades. The ability of PAL to contribute to students' learning in the clinical environment, rather than their grades, is less clear. In a study of peer discussion groups, Bennett et al (2014) describe the tension that students experienced

between learning from peers, as opposed to experts. Students felt that there was a trade-off between gaining ward experience, and participating in PAL.

Students have a large role to play in their own learning on clinical placements, however research on improving clinical education has largely focussed on what the teacher does, and not the learner (Harden, 2001; Kilminster & Jolly, 2000). On clinical placements, students learn mainly through observing and participating in the work they will later perform independently, in a kind of apprenticeship (Billett, 1996; Eraut, 2004; Lave & Wenger, 1991). Students' agency and self-direction is important in making the most of available experiences (Dornan et al., 2005): workplace-based learning requires a degree of activity even in observation, distinctly different to the passive positioning as bystander (Stegmann et al., 2012; Watling, Driessen, van der Vleuten, & Lingard, 2012). The situation observed has to be reflected on and processed, in a similar fashion to the internal processing which follows participation in an activity (Yardley et al., 2012). Watching peers in action may afford equal or greater learning opportunities than being immersed in the clinical activity itself when there is an expectation of provision of subsequent commentary on performance (Stegmann et al., 2012).

Little is known about what medical students do with their peers on clinical placements: peers are rarely mentioned in studies of student clinical activity (Bloomfield, Harris, & Hughes, 2003; Cook, Noecker, & Suits, 1992; Dolmans, Wolfhagen, Essed, Scherpbier, & van der Vleuten, 2001; Fincher, Lewis, & Nance III, 1989; Prince, Boshuizen, van der Vleuten, & Scherpbier, 2005; Schumacher, 1968; van Hell, Kuks, & Cohen-Schotanus, 2009; Wilkinson, Wells, & Bushnell, 2005) . Indeed, the "black box" of *how* and *what* students learn in clinical education has only recently been opened (Dornan et al., 2014). Few studies mention student interaction, none of which could be considered recent (Byrne & Cohen, 1973; Murray et al., 2001; O'Sullivan & Weinberg, 1997). It is likely that, given students' preclinical experiences of peer based activities, particularly in problem-based learning, PAL is also used in the clinical setting in various forms, for various purposes, and to various ends.

Aims

This study aimed to:

1. Describe the frequency and nature of PAL activities, as compared to individual or teacher-led activities, on clinical placements
2. Explore students' experiences of PAL activities to identify the features of successful PAL interactions during clinical placements

Methods

Design

An ethnographic approach (Charmaz, 2006) was used to investigate students' experiences of PAL in the clinical environment. Observation of day-to-day student activity and interviews with both students and their tutors were used, necessitating a focus on a small group of students. While O'Brien et al (2012) recently used a work-sampling technique to compare quantitative observational data of medical students' activities in two different placement models, qualitative methods were selected to develop a deep understanding of clinical placement activity (Bazeley, 2013). Since the focus of the study was also narrower than the seminal study by Becker et al (1961), an observation phase spanning 80-100 hours was planned, which would also include informal interviews with learners and tutors in the workplace.

The researcher conducting the observations was a recent medical graduate, with prior knowledge of the hospital environments, who had attended a week-long training course in qualitative research methods, including interview and observation techniques. The researcher's similarity to the participants in terms of age and background was thought to assist in being able to conduct observations without disrupting patient care and students' learning. However, this was not a true "insider" perspective, as the researcher was more a 'close outsider'.

Participants and setting

Year 3B students (in their first clinical year) at a single clinical school were invited to participate in the research project. The school allocates students to one of three hospitals as a "base" hospital; these sites vary in their size and case mix. Students at the smallest (Hospital A, 229 beds, generalist) and largest (Hospital B, 640 beds, with speciality and intensive care) were targeted in order to capture diversity of clinical experiences. As students typically undertake activities in small groups each with an identified group leader, the group leader was asked to submit an expression of interest after the researcher had explained the aim and methods of the research to the student cohort, and group consensus had been reached.

One group per site volunteered to be involved in the research; each group was observed for one week at two time points, resulting in four weeks for observation. At Hospital A, students were observed on general medicine and emergency department rotations. At Hospital B, students were observed on oncology and acute general surgical rotations. Observations centred around three students per site, with five students in each group: the

remaining two students per group were involved peripherally in the observations. Of the closely observed students, four were male; one entered the program as a graduate, while two were international students (Table 6.1).

Table 6.1 Participants' characteristics

Hospital A	Hospital B
21, male, undergraduate 25, male, graduate 21, female, undergraduate	22, female, undergraduate 22, male, undergraduate* 22, male, undergraduate*

* denotes international student

Data collection

Data collection methods were trialled by two researchers (JT and EM) as part of a pilot to ensure that field notes and recordings could be taken "on the run" during activities such as ward rounds and tutorials. A total of 84 hours was spent observing students. Field notes were hand written by the researcher JT. Where possible, the researcher also audio recorded student peer-to-peer conversations (1.5 hours). Students also participated in free-form interviews based on the observed events (2.9 hours), outside of the hours of observation. Semi-structured interviews were held with tutors, focusing on how they used PAL, and how they perceived it was useful for students' learning (1 hour). End of observation reflective focus groups were also conducted with students, which enquired about changes in their PAL practice in their first clinical year (1.75 hours total). Participants were therefore able to share their insights into why and how certain peer encounters took place, and their perceptions about the impact of peer engagement on learning. In order to capture differences in clinical environments (the impact of context on PAL opportunities) and the change in PAL practice over time, observations were structured in one-week blocks at two time points during the year, approximately 10 weeks apart.

Certain activities were not observed: though access to bedside tutorials was requested, not all tutors were comfortable with an observer, especially during student summative assessments. The format of clinical placements involved a "back to base" day per week where students spent spend their time wholly in lectures and classroom tutorials. This day was not included as part of the research as the focus was on students' ward-based activities. No identifying patient details were recorded as part of the field notes, including within student discussion of patients.

Analysis

Field notes, interview notes and audio recordings were transcribed by the researcher JT, and a professional transcription service was used for interview recordings. All transcripts

were de-identified with pseudonyms used for students and tutors. Data were entered into NVivo 10 (QSR International Pty Ltd, 2012) for analysis. JT and EM used thematic analysis (Miles et al., 2014) to examine the transcripts separately and then met to discuss the coding framework. JT then coded all transcripts using the analytical framework, and using a process of abstraction, JT and EM clustered prominent codes into higher order themes. These themes and illustrative quotations were then shared with the research group (BC and TH) for further discussion and validation. Any disagreements in opinion were resolved through discussion.

Ethics approval

This project was reviewed and approved by the Monash Health Human Research Ethics Committee, approval number 13167L, and subsequently approved by the Monash University Human Research Ethics Committee, approval number CF13/2174 – 2013001117.

Results

The average time per week spent on ward placements was 29.3 hours, including 9.4 hours spent participating in authentic 'work' activities, such as ward rounds or clinics on ward-based rotations. In contrast, on the emergency department placement, the students were constantly occupied with activities related to the work, such as clerking patients, reporting to senior medical officers, and performing basic clinical skills such as venepuncture and cannulation, so 100% of their placement time was taken up by 'work'. On the ward placements students participated in a range of 'learning activities' (Figure 6.1), spending an average of 11.9 hours per week on tutorials, lectures, practising their clinical skills, and performing tasks on the ward related to patient care. The remaining 8.0 hours not already accounted for was split amongst independent study, meal breaks, social interactions with other students, and waiting for activities and tutorials to commence.

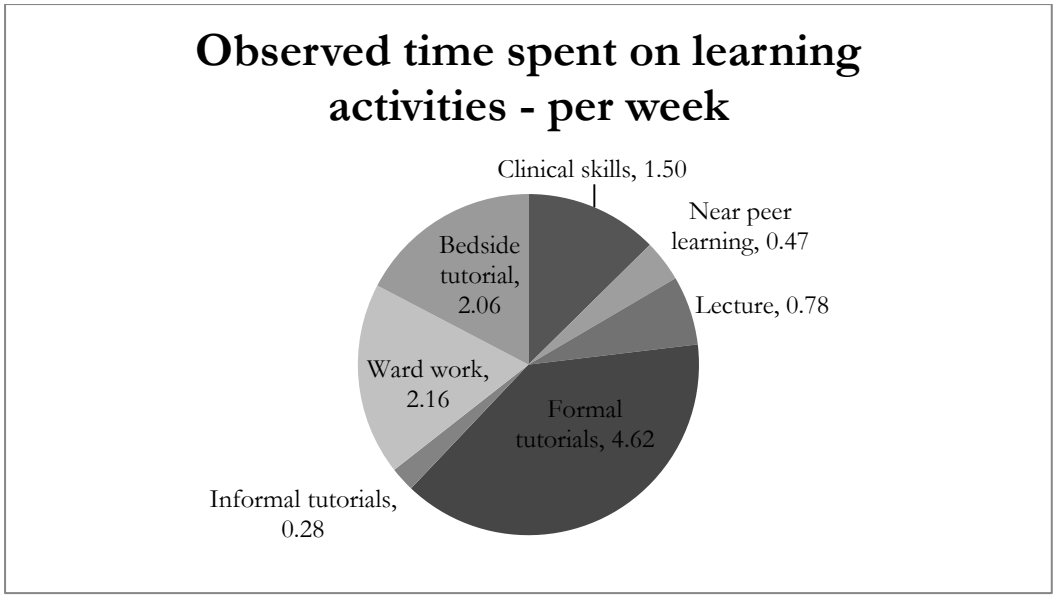

Figure 6.1 Breakdown of learning activities

PAL was observed to occur throughout the range of student activities, in ward work and bedside tutorials, and it also occurred away from the ward and organised learning activities, such as in the student common room or library. On average, students used PAL for 5.2 hours per week, spread across the range of learning activities in Figure 6.1. Students spent two-thirds of their total placement time in the presence of other students. In the ward-based weeks, participants were observed to spend only 12.5 hours of placement time alone, without the company of fellow students (Figure 6.2). Student activities during the general medicine week are detailed in Table 6.2, which demonstrates PAL was used outside of 'work' and other scheduled activities.

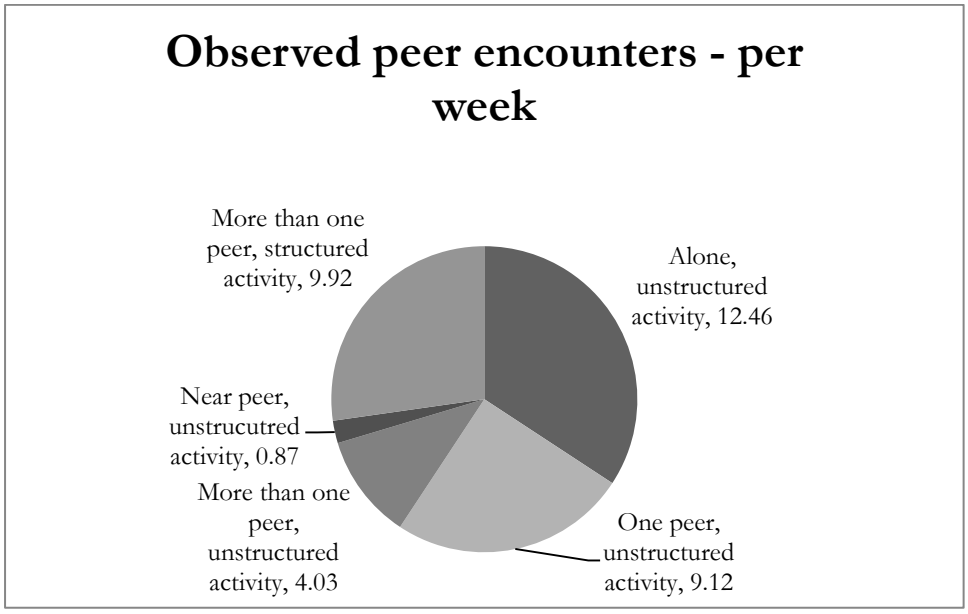

Figure 6.2 Observed peer encounters

Four key themes emerged from the observational and interview data:

1. Learning through active watching: the value of vicarious learning;
2. Students' trust and judgement are built over time;
3. The educator is influential in PAL;
4. Passivity in observation: being 'the fly on the wall' is an impediment to learning

These themes characterised students' experiences of learning on the ward with their peers.

Table 6.2 Placement activities at Hospital A – general medicine

	Monday	Tuesday	Wednesday	Thursday	Friday
AM	8:30 ward round 11:00 organise a tute for 1pm	8:30 ward round (clarifying knowledge & events with each other) 11:30 radiology meeting (keeping each other company)	Lectures	9:20 student arrives, paper round *10:00 self-directed learning on ward* (taking histories, doing examinations with a peer)	8:30 ward round 9:45 cannulation (peer observation) 11:45 ward round finishes; jobs on ward
PM	12:00 consultant arrives 12:10 "escape" to lunch & chat with other students 12:45 set up tutorial room 13:08 Skype tutorial – Hospital B registrar 14:15 leave tutorial to grab some food before cover shift 15:00 shadow cover shift intern	12:00 Grand round – students go to lunch 13:40 socialising in common room 14:00 go to ward 14:15 impromptu tutorial from HMO 14:55 hang around on ward 15:20 common room & library for study (quizzing each other) 15:45 leave the hospital for pathology tutorial at 5pm	Classroom Tutorials	12:30 lunch 13:00 Skype tutorial – Hospital B consultant 14:40 tutorial with Year 5 student (peer teaching) 15:35 tutorial ends, socialising & break 16:05 "clinical" bedside tutorial (discussion only in meeting room peer teaching)	12:35 lunch 13:40 cannulation – peer supervision 14:15 end of intern rotation afternoon tea on ward 15:15 peer tutorial (one student explains a concept to the other) 16:00 leave hospital for extracurricular activity

Bold = formal, pre-arranged teaching, be it from a peer or staff member

Italics & underline = Peer learning component

Learning through active watching: the value of vicarious learning

Students found opportunities to learn from each other on the wards; typically in the form of watching each other in practice. This took the form of clerking patients in pairs where the history and examination taking would be observed by a peer. Students also prized their bedside tutorials as places to learn how to be a doctor, not only from watching the peer perform a task but also from hearing the supervisor's feedback on the observed task. Part of their learning in this setting was vicarious, where observation and internal processing of another student's performance (and how this compared to their own approaches to tasks) allowed them to incorporate this information into their own practice:

> *'They will learn from their mistakes, and then we learn from, like, what they're good at. Because some [students] are very good at phrasing their sentence or instructions, like how you are going to do this, can you do this for me. So, I just kind of, like, stole their phrases, in a way.' – Ken, Hospital B, interview*

> *'Because you see other people [students] interviewing patients, and you sort of get an idea where your level is at, so whether you're up to – not very good, or like in terms of, like peers' – Sean, Hospital B, interview*

> *'I've certainly learned from watching my peers under that exam situation and hearing the feedback, which is a little bit more directed' – Hayley, Hospital B, interview*

Students' trust and judgement are built over time

Students noted that the utility of PAL, particularly in relation to peer based feedback, only came after students felt comfortable with each other towards the end of the year:

> *'At the start of the year, for example, bedside tutes, I was a bit intimidated both - tutor that you didn't know, patients, having to perform in front of four people that you didn't know, whereas I suppose as the year progressed, everyone got used to that and comfortable with that idea and comfortable around each other too.'– Hayley, Hospital B, interview*

Students also felt that gains in clinical knowledge helped them participate in PAL more effectively, when they had more clinical experience to be able to comment on their peers' performance.

> *'as we improved throughout the year, our feedback got better, more specific but again, the feedback we gave at the start of the year was probably more like, "You should actually listen to the aortic valve in this second intercostal space on the right side rather than the left." That sort of thing. […]and then it developed; "So what manoeuvres, dynamic manoeuvres, can you do to*

make it better?" It developed into, "All right. Now I'm going to quiz you on at what point you'd want to consider replacement" and those sort of things' – Hayley, Hospital B, interview

'At the start, it's difficult, mostly with trying to think of something positive, trying to think of something how to improve. But now, it's a lot easier, because we know those histories a lot better ourselves. So then we know if that person hasn't asked these three questions - like, yes, next time, remember to ask those. […] Now we can give a lot more constructive feedback.[…] I remember, like, at the start of the year, giving feedback, like - yes, maybe say one point. But now we can give, like - we can talk to two or three more.'- Jack, Hospital A, Focus Group

Students believed their ability to partake in PAL evolved over time, and attributed this to increased social comfort with each other, increased familiarity with feedback processes and increased understanding of clinical practice (the reference point for all feedback).

The educator is influential in PAL

The influence of the educator in prompting productive PAL was a key finding in the data set, both in the observations and the interviews. Educators encouraged students to use PAL under their supervision, such as in bedside tutorials. Tutors interviewed supported the use of peer observation and peer feedback and pointed out the irony that these student-driven activities often needed to be initiated by the educator. Sending forth questions to learners was seen as a key strategy to encourage peers to draw on their own resources, and to deflect reliance on the educator as the knowledge source:

"[One PAL strategy I use is] where one of the students will do a history or examination, while the others are observing. […] I'll try and facilitate that by - often, students will come to always put their hand up and ask me, "Should I do this, or should I do that, or what do I do next?" so I might put it back to the students and the others who are watching, and say, "What do you think?" […] Then, after we see the patient, there will be a discussion. We sit around and might discuss what the findings were, the differentials and how we might approach further investigation and management. Then we'll go around the group to go over a few things, and give an opportunity for questions." – Mariah, tutor, Hospital A

"what I promote is to go together in groups to the bedside to observe each other taking histories and doing examinations. I believe that is one of the most valuable peer learning activities in the clinical environment." – Daniel, tutor, Hospital B

One student had had a particularly good experience of bedside tutorials, where the educator did ensure that all group members were involved in the process, even if they weren't "in the spotlight":

Hayley: *also, watching my tutor when I'm not doing it, watching the person who is doing it and the feedback on all that is so useful as well because as you would have seen in our tutes, we have a discussion about things afterwards. […]and initially, the person who did it would have to give their feedback - I mean, present back then - and maybe answer some questions, but then was open to all of us. So it's very active learning, even if you weren't doing it.*

Interviewer: *Even if you're not in the spotlight, there's still lots to learn.*

Hayley: *Active learning, yes. You were being questioned afterwards so you had to pay attention.*

Interviewer: *Yes. So that really depends on the tutor running it?*

Hayley: *Definitely. Certainly.*

Focus Group, Hospital B

Tutors' prompts also encouraged students to practise their clinical skills with their peers, outside of tutorial times. In this example, some patients were not available at the time of the tutorial. The tutor then encouraged one student to return the following day to see the patient, with two others observing the peer, in lieu of the tutor. They would then be responsible for reporting back in the following tutorial:

Lots of people are not able to be examined [during the tutorial]. The tutor reassures them that it's okay, and suggests that two people are watching while doing the examination [the following day], then report back at next tute.

Field notes, Hospital B, Week 2, Day 3

Students also believed that further educator encouragement of PAL would help them gain further clinical experience, and ensure that students worked together: This is likely due to authority of the educator, serving to validate PAL as a legitimate learning method.

Interviewer: *If someone said, "Look, it's a really good idea to get out with someone else on the wards as third-years and see patients with someone else with you," would that sort of thing have made a difference, do you think?*

Jack: *I think if they had told us to, within our group rotation groups, if they had said, "You and you," or, "You guys form three pairs, and this pair is allocated here; this pair is allocated here; this pair is allocated here. Here, I'm introducing you to the reg, and go." Then I think they'd work, like, much more together. Because, one, they're a team; two, they've been put together, so they sort of have a bit of an obligation to each other.*

Chad: *I agree with that point.*

Focus Group, Hospital A

Passivity in observation: being 'the fly on the wall' is an impediment to learning

Despite students reporting they found watching others valuable, particularly when they had to do something on the basis of the observation (such as provide feedback to a colleague or perform the same procedure subsequent to the observed event), students also reported that being the 'fly on the wall' during 'work' activities was less valuable for their learning. Some students indicated that staff rarely made effort to teach or involve the students during their observational role. They even used the language 'passively watching', implying that a more active form of watching can occur with more fruitful implications for learning.

> *'Surgery and anaesthetics - I didn't love. Not a huge amount of teaching really. Going to the theatre, most of the time you're just passively watching. Maybe scrub in and hold something. The surgery and anaesthetics - they'd just say go, that's where the theatre is - there's no other teaching at all.' - Jack, Hospital A, interview*

> *'There were definitely days where it was a bit like, "I've come on this ward round. I've been sent to get the folders the whole time. I'm always running to get a folder while they're seeing a patient. I'm missing out on the patients or I'm not allowed in the room. They don't really care that I'm here. I haven't really learnt very much.' – Hayley, Hospital B, interview*

Students overall were able to use and articulate why and where PAL was useful for their learning in the clinical environment. Situations that were specifically designed for learning, such as bedside tutorials and case-based discussion, with tutors present, were perceived to be very useful, and frequently involved elements of PAL. While PAL is traditionally seen as occurring away from the aegis of the supervisor, the data suggest PAL was most used and valued when an educator prompted the peer engagement. Students identified that they were less satisfied with the 'work' activities they attended when they adopted a passive observational role, without clinician or peer commentary, prompts or questions to stimulate learning.

Discussion

This research represents one of the few observational studies of PAL on clinical placements. Unlike other health professions, where students have their own caseload (Currens & Bithell, 2003; Roberts et al., 2009), junior medical students have fewer responsibilities: what they do on placement is less well defined (Worley, Prideaux, Strasser, March, & Worley, 2004). Previous observational studies have focussed on study activity in relation to program aims (Byrne & Cohen, 1973) and patient care activities (O'Brien et al., 2012), with little examination of PAL.

In this study, PAL was found to be a common thread through both formal and informal activities on placement, taking up one sixth of students' time. Only one previous self-report study quantified the time peers contributed to student learning: O'Sullivan and Weinberg (1997) reported the senior peers' role in student education was minimal, with a mean of 0.01 hours teaching (or 0.7% of the student's total placement time) per day. Compared to these figures, the observed PAL activity appears high, though the efficacy of PAL compared to other learning activities is unknown beyond student self-report.

Students in this study spent almost thirty hours per week on clinical placements, with approximately one-third of their time devoted to participating in clinical 'work', and over one-third on specific learning activities. This observed activity breakdown is similar to the student activities reported by Worley et al (2004). In other studies of student clerkship activity in Australia, the US, the UK, and the Netherlands, students reported spending between 40 and 48 hours per week on clerkships (Bloomfield et al., 2003; Dolmans et al., 2001), or between 11.5 and 13.1 hours per day on placements (Cook et al., 1992; Fincher et al., 1989; O'Sullivan & Weinberg, 1997) with an average 6.5 hours per day spent in learning activities (Murray et al., 2001) . These figures are all substantially higher than the observed student activity in this study; this may be partially explained by the four-day per week placements observed, as compared to five-day per week placements elsewhere, but the discrepancy could also represent self-report bias from students.

Students clearly articulated the value of dedicated 'learning time' with peers, such as bedside tutorials. This occurred even if they were not undertaking the task themselves and receiving feedback on their own performance. This may be an example of the 'hidden curriculum', where educator attitudes towards specific activities influence student perceptions of those activities (Kibble, Hansen, & Nelson, 2006): clinicians find the time to give tutorials, yet are perceived to be less concerned with student learning during patient care activities. The ability to identify with the person undertaking the 'practitioner'

role (e.g. observing a student during the tutorial instead of a qualified doctor on ward rounds) may influence students' perceptions of the utility of a clinical activity. An alternative explanation for this phenomenon may be that students require validation and authentication of their learning activities by an expert: Murray et al.(2001) found supervised interactions were valued more than unsupervised and self-directed learning interactions. Students additionally perceived that their role in the work team (e.g. fetching files) took them further away from learning opportunities. Byrne and Cohen (1973) also reported that students perceived such "scut work" did not contribute substantially to students' sense of responsibility and skill development. Students may need to be better oriented to their roles in patient care when they commence placements, with increasing responsibility and involvement as they progress(Bennett et al., 2014).

Workplace learning theory suggests that students learn best by observation and participation, rather than through specific learning activities tailored to their needs (Billett, 1996; Yardley et al., 2012). However, the findings of this observational study suggest that the value attributed to participating in authentic work activities was contingent on prompts and invitations for engagement by peers or teachers. Without invitations or cues such as feedback after performance, or questions for students on ward rounds, the students took on 'passive observation' roles. This was viewed as less satisfying than when they had a task to complete, even if this task entailed watching a fellow student take a history, and providing feedback. The data strongly suggest that when taking an observational role, students require explicit tasks to become more involved. Stegmann et al (2012) have demonstrated that structured vicarious learning (i.e. students watching with an observational script) can be more effective than undertaking the task itself within a simulation education environment. Tools to hone the observer's gaze, such as 'assessment criteria' or reflective observational prompts (open ended questions relating to peer's performance strengths and areas for improvement) may help students to use the time spent on the wards more actively, and induce students to reflect further on the experiences they have been part of. The potential for modifying passive observation to active learning through undertaking PAL with such tools requires more research.

The observational data indicate that peers use each other as a discussion partner to invite reflection. Having a 'buddy' was also seen to reduce the perceived risk of participating in learning. The clinical environment is described as "much more threatening than the seminar room"(Dornan et al., 2005, p. 360) and such strain can limit learning (Godefrooij et al., 2010; Prince, Van De Wiel, Scherpbier, Van Der Vleuten, & Boshuizen, 2000). There is safety in numbers, and it has been reported that student motivation to be involved

increases with confidence in their abilities (Dornan, Boshuizen, King, & Scherpbier, 2007), which may be provided by peer support.

Formal activities have been implemented in allied health clinical education to promote peer engagement, including a peer observation record and written feedback log, where both peers and supervisors were invited to document feedback on the learner's performance (Sevenhuysen et al., 2013). Undergraduate physiotherapy students who were required to complete a quota of PAL activities per week felt this was more of an imposition than those who were merely presented with the resources to promote engagement (Sevenhuysen et al., 2014). The impact of mandating such learning activities and their effect on student performance has yet to be investigated within a medical education setting. These activities, designed to promote PAL, may be best introduced to students during an orientation or transition program as an optional learning activity, in the discussion of opportunities for learning on the wards. Likewise, the skills required for supervisors to promote PAL engagement (such as the prompts outlined in the illustrative quotes) might be built into professional development workshops or short courses to become embedded within supervisory practice rather than viewed as mandated activities that need to be added to existing practices.

Limitations

This study was conducted at two clinical placement sites that hosted students from a single university. The sample could therefore be considered homogenous despite the fact that the participants were of different backgrounds (i.e. domestic and international students, undergraduate and graduate entry). Students may also participate in greater, or fewer, ward based activities, depending on the location and structure of their clinical placements. The presence of the researcher may have also caused the students to behave differently to what they might have otherwise done (i.e. the Hawthorne effect).

The aim of the PAL research was for illumination rather than generalizability (Patton, 1999). The observations captured the type and frequency of PAL activities occurring on clinical placements, whilst student and supervisor interviews provided insights into the value and perceived efficacy of those activities. Capturing students at different levels of experience, and across different hospital networks may add to the data set and reveal additional insights. Likewise, given the emergent themes on the key role of the supervisor in facilitating PAL, it would be wise to focus future research on targeted observation of both learners and educators in action.

The effect of PAL, in terms of performance outcomes, was not captured in this research. Determining the impact of PAL on clinical performance requires complex experimental designs, and should be the focus of future studies of PAL in clinical education.

Conclusion

Student self-direction and tutor teaching capability have previously been viewed as key drivers for success in clinical learning. This observational study reveals that PAL may also play an important role in assisting students to make the most of their placements. Students had relatively little formal teaching, compared to the amount of time spent independently learning, and participating in clinical activities, or 'work'. PAL was recognised as a learning strategy, especially during tutorials. Students reported that their capacity to engage in PAL evolved over time, and attributed this to increased social comfort and trust, increased exposure to feedback, and increased understanding of the standards and goals of clinical practice. As the target for 'good practice' became clearer, students expressed that they were more comfortable in providing judgements on others' performance.

Educators have a key role to play in encouraging students to use PAL to greater effect during ward based activities. Inviting 'active observation' using reflective tools or checklists and formalising peer feedback post observation may be important mechanisms to encourage vicarious learning. Students may then find that their time spent on ward-based activities isn't just work, but learning, after all.

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Declaration of Interest

The authors have no declarations of interest

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Building evaluative judgement through peer-assisted learning: opportunities in clinical medical education

During the preparation of the manuscript in the previous section, analysis revealed that one of the key roles of PAL in clinical education was in the development of students' evaluative judgement, heretofore only an hypothesised effect of PAL. This concept was therefore explored more deeply, and forms the following section, a second paper arising from the observational study. This paper was submitted to *Advances in Health Sciences Education*, and has been accepted pending minor revisions.

Abstract

This study explored the contribution of Peer-Assisted Learning (PAL) in the development of evaluative judgement capacity; the ability to understand work quality and apply those standards to appraising performance. The study employed a mixed methods approach, collecting self-reported survey data, observations of, and reflective interviews with, the medical students observed. Participants were in their first year of clinical placements. Data were thematically analysed.

PAL contributed to both the comprehension of notions of quality, and the practice of making comparisons between a given performance and the standards. Emergent themes included peer story-telling, direct observation of performance, and peer-based feedback, all of which helped students to define 'work quality'. By participating in PAL, students were required to make comparisons, therefore using the standards of practice and gaining a deeper understanding of them. The data revealed that peers were seen as less threatening than supervisors with the advantage of increasing learners' appetites for thoughtful 'intellectual risk taking'. Despite this reported advantage of peer engagement, learners still expressed a preference for feedback from senior teachers as more trusted sources of clinical knowledge.

While this study suggests that PAL already contributes to the development of evaluative judgement, further steps could be taken to formalise PAL in clinical placements to improve learners' capacity to make accurate judgements on the performance of self and others. Further experimental studies are necessary to confirm the best methods of using PAL to develop evaluative judgement. This may include both students and educators as instigators of PAL in the workplace.

Key words: clinical placements, evaluative judgement, peer assisted learning

Background

Peer assisted learning (PAL) has been defined as 'People from similar social groups, who are not professional teachers, helping each other to learn and by so doing, learning themselves' (Topping & Ehly, 1998). PAL has been used increasingly over the years in medical education, and has been shown to be effective in knowledge transfer, especially in the classroom, where basic sciences and anatomy are taught. While there is evidence that PAL can produce gains in students' clinical knowledge and skill (Burgess et al., 2014; Yu et al., 2011), there is little evidence, or conversation in fact, about the role of PAL in supporting learners' capacity to make judgements about quality of work (Speyer et al., 2011). This capacity to think and apply standards of quality is known in the higher education discourse as 'evaluative judgement' and one of the generic skills needed for lifelong learning (Nicol, 2013).

There is some evidence supporting the role of students as assessors: correlations with expert grading, though positive, are weak (Kovach et al., 2009; Levine et al., 2007; Papinczak, Young, Groves, et al., 2007). Many studies involving peer assessment, especially in the clinical environment, have also focussed on professional behaviour rather than clinical or procedural skill evaluation (Lurie, Nofziger, Meldrum, Mooney, & Epstein, 2006; Nofziger, Naumburg, Davis, Mooney, & Epstein, 2010; Schönrock-Adema et al., 2007). Although this peer assessment research suggests that students may be able to formally grade the work of other students, it does not cover the full spectrum of capacities defined as evaluative judgement.

The definition of evaluative judgement remains nebulous, despite use of the term in higher and professional education (Boud & Molloy, 2013b; Cowan, 2010; Nicol et al., 2014). Sadler (1989) describes evaluative knowledge as knowledge about the criteria required to make quality judgements, developed through practising assessment of others, and through the process of reflecting on one's own performance either with or without feedback from an external other. Building evaluative judgement is about building students' notions of quality (Nicol et al., 2014). Notably, there may not be explicit criteria for the work to be measured against (Nicol, 2013). The definition we present, drawn from the above authors' works is:

> *Evaluative judgement is the ability to critically assess a performance in relation to a predefined but not necessarily explicit standard, which entails a complex process of reflection. It has an internal application, in the form of self-evaluation, and an external application, in making decisions about the quality of others' work.*

There are concerns about students learning from students in clinical education. A common concern is that "high achievers" are held back by the "poorly performing student", and neither succeed in reaching performance goals, though there is little evidence of this in empirical studies (Currens & Bithell, 2003). Students are also reluctant to undertake PAL in terms of giving each other feedback, as they do not wish to cause social rifts, and prefer to take a supportive role (Levine et al., 2007; Papinczak, Young, & Groves, 2007). Students also express concern about the "blind leading the blind" in that they do not trust peers' judgements, and therefore prefer and revere the expert opinion (Carless, 2013b; Ladyshewsky, 2013; Tai et al., 2014).

PAL is therefore frequently reduced to a means of efficient information transfer between students, much like encouraging them to swap collector cards[24]. This has been relatively successful in knowledge-based areas such as anatomy teaching (Krych et al., 2005; Nnodim, 1997). Trained student tutors have also been shown to be as effective as faculty tutors in ultrasound technique teaching (Knobe et al., 2010) and clinical examination (Burke et al., 2007). Although these methods have been successful in their aims, they may add to produce a limited view of PAL; where learning is conceived as transmission of knowledge from a 'mini tutor' to the recipient peer.

It has been theorised that students are well-suited to engaging in learning together, as they are able to express concepts in congruent terms which are likely to be understood by others (Rogoff, 1990). Students are likely to understand the appropriate level of performance required, as they too will be held to those standards. Their proximity to the learning task also means they are able to identify the steps involved (compared with an expert with automated or subliminal skills), and have recently trialled the process themselves, thereby already possessing problem-solving strategies (Vygotsky, 1978). Students are also likely to have empathy for each other in the learning role, having recently moved through the same learning processes, compared with experts. Observing others' performance and comparing it with one's own may also motivate some students to apply themselves to a task (Raat et al., 2010). Students also tend to spend time together on the wards, increasing accessibility to feedback, unlike ward staff, who have defined responsibilities to patients and may be called away by other obligations. There is merit in considering the broader learning that can be gained through the process of PAL; this includes, but is not limited to, "non technical" aspects of clinical practice such as learning to make judgements about work quality.

[24] Much like Freire noted that knowledge was not coins, deposited by the teacher into students. (Pedagogy of the Oppressed (1970) Continuum International Publishing Group: New York)

Sadler (1989) suggested that peer interaction under expert tutelage may be useful for students to develop concepts around the standards of performance and provide an avenue to practise judgement making, both of which are key to building a learner's evaluative judgement capacity. Evaluative judgement is viewed as a key component of effective feedback, and in fact, a product of effective feedback. Feedback requires three elements: that the learner possesses a concept of the standard required, that the learner is able to compare their performance to the standard, and that they are able to engage in activity to close the gap. By requiring a better understanding of the standard, and encouraging students to make comparisons (between observed performance and the standard), PAL could be useful in developing evaluative judgement.

This paper explores how engagement in PAL may help to build evaluative judgement skills in medical students on clinical placements.

Aim

This study explores the role of PAL in building evaluative judgement in the workplace setting.

The paper draws from a larger study of PAL on medical clinical placements, where students' perceptions and the effects of PAL were investigated. Results from observations, interviews and a survey of medical students on clinical placements are presented.

Methods

Participants and setting

Medical students at Monash University, Melbourne, Australia, commence their clinical placements in the third year of a five year undergraduate degree. They are assigned to a single hospital site for the year, and undertake both medical and surgical rotations; the exact makeup and configuration of rotations depends on the site. There are three metropolitan clinical schools covering nine hospitals between them, and two rural clinical schools covering four sites.

Design and data collection

The research employed a mixed methods design. Ethnography was undertaken at two sites (a large, tertiary hospital, and smaller, metropolitan generalist hospital) within one clinical school in 2013. Students were invited to volunteer to participate through a brief in-person address between lectures at the clinical site by principal researcher, JT. At each site, one group of Year 3 students were observed during their clinical placements. The observing

researcher (JT) also conducted reflective interviews with students during and at the conclusion of the observations, and interviewed a tutor from each group. Field notes were taken during the observations of practice, and audio recordings of interviews were transcribed. The multiple sources of data enabled a deep understanding of students' PAL activities during clinical placements.

To provide supporting information on experiences of and attitudes to peer learning, three consecutive cohorts of Year 3 medical students (total n = 1189) were invited to complete a questionnaire through their online learning management system. Based on a literature review, five PAL activities were included in the questionnaire: observation of performance, feedback on performance, skill demonstration, teaching, and case discussion. These activities were considered to have two cases: where the student assumed the educator role, and where the student assumed the learner role. For example, the two items relating to observation of performance were "I observed a peer performing a history or examination" and "I was observed by a peer, performing a history or examination". Students were asked to report the number of times they undertook these activities in one week, who initiated the activity, and how useful they found it for their learning, on a scale of 1 = not useful at all, to 5 = extremely useful. Students were also asked to explain why they had rated it useful or not useful, in a free text response.

Data analysis

All qualitative data were entered into NVivo 10 (QSR International) for thematic analysis (Miles et al., 2014). The observational and interview data were first examined and coded, then the co-ordinating survey data (discussing the same peer learning activities) were coded based on the same coding schema.

Observational & interview data

Two groups of Year 3 students were observed for a total of four weeks. Almost one third of the observed time on placements was spent in the company of peers, however not all of this time was spent undertaking PAL activities. Further information regarding the breakdown of activities students participated in has been published previously (Tai, Canny, Haines, & Molloy, 2015b).

EM and JT independently coded a sample of the observational data, then discussed the codes together. Following this shared analysis, JT subsequently coded the remaining data from the observational data set and interview data set. Codes were then grouped by JT into themes to form an understanding of the effects of PAL, which was discussed and refined with input from EM, TH and BC.

Survey data

Over the three years that the questionnaire was administered, 191 (16%) medical students responded; 52% were female and 12% defined themselves as international students. Analysis focussed on the PAL activities which were identified as contributing the most to the construction of clinical knowledge. These activities were observation of performance, feedback on performance, and case discussion. On average, 30% of the 191 respondents gave qualitative responses to the question "why did you find this type of PAL useful or not useful?", for the types of PAL of interest. There were 61 comments for "I observed a peer performing a history or examination", 58 comments for "A peer observed me performing a history or examination", 55 comments for "I gave feedback to a peer on their performance or knowledge", 53 comments for "I received feedback from a peer on my performance or knowledge", 58 comments for "I discussed a case with a peer" and 59 comments for "A peer discussed a case with me".

A preliminary analysis of comments from all categories revealed that similar codes appeared across all groups of responses relating to the development of evaluative judgement. Therefore, the response categories were collapsed, and all comments were coded inductively. These codes were then compared to the codes arising from the observational data.

The conceptual map of PAL's contribution to evaluative judgement was then built from the data from all three sources.

Ethics approval

Ethics approval was received from Monash University (CF12/2429 - 2012001312) for the online questionnaire, and Monash Health (13167L) for the hospital based ethnographic component.

Results

PAL contributed to the development of evaluative judgement in two principal ways: i) participating in PAL helped students to understand notions of quality and oriented them to the standards of practice, and ii) participating in PAL required students to make comparisons in relation to those standards. The value of PAL was influenced by the surrounding 'traditional learning culture': while the support of peers was reported to enable students to learn more effectively, tutor/clinician knowledge was still privileged and from the students' point of view, detracted from the PAL experience.

An orientation to the standards of clinical practice was achieved through discussion or story telling between peers, the observation of others' performances, and receiving feedback. However, in order to engage more deeply with the standards, students were required to take on a more traditional "educator" role. This involved comparing another student's performance to a standard (either held internally, or as made explicitly according to examination criteria), making a judgement, and then providing verbal feedback or assigning marks.

The existing learning culture, characterised by hierarchy, had both positive and negative impacts on the perceived value of PAL. PAL was differentiated from learning experiences with formal tutors as it was reported to occur in a lower stress environment. The feedback was aimed at an appropriate level, peers provided supportive comments on performance, and while there was a degree of pressure to perform, the stakes in performing in front of a peer were lower. Undertaking peer observation and feedback also resulted in additional practise of clinical skills. However, despite learner praise for peer to peer feedback and the positive peer interactions captured in the observational study, learners placed greater value on feedback from tutors or senior medical staff. This tension was a feature throughout the data set and warranted closer examination in the iterative analysis rounds as to the underlying medical practice culture that informs and strengthens these opinions.

The majority of students reported that PAL activities related to the development of evaluative judgement were at least a little useful for their learning (Figure 6.3), however the least useful of the activities was "I gave feedback to a peer" (23% rated it 1 = not useful at all, 2 = a little useful).

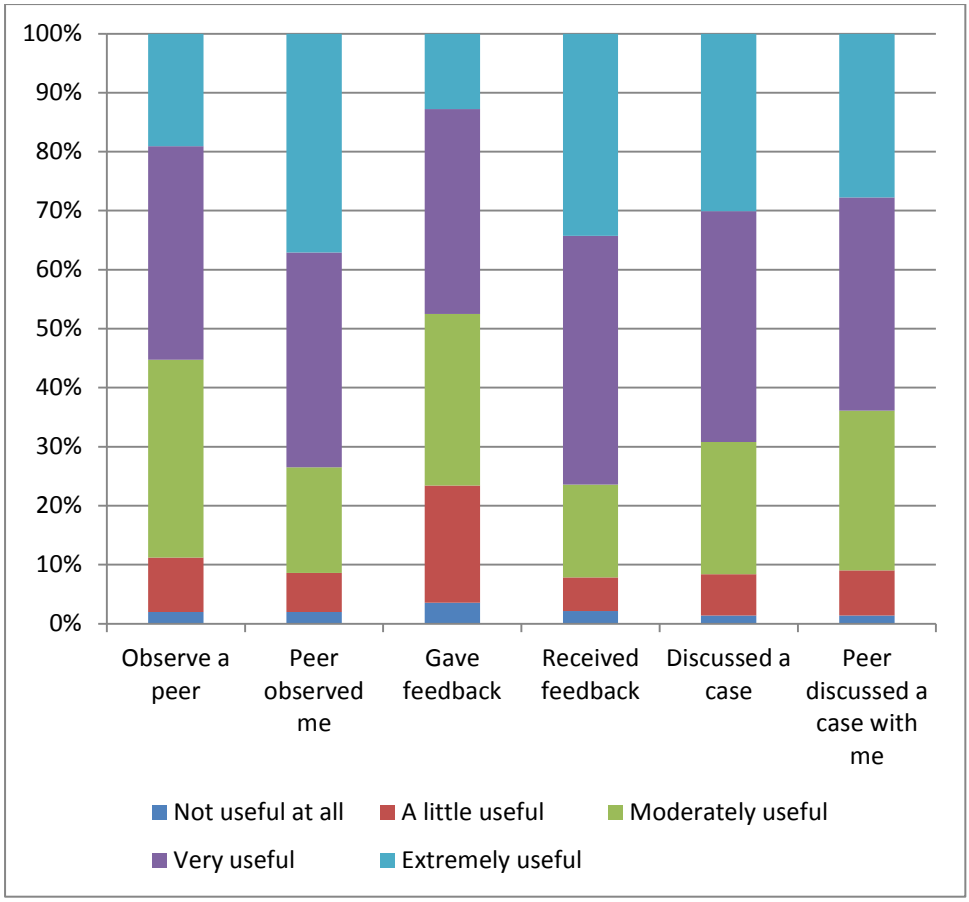

Figure 6.3 Reported utility of PAL activities

Understanding notions of quality

Peer storytelling

Students related their clinical experiences to their peers through story-telling. This occurred in informal settings, such as in the common rooms, on the wards, and while waiting for formal learning opportunities (such as tutorials, ward rounds, outpatient clinics) to occur. They were frequently short snippets rather than a lengthy narration. These stories allowed students to debrief about their own experiences, actions and reactions, and in doing so, enabled their peers to gain an understanding of the expected targets for practice.

In this situation, Charlotte and Hayley are undertaking a peer learning activity, practising their OSCEs (Objective Structured Clinical Examinations) together, however are taking a break between scenarios. This enables them to discuss their recent clinical experiences. Charlotte's story is a common one and allows for both standard setting for peers, but also an explicit comparison of performance to more senior students. Hayley's story focuses on standards for attendance (which is part of the informal curriculum) and also the opportunities afforded by a particular activity, in this case, the gastroscopy list.

Charlotte: I tried to put in a cannula today but failed. But so did the 5th year, twice!

Hayley: I went to scopes on Friday and it was great, but long. Stayed until 5:30, I actually got to see the gallstone that they got out but then the reg said in a joking manner "oh, but you'll be here for a while my friend". I wasn't sure if he was joking. But I said I was going home to study, so he said I could go.

Hospital B, field notes

Students also talked about the role of peer discussion in the interviews. It was not viewed as an overt teaching method, but a means of gaining vicarious experience, including value judgements about what should be interesting or important to students at the same level.

Interviewer: Do you chat about stuff, like what you saw today or things that have happened?

Chad: Yes. We do. Not so much like, "This is what I've learnt." Not so much like teaching each other things, but just chatting about things like, "I saw this really interesting patient today."

Hospital A, interview

The vicarious aspect of peer story-telling was also identified in survey responses. Students reported that hearing stories was important to increase their knowledge of what was expected of doctors and medical students. This understanding was not limited to simple knowledge or facts, but how to undertake clinical management and respond to cases in the future.

Part of common room discussion. This is a great way to learn about other patients and learning how your peers react to various clinical scenarios.

I usually discuss interesting or difficult patients, and it helps me to understand it

Sharing a variety of cases and different opinions on clinical presentation, investigations and management

really good to talk through cases, can go in depth and with peers can ask any questions, try and clarify gaps in understanding and spend as much time as you want on the topic

Survey

Peer observation

Observation on the wards allowed students to compare their performance to other students. Participants reported that this direct observation enabled calibration of self-evaluation:

> *"Because you see other people interviewing patients, and you sort of get an idea where your level is at, so whether you're up to – not very good, or like in terms of, like peers" – Sean, Hospital B, interview*

Students also reported the value of observing peers in an examination setting. The tutor feedback provided to the other student was also found to be helpful:

> *"I've certainly learned from watching my peers under that exam situation and hearing the feedback, which is a little bit more directed" – Hayley, Hospital B, interview*

Students also recognised that there could be more than one "correct" way to ask a question, or perform an aspect of a physical examination. The observation of peers enabled students to be exposed to a greater range of techniques, which they could then incorporate if they decided it was in some way superior to their own. Integrating others' approaches to work was described at the process level, for example, how to be more systematic in taking histories, down to modelling the minutia- 'stealing' their peers' good phrases.

> *"if they do something different that you haven't seen that's good, or that's required, then you'll be like, I'll do that next time I do that history or that exam." – Jack, Hospital A, focus group*

> *"we learn from what they're [peers] good at. Because some are very good at phrasing their sentence or instructions, like how you are going to do this, can you do this for me. So, I just kind of, like, stole their phrases, in a way." – Ken, Hospital B, interview*

> *Watching the way other people do things allows me to improve my own examination/histories*
>
> *Survey*

Receiving feedback on performance

Many students found that feedback from a peer was beneficial especially when the peer identified gaps in their performance. These data challenge published theories that peers are too concerned about maintaining social harmony to provide honest appraisal of their near peer's performance :

> *Peers tend to give good critique in terms of mistakes and what was forgotten*

> *Very useful in knowing where I was going wrong and also reinforcing what I was doing right*

Someone to tell me if I forgot to check for an important sign which would have been missed otherwise.

Survey

Making comparisons

Comparing performances

As part of the feedback process, students were required to identify gaps in their peers' knowledge and performance, which encourages them to build their evaluative judgement. Students reported however that this was not necessarily a conscious process of comparing observed performances to standards:

Interviewer: Do you actually compare yourself to other students when you're in that sort of situation; like, I would have done that better, or that kind of thing?

Jack: Yes, definitely. At least subliminally, you do, yes – like, without realising that you might be. Well, that's how you mark them, I suppose. If you're going to give them a mark, you have to think, well, they didn't ask about that, or, they didn't do that properly, or something, and then you give them feedback. If you didn't think about it like that, then how would you give them feedback?

Hospital A, focus group

The added responsibility of having to comment on a peer's performance (formative assessment) fostered a deeper engagement with the task at hand. This required the student to actually make a comparison, identify what an examiner would be looking for as evidence of having performed the task correctly, and finally commit to and communicate that judgement. This process therefore also built students' notions of quality in clinical performance.

"So instead of doing the same [OSCE] station three times, we can do three different stations, and experience each one from a different point of view. At least you've seen the station and learned from it." – Chad, Hospital A, interview

makes you think about what you would do, and you have to give [a] proper rationale as well.

Gave me an idea of what being an examiner is like and what they look for

Survey

The value of PAL is influenced by the culture of medicine

Peers provide a more supportive learning environment

Working with peers lowered the stress of clinical learning. Peers provided supportive comments, rewarding effort and development, in contrast to expert feedback which had a focus on task mastery. Peers, being at the same level, were attuned to the level of help required to develop performance.

> *Annie: okay, that's it.*
>
> *Hayley: I felt like I was struggling*
>
> *Annie: You didn't seem like you were struggling. So here's how I did it. (gives feedback on performance, differential diagnosis, extra history questions, also "I would ask….")*
>
> *Hospital B, Field notes*

> *Good for support & direction if get stuck, feedback v. useful*
>
> *Learning from a peer creates a friendly environment compared to if it's someone higher up like a consultant.*
>
> *peers are usually much nicer than tutors etc so you dont get as stressed*
>
> *really good to have someone watch you who is at a similar level to you*
>
> *Survey*

Some students also appreciated the 'moderate' pressure they felt when being observed by a peer, which was more than they felt if they performed the task alone. The surveillance was felt to motivate performance and also to replicate conditions of supervision so as to desensitise students to 'performance anxiety' in future practice.

> *It keeps the pressure on and gets you used to performing when others are watching which will happen more and more as the years go by. It makes me want to do my best because I am inherently competitive for some silly reason.*
>
> *Good, but hard, puts you under more pressure, and I guess you get used to it after a while.*
>
> *Survey*

The culture of medicine privileges expertise

There were however some concerns about peer feedback and observation: some students did not feel confident to participate, or felt the utility of PAL really depended on the skills and knowledge of the peer they were working with. Students also thought that peer observation and feedback would be more useful in the presence of a tutor, who could validate or challenge the peer feedback.

Expertise was found to play a dominant role in the perceived value of feedback on clinical placements. Several students in the survey commented that they found a peer interaction more useful when a tutor was present:

> *"helpful to watch someone else and take notes and to ask for clarification from the peer/tutor when I would have done it differently"*
>
> *"Also in class, useful because observed by tutor who gives good feedback."*
>
> *"It's easy to zone out when you're being passive. But the feedback given by the tutor to the peer is useful"*
>
> *"Good to see [a peer doing an examination] but more helpful to do myself. This was especially useful with a consultant present"*
>
> *Survey*

Students used peer judgements frequently and thought they were useful for learning, yet at the same time, they placed greater value on feedback from a senior colleague or teacher. Teacher-delivered feedback was seen to be more decisive.

> *"I think the more senior or the more expert someone is in the field, the more I suppose their feedback means, in some senses. However, that doesn't mean you disregard the feedback from your peers. " – Hayley, Hospital B, interview*
>
> *"A lot of the time I would think that if I don't know it, the other student might not know it either, so I might as well just ask the doctor. [Registrar] and [HMOs] are so approachable that I don't feel any issue with that." – Jack, Hospital A, interview*
>
> *"if you do ask a peer, they'll say, "Oh, I think it's this, but I don't really know exactly." Whereas if you ask the reg or the consultant something it would be, "It is this," - and they do know. So if I do ask the student first, chances are I'd have to go and ask someone else anyway." – Jack, Hospital A, interview*

"Not as useful as consultant"

"My beside tutor usually gives better feedback"

Survey

Some students reported that peer feedback would not be as constructive as feedback from senior staff, because students wanted to preserve social relationships with their peers. In some cases the need to maintain social cohesion resulted in 'toned down' performance-based comments:

> *"When your peers tell you what you do well, you're like, "Yes, okay. Maybe." When someone senior tells you, "You're doing that really well", you're like, "That's kind of nice. All right, I'll keep working on doing it that way." […]I think that's generally because your peers - unless you've got a really harsh peer, I think generally your feedback is generally - to your peers, it's going to be more positive and perhaps some are less honest. Not in terms of - I mean, honest but I feel like you're more likely to pick up when it's your peers and the good things that they did and maybe making a couple of suggestions […] your peers you're trying to work with and trying to help with - you don't want to hurt them as well." – Hayley, Hospital B, interview*

Other students perceived their judgements overall to be less useful:

> *We are both 3rd years & not experts. Hard to give & receive feedback when you are both amaterus [sic - amateurs]*
>
> *good activity to do (think about what peer missed/you'd do differently) but may miss things due to lack of experience*
>
> *Survey*

Discussion

Peers were able to cite a number of different ways in which story-telling, observing peers and giving feedback on peer performance contributed to their learning. These opportunities built students' evaluative judgement capacity, though it was not explicitly articulated as such. This self-recognised worth of PAL suggests that it is useful for more than just "depositing knowledge" within a clinical placement. Evaluative judgement, as a skill, has potential application long into doctors' careers in terms of self-regulation, and the development of others through feedback.

Understanding the notions of quality (orientation to practice standards) were achieved through peer story-telling or discussion, the observation of others, and receiving feedback

from other students. While receiving feedback from others is recognised as a mechanism to improve performance, the additional function of this group of activities, to orientate students to practice standards, could be better promoted. Taking on an active role in being an observer (both of peer and expert performance) may also increase engagement and satisfaction with placements (Tai et al., 2014). Observing higher and lower practice standards may also help learners to further orientate themselves. This already occurs where recent graduates become examiners for medical students, and where medical students and junior doctors act as "bulldogs" for fellowship examinations (Ngo, 2011). A broader range of standards may also enable students to identify when their peers over- or under-state their ability, which may lead to the creation of false standards amongst students.

Making comparisons, between a performance, and the standards, was achieved through undertaking peer assessment and giving feedback. Students were required to commit to an evaluation, and therefore not only were able to practise the identification of quality performance, but also gained a greater comprehension of what quality entailed. Students have previously relatively accurately assessed their peers on both written and practical examinations (Kovach et al., 2009; Langendyk, 2006; Moineau, Power, Pion, Wood, & Humphrey-Murto, 2011). The accuracy of peer assessment may also be improved by the provision of frameworks or guidelines (Stegmann et al., 2012).

In this study, actions by peers and clinical experts were seen to contribute to the development of evaluative judgement. A conceptual model was developed based on the empirical findings (Figure 6.4). PAL makes up a large number of the elements which contribute to evaluative judgement, both in the "understanding notions of quality" and "making comparisons" between observed performance and target performance. The formation of evaluative judgement is represented as a cyclical process, with comparisons informing notions of quality, and notions of quality informing the comparisons made. The role of both peers and experts were seen as crucial to the judgement building process, and their contributions are represented in the model. The major inhibiting and enabling factors for judgement building are also reflected. The model also identifies some notable absences within the data set, expressed through the italicisation of the text and asterisk: learner self-evaluation opportunities after skill performance was not observed in the study, nor was modelling of quality performance by educators as a way to orientate learners to standards (for example, there were few extended periods of 'clinician shadowing'). In line with the analogy of "don't throw the baby out with the bath water", while PAL could be seen as advantageous in getting students 'to do the work' on clinical placements, one risk is that the value of expert involvement may be neglected.

In this study, the tension between seeking knowledge from peers, and knowledge from authority, was strong. This is consistent with other studies, where students still preferred faculty members' instruction and feedback on their performance (Byrne & Cohen, 1973; Moineau et al., 2011). This tension may be diminished by encouraging peer contributions that are formative, rather than summative, in nature. It is also in keeping with guidelines for building evaluative judgement, that is, that no mark or grade is awarded for the activity, and that information is qualitative and criteria-based (Nicol et al., 2014). The tension may also be reduced by engaging in explicit discussions with students about the value of multiple opinions in building views on performance. Educators could refer students to the multi-source feedback literature (Lockyer, 2003; N. Sharma et al., 2012) indicating that sources at different levels of expertise often comment on different aspects of performance (they identify different points for improvement when observing the same performance) and this also helps to enhance judgement building.

The role of 'feedback giver' was also rated the least useful by students in this study. This may have implications for motivating students to participate in such activities, and is not surprising, given the characteristic positioning of learners as 'recipients' of knowledge. The reason for taking part in peer feedback and observation should also be made explicit: that students are taking on this 'provider role' to practise their skills in forming judgements, and as such, can gain important insights into their own clinical practice.

For effective learning, the learner also requires the ability to develop strategies to close the gap between observed and ideal performance (Sadler, 1989). This study demonstrated that students were exposed to such strategies through observing others and from giving feedback to others, and also through tutor input, whether it was direct or vicarious. However, as students reported, they did not wish to harm their relationship with fellow students, and so the feedback was sometimes diluted, which a common problem even when experienced educators are delivering the feedback (E. K. Molloy, 2009). Education on feedback strategies at the pre-clinical level, would be an ideal step to develop peer feedback practices, and improve future practice as a clinician.

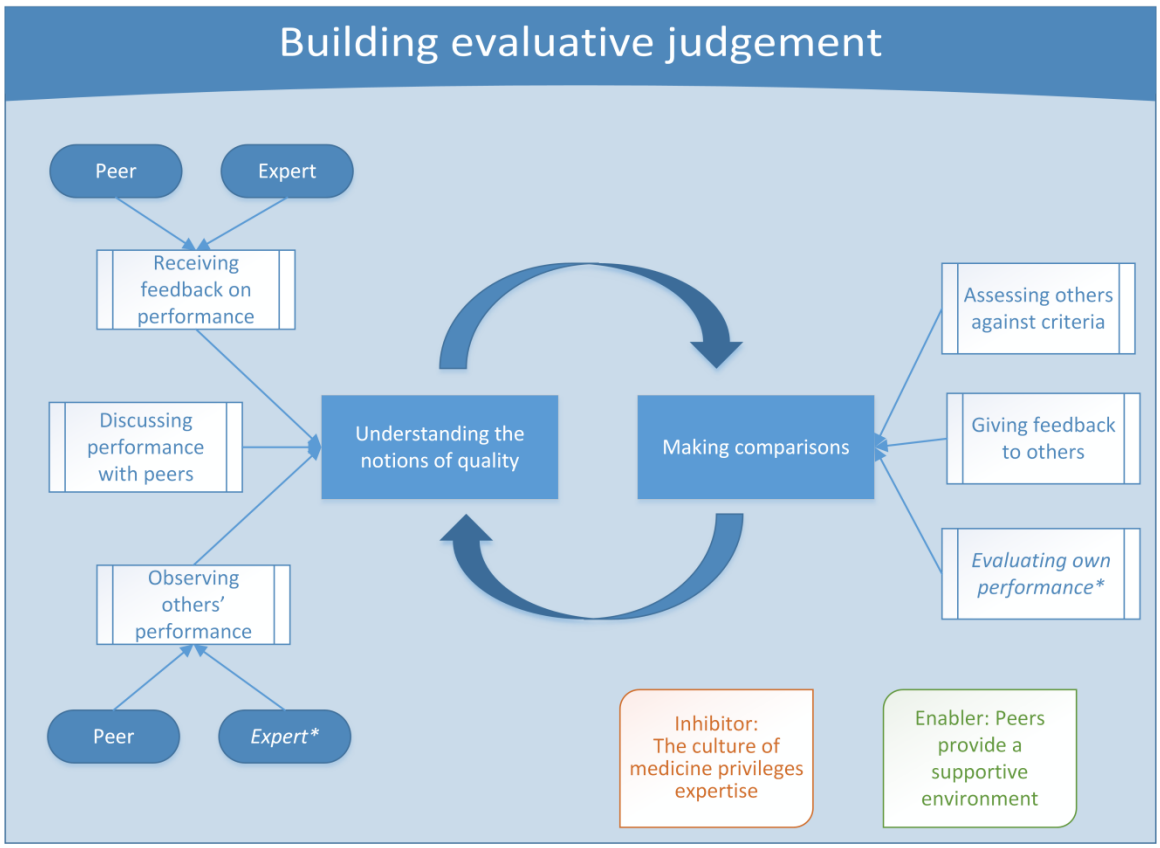

Figure 6.4 PAL contributes to the building of evaluative judgement.

Asterisked items were not identified within the dataset

Without opportunities for the development of evaluative judgement, we can hardly expect students to develop this skill (Nicol, 2013). It is only through practice, led by an expert, or with a framework, that evaluative judgement can be formed effectively, with appropriate ideas around standards and how to assess them (Boud & Molloy, 2013b). Same-level peer interactions requiring students to observe and assess each other may therefore provide an opportunity for students to exercise their evaluative judgement ability. This study suggests that PAL provides an avenue to exercise, practise and develop the processes involved in developing evaluative judgement from an early stage. Judgement making is largely an unconscious process, which should be explicated as a key requirement or graduate outcome. It enables self-appraisal and appraisal of others, which is also necessary for broader professional skills such as critical thinking and reflective capabilities (Cowan, 2010). These higher level cognitive skills are crucial for developing the capacity of health professionals. This is important not only to identify future professional development goals (i.e. areas for improvement), but also may also have a more immediate impact on patient safety.

Strengths and limitations

This study provides empirical evidence for the importance of PAL in the development of evaluative judgement. The clinical medical education context has not been well explored with regards to the development of evaluative judgement. This study builds on the work of Nicol et al. (2014) in the classroom context, and suggests that PAL can assist in the understanding of notions of quality in the workplace.

This research, focussing on student self-report and the observation of students, was not an experimental study which conclusively links PAL with the formation of evaluative judgement. The complexity of a learning environment, especially a clinical learning environment, may preclude a true randomised controlled trial. However, further research, with an experimental design, is still required to determine the best ways in which to promote the development of evaluative judgement through PAL.

Implications for further research and practice

This study supports the notion that educators are not redundant in PAL. They are in fact key to encouraging students to learn with and from their peers. They also serve an important "guardianship" role in ensuring that appropriate strategies, or conclusions are reached. Setting tasks or providing cues can encourage students' critical thinking and confidence to make judgements about performance quality. Additionally, the manner in which feedback is given, or discussion of performance is undertaken may also encourage thought about the quality of work (e.g. Boud & Molloy (2013b)). Faculty development on how to facilitate effective PAL is vital. However, encouragement for the use of PAL from educators alone may be insufficient. Student champions have previously had success in encouraging their peers to participate in learning (Zaidi et al., 2012). Testimonies from students or new graduates who perceive they have benefited from PAL may also add strength to the argument for PAL.

Given the key roles of both learners and educators in PAL, future research needs to address the needs and skills of both parties. Programs should use PAL to sharpen students' clinical skills, with scaffolded guidance from educators, and evaluated not only on the basis of acceptance and likeability, but also student performance. To determine if there is a correlation between PAL and clinical performance, records of PAL activity could be kept (Sevenhuysen et al., 2013). To avoid concerns surrounding randomised control trial methods in an education context, trial designs such as a crossover model or a stepped wedge model could be used (Haines et al., 2014).

Conclusion

Evaluative judgement is an important ability for health professionals to develop. It involves the linking of inward-facing self-evaluation to performance standards, and also external comparison of others' performances to the standards. Through interaction with peers, medical students in this study reported an improved understanding of performance targets, as well as how their own practice measured up against these targets. However, the concept of evaluative judgement is not commonly discussed within the sphere of medical education, let alone amongst medical students and their clinical educators. Medical students should be made aware of the opportunities for building evaluative judgement skills through working with peers, along with the value of these skills within and beyond the clinical placement.

Acknowledgements

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PAL Activity Matrix

The themes identified from the observational study suggest that additional instruction or scaffolding could increase the perceived value of PAL amongst medical students. Empirical data reported on in the previous two papers formed the basis for the PAL Activity Matrix, presented in Table 6.3. This Activity Matrix directly links the themes identified in the data, to educational activities that students could undertake with, or without, the guidance of educators. The pertinent themes are given in the first column; a brief description of the activity is given in the second column; the suggested prompts for educators or students are presented in column three; lastly an educational rationale for each activity is given for each activity.

The activities in the matrix are empirically derived (that is, activities were observed as part of the clinical placements, analysed, and reconstructed as prompts in this matrix). Themes for each activity overlap, as it was possible to address multiple themes within a single activity. Activity prompts are provided and supporting evidence cited, as both structure and rationale for activities has been previously suggested to help students make the most of PAL interactions (Ladyshewsky, 2013). This may be particularly relevant to students who are new to clinical environments, where guidance from teachers has been demonstrated to be more useful than self-direction alone. This guidance was reported to increase student activity and motivation for learning (Dornan et al., 2005).

The first group of structured learning activities allows educators to be seen as being involved in PAL, and promoting PAL. This capitalises on the theme "The educator is influential in PAL". Billett (1996) describes the need for experts to afford students opportunities to learn; this may even extend to opportunities for learning with peers. Discussion of a task or performance between students and educators can develop shared meaning and an understanding of standards (Carless, 2013a). This idea can be applied in two ways: firstly, shared meaning about what PAL interactions are, and secondly, around performance standards for students. An orientation to PAL as a method of learning also may improve alignment between intended outcomes (e.g. ability to communicate and work with others), and enacted learning activities (Biggs, 1996).

Vicarious learning, through observing others' performance, was highlighted by students in the observational study as particularly valuable. They reported that observing others contributed to their own development of clinical knowledge, and also their ability to form judgements about the quality of their work. The power of observation should not be underestimated, especially when students are primed as to which elements they should be

particularly focussed on. Therefore, the majority of activities included in the matrix contain an observational component: not only of students, but of clinicians (with two or more student observers to generate reflective discussion). This also therefore fulfils the requirement for "expert modelling" outlined in the evaluative judgement model. Requiring a reflection or discussion on observed events also turns what could be a very passive activity into an active situation. As students reported, passivity during clinical placements is not conducive to learning, and reducing this stance as much as possible is likely to improve learning.

The remainder of the matrix capitalises on the potential value of vicarious learning. Participating in clinical activities together may develop a shared understanding of practice goals, i.e. shared meaning of what it is to learn medicine in the clinical environment (Rogoff, 1994), such as the shared history taking activity. However, it is likely that students will want to develop their individual capabilities. The assessment of individual and independent practice as experience is gained has been previously reported to be important, both for learner confidence and educator trust (Sevenhuysen et al., 2014). Bandura's (1977) social learning theory supports the observational data that suggests learning can be and very often is vicarious in nature. The value of vicarious learning has previously been tested in a simulated setting. "Observational scripts" which focussed the learner to the features of performance to be assessed, including a checklist of items, were found to be more successful for promoting learning than students' direct participation in a clinical activity (Stegmann et al., 2012). Both structured teaching and learning, and independent activities in the matrix have incorporated a "script" which could be modified by individual educators to suit various situations. This may focus learners' attention and support their participation in ward based "work" activities (Dornan et al., 2005).

The students in the observational study reported that trust was a crucial requirement for peer feedback. Student-educator trust has been identified as a key element for effective feedback relationships (Watling et al., 2014). Carless (2013b) describes two types of trust required in educator-student feedback relationships: competence trust (the ability to undertake a task), and communication trust (that the message is being delivered accurately and with good intent). This was also identified by students as required when interacting with their peers. To develop these two types of trust, suggested activities ask students to work with each other in a progressive manner which intends to scaffold trusting

relationships between peers. Students may then be able to identify who they can trust[25] in delivering feedback.

Students reported that participating in PAL particularly developed their evaluative abilities, both of others, and themselves. Crucially, it is discussion of standards, and creating a shared meaning and understanding of the standards, which aids in developing autonomous self-regulating learnings (Carless, 2013a). In a classroom setting, To & Carless (2015) demonstrated that guided discussion of work exemplars aided students' understanding of goals and standards. In a similar fashion, many of the of the PAL activities included in the matrix require a "feedback loop", where the task and performance is discussed between students to develop shared meaning of performance goals. In addition to developing students' ability to understand notions of quality, the determination of relative performance may also motivate students to continue to learn. According to social comparison theory, seeing others demonstrate superior performance largely spurs students on to improve themselves (Raat et al., 2010).

This matrix, it should be noted, should not be a stand-alone artefact which is implemented without appropriate preparation of both students and educators. For example, Ladyshewsky (2013) notes that training on how to deliver feedback is particularly important for student peers, as the feedback should be "non-evaluative" in nature. This may be contrary to medical students' previous experiences of feedback. Educators in the clinical environment may also require training on basic feedback principles, given the demand for basic clinical supervisor training is remains high (Tai et al., 2015). Aside from training on feedback, both students and educators may require training on PAL, including the situations (i.e. invitations or affordances) that are appropriate for learning with and from peers. This may contribute to the success of PAL in providing valuable learning opportunities.

[25] Boud, Lawson & Thompson (2013) point out that it is also necessary for students to develop evaluative capacity to identify who *not* to trust.

Table 6.3 Strategies to increase learner engagement: PAL Activity Matrix

Observed theme	Suggested learner activity	Example educator or learner prompts	Educational rationale
During structured teaching and learning			
The educator is influential in PAL	Orientation to the purpose and expectations of PAL in clinical education	Initial informal discussion between educators and learners on strategies for learning in the clinical environment, including shared vision for use of PAL. May include educator reference to PAL research in medical education	Explicit orientation to expectations and use of PAL as part of aligned curriculum (Biggs, 1996) Explicit invitations from experts allows students to request involvement of peers (Billett, 1996)
Learning through active watching: the value of vicarious learning	Observed history taking or examination with a peer	Nominate one student in the tutorial to take the history or perform an examination. Nominate a second student to be the primary feedback provider on specific areas, such as group of questions, responsiveness to patient's comments, or a specific section of the examination (e.g. auscultation of heart sounds in a cardiovascular examination) Tutor to provide feedback after the peer feedback – comment on the same points (did they agree?) and any further points to improve performance	Students can learn vicariously through observation of other learners' actions (Bandura, 1977) Develops trust between students (Carless, 2013b) Internal student comparison of a peer's performance to their own may make them more mindful of included elements, should they be called upon to perform the next history or examination (Raat et al., 2010). Students can learn to calibrate their judgements and feedback, with guidance from an expert (To & Carless, 2015), and develop shared meaning (Carless, 2013a)
During ward 'work'			
Passivity in observation: being 'the fly on the wall' is an impediment to learning & Learning through active watching: the value of vicarious learning	Putting yourself in the doctor's shoes	When a clinician is examining a patient, "play along" in your head. Which signs would you like to examine for? Why is the information important? How does it alter your diagnosis or management plan? What would come next? What else would you do? What was omitted? What were the reasons for this? Did you see any alternative examination techniques or things done differently? Why did they do it in such a fashion? Following the examination, discuss with a peer to compare your responses to the above questions and clarify any examination techniques you were unfamiliar with	Guides student attention to important aspects of clinical interactions (Dornan et al., 2005) Constructs an internal feedback situation: requires student to compare their own imagined performance to the clinician's performance, enabling them to identify gaps in their own knowledge. (Silverman, Kurtz, & Draper, 1996) Peer comparison to assist with self-evaluation- either validates or expands the student's knowledge (Sadler, 2010).
	Working backwards	Select a patient who already has a diagnosis. Work backwards from the diagnosis to compile a list of symptoms and signs which they may have presented with. Presents your list of signs and symptoms to a peer, and ask them to make a diagnosis. Compare your resultant list of signs & symptoms, and the diagnosis, to the patient notes.	Comparison of progress with peers may motivate learning (Raat, Kuks, van Hell, & Cohen-Schotanus, 2013)

During independent learning – in pairs			
Students' trust and judgement are built over time	Shared history taking	See a patient with a peer from your bedside tutorial group. Choose a specific system to focus your questions on. Take it in turns to ask the patient questions to generate a complete history.	Develops a shared understanding of the intended goals of history taking (Rogoff, 1994)
Students' trust and judgement are built over time	History presentation	Report back your shared history, one at a time. Choose some aspects to comment on – ask what was the justification for presenting the information in a specific order. What was done well?	Develops ability to judge others' performance, an understanding of the standards, and feedback delivery for both students (Nicol et al., 2014; Sadler, 2010).
Learning through active watching: the value of vicarious learning	Independent history taking with a peer	Go with a peer to see a patient. Ask your peer to observe your history taking, and request feedback on two specific areas that you feel you require help on. Also ask them to provide feedback on an additional area. – "if you were me, what would you have done differently?"	Develops ability to judge others' performance, an understanding of the standards, and feedback delivery for both students (Nicol et al., 2014; Sadler, 2010). Develops student ability to initiate feedback dialogue (E. Molloy & Boud, 2013)

Summary

This chapter described the purpose and evolution of the observational study, then presented the findings in the format of two submitted papers. The first paper gave an overview of students' use of PAL on clinical placements within the broader context of their placement activities. From this work, we have a better understanding of when and where students use PAL. While PAL was witnessed within formal educational activities, the majority of PAL activity and indeed, time spent with peers, was in informal learning environments such as the ward, the cafeteria, and the student common room. Therefore, strategies to improve PAL must not only target supervisors or educators (who are present for only part of the time), but also the students themselves. Both trust and clinical experience were required for between-student interactions to be effective; these factors were developed over the course of the clinical placement year. Vicarious learning was praised, and was seen to be activated through the use of educator or peer prompts (for example, the requirement for feedback provision post performance). Passive observation was identified as a barrier to all forms of learning, including PAL. Students also placed greater value on PAL when an educator was present, indicating the importance of educator sanctioning of activities, and validation (or correction) of peer exchanges. This was highly influential in the development of the PAL activity matrix.

The second paper focussed on one of the key applications of PAL as observed by the researcher, and as described by the student participants: evaluative judgement. PAL was observed and reported to help students build their capacity for judgement and their conceptions of standards and quality, a key ability for lifelong and sustainable learning. A conceptual model of the role of PAL in the formation of this evaluative judgement was built from the emergent themes in the data. Observing peer performance, receiving feedback on performance, and discussion of performance helped students to understand notions of quality. Through assessing others against standards, and giving feedback to others, students also gained practice in making comparisons, which is also a crucial component of self-evaluation. This paper also identified some *absences* from the observed student experience: practising self-evaluation, and observing expert modelled performance were found to be lacking within the observational dataset. Crucially, this paper also identified the key role that educators play in guiding student activity on clinical placements. Students' perceptions of PAL were mediated by the enveloping medical culture which privileges expertise. However, the support that peers provided also led them to perceive PAL more favourably. The results strengthened the argument for more educator-led, structured PAL activities, and the led to development of the PAL Activity Matrix.

The Activity Matrix of potential PAL activities was derived from the data, and supported by the higher and professional education literature. The matrix addresses a number of facets of PAL practice: educators would be seen to encourage PAL; structured PAL activities would be made available to students; additional opportunities for students to practise their peer feedback and evaluative judgement skills would be created; and most importantly, passivity in learning would be reduced. While the matrix alone is described in this chapter, it represents just one tool that could be used to increase the use of PAL in clinical environments for students' learning. The matrix should be accompanied by broader strategies and considerations relating to context, which are discussed in later chapters.

This chapter afforded a deeper, more detailed perspective on the uses and benefits of PAL in undergraduate clinical medical education, and specifically, the contribution of PAL to students' learning. However, we acknowledge that the observational study was, indeed, a case study, and while aspects of the findings have generalisability, the findings have not yet been tested in a broader context. To further triangulate the results of both the student surveys and the observational work, experts were interviewed with regards to the findings from previous studies within this research (i.e. Chapters 4, 5 and 6), and asked specifically about the barriers and facilitators to the implementation of PAL in the "real world". The results of these expert educator interviews will be presented in the following chapter.

Chapter 7
Expert Interviews

Declaration for Thesis Chapter 7

Declaration by candidate

In the case of the publication in Chapter 7, "*The development of a framework to support 'real world' implementation of peer learning in medical clinical education*", the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Contributed to conception of the study, undertook data collection (observations and interviews), was main analyser of data, drafted and prepared the manuscript for publication	85%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Elizabeth Molloy	Contributed to the conception of the study, undertook qualitative data analysis, assisted in drafting of the manuscript	n/a
Ben Canny	Contributed to the conception of the study, contributed to data analysis where consensus was required for coding and interpretation, assisted in drafting of the manuscript	n/a
Terry Haines	Contributed to the conception of the study, contributed to data analysis where consensus was required for coding and interpretation, assisted in drafting of the manuscript	n/a

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's Signature: [redacted] **Date:** 20 August 2015

Main Supervisor's Signature [redacted] **Date:** 20 August 2015

*Note: Where the responsible author is not the candidate's main supervisor, the main supervisor should consult with the responsible author to agree on the respective contributions of the authors.

Chapter 7 Expert Interviews

Introduction

This final component of the research was conceived in order to gain perspectives on the practicalities of implementing PAL in the clinical world. While examples of productive peer learning were observed in Phase 2, they were countered by frequent cases of learners who passively watched ward rounds without involvement, and without post-event debriefing or reflection. The variability in PAL practice observed in the observational phase prompted questions about the reasons that some educators and learners were enacting those practices, while others were not. Student experience, both self-reported and observed, comprised the majority of data collected to this point. The clinician educators who were interviewed as part of the observational study also reported encouraging PAL in their own educational practice. The level of systemic support of PAL, partially revealed through the Curriculum Map presented in Chapter 4, was less clear. Therefore, senior clinician educators who had oversight of student placements were interviewed as an additional source of information about the systemic support provided for PAL, as a form of triangulation (Mays & Pope, 2000). Through the presentation of the findings from previous phases, this component also acted as a hybrid form of member-checking and peer review (Fereday & Muir-Cochrane, 2006). These expert interviews also presented the opportunity to identify barriers and facilitators for PAL from a director of education perspective. This chapter presents and discusses the results from the expert interviews, which are developed into a framework for the implementation of PAL, in the form of a paper submitted for publication in *Medical Teacher*.

The development of a framework to support 'real world' implementation of peer learning in medical clinical education

Abstract

Peer learning has many benefits, and can assist students in gaining the educational skills required in future years when they become teachers themselves. Peer learning may be particularly useful in clinical learning environments, where students report feeling marginalised, overwhelmed and unsupported. Educational interventions often fail in the workplace environment as they are often conceived in the "ideal" rather than the complex, messy real world. Results from previous peer learning research and a matrix of empirically derived peer learning activities were presented to local clinical education experts to

generate discussion around the realities of implementing such activities. The local clinical education experts were interviewed individually to better understand the barriers and limitations of implementing peer learning in clinical education. Thematic analysis of the data identified three key considerations for real-world implementation of peer learning: culture, epistemic authority, and the primacy of patient-centred care. A framework of strategies relating to these considerations was developed for peer learning implementation. This framework may also be of use to those who are implementing other novel educational techniques in workplace based education.

Background

Peer assisted learning (PAL) has been documented as a general teaching and learning strategy since ancient times (Wagner, 1982). PAL has only more recently become a formal feature of the medical education curriculum (Ross & Cameron, 2007), most commonly in the form of a type of problem-based learning (PBL) activity, where students work together to form learning objectives and develop learning materials in response to a case or problem. Innovations in PAL have led to its use not only for basic sciences teaching, but also in the clinical environment (Tai, Haines, Molloy, & Canny, 2015), where peer teaching, peer feedback and peer assessment on clinical skills, usually as a module or activity within a specific rotation to achieve a single task or skill, or cover an area of the curriculum.

A commonly reported rationale for the use of PAL is that, in the constraints of the current healthcare system, alternative teaching and learning methods should be explored (Lincoln & McAllister, 1993; Silbert et al., 2013; Tai et al., 2014). However, PAL has also been found to develop professional and communication skills. Increased confidence of students, providing support for peers, and developing students' ability to self-evaluate and evaluate others' performance of clinical skills have also been identified as benefits of PAL (Tai et al., 2015). Some of these may not be as well developed through traditional teaching methods, but yet are vital for practice as part of a multidisciplinary healthcare team in the 21st century. Ali (2015) additionally argues for the inclusion of educational skills in the undergraduate curriculum, given the likelihood that students will be required to teach as part of their postgraduate training requirements.

Encouraging learning in the clinical environment can be particularly challenging. Studies of medical student involvement in ward-based activity have identified that students can feel marginalised and ignored (Quilligan, 2015; Tai, Canny, Haines, et al., 2015b). Students have previously identified that PAL activities are valuable for learning, however they

require further guidance on using PAL, especially when transitioning to learning in a clinical environment (Tai, Canny, Haines, et al., 2015b; Tai et al., 2014). As a result of an observational study that illuminated medical students' PAL practices during clinical placements, an activity matrix was constructed from these observed examples of PAL, to act as an explicit guide to PAL for both students and educators.

PAL activities may serve to improve learner engagement in workplace activities and therefore the quality of learning during clinical placements. However, there are many barriers to change in medical education, with much remaining constant over decades if not centuries (Walsh, 2013). Yardley (2014) highlighted the potential for disjuncture between "real world" practice and theoretical educational work, which may contribute to the inability to implement quality educational interventions. There have also been many passing fads in medical education, and it is yet to be determined if PAL is part of this group (Grant, 1999). To test the perceived validity of the PAL activity matrix, a number of local "real world" experts in medical education were consulted to provide input on the activities, and to determine what considerations would need to be taken into account when implementing them.

Aims

To illuminate potential barriers and facilitators for the implementation of PAL activities in clinical medical education as identified by expert educators

To present a framework for the implementation of PAL in clinical medical education taking into consideration the identified 'real world' obstacles and facilitators

Methods

This study represents the third and final phase in a research project undertaken as part of a doctoral program. Expert educators were asked to consider the empirical findings from the previous two phases, a survey of medical students (Tai et al., 2014) and an observational study of medical students' PAL activities on clinical placements (Tai, Canny, Haines, et al., 2015b), to compare the phase 1 and 2 results with their own experiences of PAL in clinical education, and to provide their views on the barriers and facilitators to PAL that existed within their own environment.

Participants and setting

At Monash University, medical students attend clinical placements from the third year of a five year course onwards. This first clinical year is spent wholly at a single hospital

network, with most students remaining at a single hospital for the year that is devoted to the study of medicine and surgery.

"Expert educators", clinicians who had positions of responsibility and oversight with regards to this first clinical year, were chosen for their experience in clinical medical education, and therefore their ability to comment on the feasibility of PAL implementation. Five experts were invited to participate in individual interviews. Four experts responded to the invitation and were consequently interviewed at their place of work between December 2014 and February 2015. Due to their seniority, further descriptions of positions or demographics would enable identification of participants, and are therefore not provided.

Study design and data collection

Interviews were semi-structured. An interview guide was used (Figure 7.1), along with an 18 slide summary presentation of findings from the previous phases of the research (Tai et al 2014, (Tai, Canny, Haines, et al., 2015b) (see Figure 7.2 for summary of findings). Participants were invited to comment on the validity of the findings during the presentation, and how the results compared with their own experience of educating students to learn together. Participants were then asked to describe the culture of medical education in relation to PAL, and how this might lead to barriers and motivators for the use of PAL. Explanations of the observed phenomena were also sought, in regards to gender and cultural differences detected through the survey data. Finally, a matrix of PAL activities for medical students (Table 7.1) was presented to the participants for comment. Interviews were recorded with a voice recording device, and transcribed verbatim by the main researcher, JT. Transcripts were de-identified with only the main researcher holding the linking key.

1. Presentation of key findings (see Figure 7.2)
    a. Are they valid i.e. do they resonate or challenge your own experiences of PAL? Can you speak to them from your own experience?

2. The culture of medical education in the clinical world
    a. Can you describe the overall culture of 'workplace learning'?
    b. Own experiences of PAL in clinical education

3. Unresolved issues: trends in the data – have these phenomena occurred in your experience?
    a. Gender differences in learning (e.g. trend in survey data- males commented that they preferred learning from those in authority/experts vs collaborative peer learning)
    b. International student approaches to peer learning (e.g. preference for peer feedback as more supportive than educator generated feedback)

4. Presentation of the Activity Matrix (empirically generated)

5. Practicalities of implementing PAL models
    a. How do you think the Activity Matrix would fit into the curriculum?
    b. Would you get buy in from staff & students? (what might be the biggest obstacles?)
    c. What resources would be useful to promote the use of peer learning?
    d. Is there a "best time" for learning educational skills like how to seek and give feedback, how to teach skills etc (not just theory, but putting it into practice with peers & near peers) How might you encourage students to engage in this 'content' when they are so focussed on acquiring 'clinical knowledge/skills?"

6. Any other comments?

Figure 7.1 Interview guide

Table 7.1 PAL Activity Matrix, as presented & explained to experts.

Observed theme	Suggested learner activity	**Example educator or learner prompts**	Educational rationale
During structured teaching and learning			
The educator is influential in PAL	Orientation to the purpose and expectations of PAL in clinical education	Initial informal discussion between educators and learners on strategies for learning in the clinical environment, including shared vision for use of PAL. May include educator reference to PAL research in medical education	Explicit orientation to expectations and use of PAL as part of aligned curriculum (Biggs, 1996) Explicit invitations from experts allows students to request involvement of peers (Billett, 1996)
Learning through active watching: the value of vicarious learning	Observed history taking or examination with a peer	Nominate one student in the tutorial to take the history or perform an examination. Nominate a second student to be the primary feedback provider on specific areas, such as group of questions, responsiveness to patient's comments, or a specific section of the examination (e.g. auscultation of heart sounds in a cardiovascular examination) Tutor to provide feedback after the peer feedback – comment on the same points (did they agree?) and any further points to improve performance	Students can learn vicariously through observation of other learners' actions (Bandura, 1977) Develops trust between students (Carless, 2013) Internal student comparison of a peer's performance to their own may make them more mindful of included elements, should they be called upon to perform the next history or examination (J. Raat, Kuks, & Cohen-Schotanus, 2010). Students can learn to calibrate their judgements and feedback, with guidance from an expert (To & Carless, 2015)
During ward 'work'			
Passivity in observation: being 'the fly on the wall' is an impediment to learning & Learning through active watching: the value of vicarious learning	Putting yourself in the doctor's shoes	When a clinician is examining a patient, "play along" in your head. Which signs would you like to examine for? Why is the information important? How does it alter your diagnosis or management plan? What would come next? What else would you do? What was omitted? What were the reasons for this? Did you see any alternative examination techniques or things done differently? Why did they do it in such a fashion? Following the examination, discuss with a peer to compare your responses to the above questions and clarify any examination techniques you were unfamiliar with	Constructs an internal feedback situation: requires student to compare their own imagined performance to the clinician's performance, enabling them to identify gaps in their own knowledge. (Silverman, Kurtz, & Draper, 1996) Peer comparison to assist with self-evaluation-either validates or expands the student's knowledge (Sadler, 2010).

	Working backwards	Select a patient who already has a diagnosis. Work backwards from the diagnosis to compile a list of symptoms and signs which they may have presented with. Presents your list of signs and symptoms to a peer, and ask them to make a diagnosis. Compare your resultant list of signs & symptoms, and the diagnosis, to the patient notes.	Comparison of progress with peers may motivate learning (a N. J. Raat, Kuks, van Hell, & Cohen-Schotanus, 2013)
During independent learning – in pairs			
Students' trust and judgement are built over time	Shared history taking	See a patient with a peer from your bedside tutorial group. Choose a specific system to focus your questions on. Take it in turns to ask the patient questions to generate a complete history.	Develops a shared understanding of the intended goals of history taking (Rogoff, 1994)
Students' trust and judgement are built over time	History presentation	Report back your shared history, one at a time. Choose some aspects to comment on – ask what was the justification for presenting the information in a specific order. What was done well?	Develops ability to judge others' performance, an understanding of the standards, and feedback delivery for both students (Nicol, Thomson, & Breslin, 2014; Sadler, 2010).
Learning through active watching: the value of vicarious learning	Independent history taking with a peer	Go with a peer to see a patient. Ask your peer to observe your history taking, and request feedback on two specific areas that you feel you require help on. Also ask them to provide feedback on an additional area. – "if you were me, what would you have done differently?"	Develops ability to judge others' performance, an understanding of the standards, and feedback delivery for both students (Nicol et al., 2014; Sadler, 2010). Develops student ability to initiate feedback dialogue (Molloy & Boud, 2013)

Data analysis

Interview transcripts were entered into NVivo 10 (QSR International) for qualitative data management using Thematic Analysis (Miles et al., 2014). Transcripts were then independently coded by JT and EM, who then discussed the codes used, and the clustering of codes into higher order themes. Themes and illustrative quotes were presented to BC and TH where additional consensus was required.

Ethics approval

Ethics approval was received from Monash Health (13167L) to interview educators involved in the Year 3 medical program.

- PAL was identified in all year levels of the course through a curriculum mapping exercise. Therefore students are already likely to be using PAL
- A survey of Year 3 medical students confirmed PAL occurred frequently, with an average of 20 times per week. It occurred mainly in informal settings, and was mostly self-initiated.
- Medical students valued PAL. However, students reported a lack of guidance and structure on how to use it appropriately.
- Female students were more likely to agree that PAL provided a safe learning environment.
- The observational study revealed though two thirds of students' time was spent with peers, only $1/6^{th}$ was spent learning with peers. Students did realise the value of PAL for "vicarious learning". Educator involvement increased the perceived value of activities. Students reported that their trust in peers, and of peers' judgement were built over time. Students also reported it was difficult to learn passively (i.e. acting like a "fly on the wall")

PAL was particularly useful for learning in a number of ways:

- Peer story telling served as an orientation to practice standards
- Peer observation & feedback contributed to learning through:
    - Evaluating performance in comparison to others
    - Learning different methods or techniques
    - Encouraging deeper thought on performance criteria
- Peers provided a supportive learning environment

Educators were not redundant in PAL, and in fact were key ingredients to success in facilitating students to learn with their peers by setting tasks or providing cues to encourage critical thinking and judgements about quality.

Figure 7.2 Summary of findings from the authors' previous work, which was presented to experts

Results

Participants agreed that most of the proposed PAL activities would be useful for students' clinical learning. Three overarching considerations for PAL implementation were identified within the dataset: culture, epistemic authority, and patient-centred care. Within these three themes were a number of sub-themes representing considerations for implementation. From these considerations, a range of practical strategies for the implementation of PAL were identified by participants, however these also overlapped

between themes (see Figure 7.3). Each theme with accompanying sub-themes will be presented, along with the strategies as raised by interview participants.

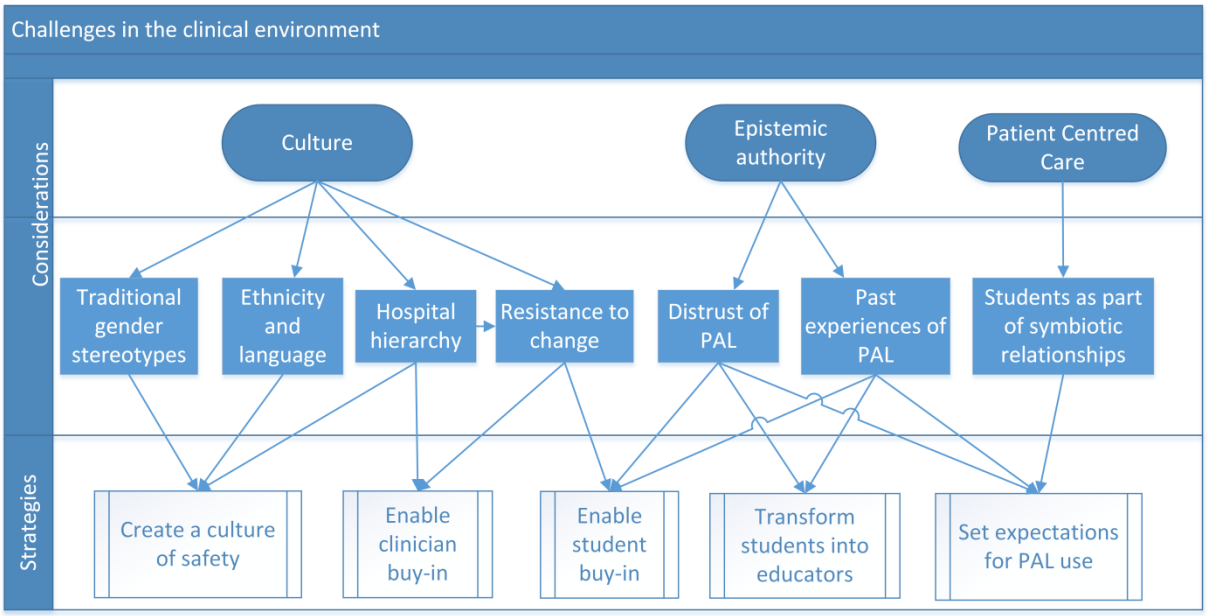

Figure 7.3 A framework guiding implementation of PAL in the clinical environment

Theme 1: Culture

Traditional gender stereotypes

When asked about the potential for gender to influence students' engagement in PAL (identified within the survey data), participants reported that female students were more likely to take to PAL. Educators indicated that potentially women were more thoughtful and willing to work together, whilst men were more confident, independent, and willing to speak up. Within the typical Western medical education setting, male students might regard PAL as a "weaker" option and not take it up, as it could reduce their own standing. Conversely, female students might be more likely to gravitate towards peer learning due to its relative safety.

> *"most of the women seem to be taking the more thinking, clinical approaches whereas most of the blokes see themselves as more the cowboy end of the spectrum. You see it – it's a lump, you cut it off, it's cured, and don't think about anything else."* E1

> *"Like you know – quieter than a girl in maths class – at school – but maybe it's about the fact that girls are less inclined to want to speak out in a public environment and more comfortable speaking to their peers. "* E4

Ethnicity and language

All participants commented on the propensity of ethnicity or language-based groups to have a particular style of learning, and therefore, to work together to maximise the efficiency of learning, and to maintain a safe learning environment in a familiar setting. While this could be seen as useful and a promoter of PAL, participants also pointed out that this reduced opportunities to develop cross-cultural understanding, and share strengths across groups.

> *"there is nevertheless a cultural element in some of the overseas students. I really do [think]. I think that they don't challenge as much, Australians are much more likely to challenge authority. I think students are much more likely to do that. "* E2

> *"to a certain extent that's [peer learning within a homogenous cultural group] isolating them from the bigger picture of the culture and the behaviour and the healthcare delivery system in which they're supposed to be participating because they're reinforcing their own idiosyncratic group."* E3

> *"It actually can be very challenging for students, some students are very comfortable in their peer group, and I wonder if international students are a little bit more comfortable in their peer group sometimes. Particularly if their English is modest and not – I mean, everyone here speaks good English, but if it's not perfect, you only need to be one percent down before it's obvious."* E2

> *"People are cohorting themselves – I mean, you know, we're not asking them to or getting them to or doing anything, they're doing it, you know, the [country] students will sometimes stick together, the [country] students always used to work together. You know. That's how they felt comfortable."* E3

Hospital hierarchy

Participants suggested that the existing hierarchy in medicine was a barrier to the successful implementation of peer learning activities. Implying that students could also learn from each other could be seen as taking away the 'expert' teaching roles of senior clinicians. Therefore, any peer learning initiative would have to challenge the current structure, and involve senior clinicians as key players.

> *"if you talk about it [peer learning], you will annoy them. So because of the hierarchy of medicine and you learn from people senior to yourself, so just even saying it will annoy people."* E4

Resistance to change

When it came to discussions about implementing new approaches to clinical education, participants perceived inertia on the part of students, and clinical educators, for varying reasons. Students with preferred learning styles were thought to be unlikely to change, and to be unreceptive to the "unessential" educational theory. Participants also reported that clinicians might also find the theory dry. Another pressing problem for these educational leaders was being able to communicate with educators effectively to enable the understanding of new educational methods. This was partly due to time constraints, but also to the large numbers of clinical educators involved at large teaching establishments.

> *"You get the students who you know – are early adopters of these things. And you would get the people who are going to be the lone wolf for the rest of their life. I don't know how to change the spots on their learning styles."* E1

> *"I've tried to get all the teachers in line, and even in one school, you just – you can't control what they do. And you can't email them, and you can't call them. You try, at the beginning of the year you try to bring them together."* E3

> *"The problem is I've noticed with both educators and even modern students and things is that if you spend too much time on [educational] theory, like, your other message will not come through. And I see people's eyes glaze over in so many sessions"* E3

Strategies to help navigate the various cultural elements were suggested by all participants. They focussed on both the individual student and educator, and the broader curriculum as a whole.

Strategy: Create a 'culture of safety'

Safety was seen as a priority in encouraging peer learning. Several elements of a safe learning environment were discussed. Cultural (ethnicity- and language-based) understanding was seen to be important for students, in encouraging them to interact with others. Physical safety was also seen as crucial to promoting peer learning: having an environment where students could feel comfortable in taking intellectual risks and not likely to be interrupted (for instance, when a clinical need overrode their educational needs) was highlighted as necessary.

> *"culture and cultural understanding underpins trust. And that is perhaps why we need to pay attention to this […] for peer learning, maybe it is important to have those cultural supports."* E3

"what infrastructure do you need to support peer assisted learning? You have to have a place where students can feel safe, right, so they have to have access with rooms where they can close the door, and they're not going to be interrupted by a group of nurses [or] a group of OTs [occupational therapists] going in or a family meeting. No-one can hear you, you're with your peers, you're making a fool of yourself and that's okay. You're putting yourself out there, which is what peer learning is a little bit. If you're going to put yourself out there, you'd better be sure that it's okay to do that." E2

Strategy: Enable clinician buy-in

Specific strategies were suggested to ensure that the medical hierarchy was respected and included in the implementation of peer learning. Educators suggested that in order for the rationale to be persuasive, teachers needed to view that they would be still working hard, but working differently, to contribute to students' learning in the workplace. Clinician involvement in tailoring PAL to their specific context was paramount.

"You should really be careful never to say peer learning will in any way replace [them]. That's what will annoy the doctors . […] the way to get around it […] if you kind of involved the teachers and the tutors in it, so it was about what they taught, they set the agenda for the peer learning. As long as it didn't involve any extra work for them, but they then said, right, peer learning group we did heart failure, go away and practice – see some patients or work as a group. That would be fine." E4

Strategy: Enable learner buy-in

Participants were supportive of PAL, but also recognised that PAL would ideally be approached, taught and discussed in a manner that was appropriate and appealing to students. When asked how and when students could be introduced to the idea of peer learning, participants suggested that any 'education on education' should be short, to the point, and incorporated all the way through their medical degree. Participants suggested that the re-iteration of basic concepts and their application to new contexts would help students see the utility of peer learning, and encourage them to use it more. Including peer assessment would also align the PAL curriculum within the clinical environment, and encourage students to improve their ability to communicate and co-operate with their peers.

"I think this [the activity matrix] is terribly important. It's enabling. It's permission giving." E2

"the single most important learning experience [. . .] is actually going, talking to patients and examining patients. And that is facilitated best by what you're talking about here, the peer support and peer reviewed learning process." E1

"make it [teaching feedback] really fast, maybe come in and do it for the Year 1s and 2s, so that – and then do it just before they go into Year 3, I think highlighting the way in which it's so different for clinical years." E3

"what I've wondered about is whether or not you could introduce peer assessment.....For example, we do a professional behaviours assessment. And we do it on the students. But I just think that would be really useful, if one student, if it was given to students from their peers. To get an opinion of how useful they've been helping them with their learning, if they've been constructive, if they're good to talk to, they are important skills, that [is what] I think they're totally missing in their curriculum." E4

Theme 2: Epistemic authority

Several concerns about peer learning stemmed from "mainstream" views on epistemic authority: the qualification and ability of a person to be knowledgeable, and therefore a reliable source of information on a subject area (Hornikx, 2011). Without this perceived "right", information from that person is unable to be trusted. The educators' views mirrored the student participant data from Phases 1 and 2 of the PAL study.

Distrust of PAL

Educators indicated that students were sceptical about peer learning. Firstly, participants reported that students had to effectively sift through and prioritise the learning that they thought would be important. Peer learning, being a learning method rather than a fact or skill that could be assessed or examined, might be placed further down the list of things to learn about. Educators recognised the adage "the blind leading the blind": the potential for inaccurate information to be perpetuated between students. This might stem from incorrect understanding, but also from placing trust in sources of information that may not be completely accurate.

"I think you have to be really careful. Can I tell you why? They've had enough [soft stuff]. And they will conflate this [peer learning] with [soft stuff].....They don't need any more staring at sultanas. They're interested in medicine."

"I think the blind leading the blind is a bit of a.... a bit of sort of a "not allowed to talk about it issue" with peer learning, you just have to be really careful of the blind leading the blind, because they all get hold of the Oxford handbook of medicine, that little green and yellow thing,

they'll look up hyponatraemia on page 666 and that will become the dominant meme of how it's potentially wrong. So you can also privilege other sources of expertise, not just the tutor, you can privilege textbooks, YouTube and there's no curation of the expertise." E2

Past learning experiences

The educators highlighted the impact of previous learning experiences on learners' perceptions of learning methods. Previous good experiences with PAL, or poor experiences with expert-led learning might motivate a student to engage in more PAL. However, poor experiences with PAL, and good experiences with expert learning might mean that students would not reach to PAL as a legitimate learning mode. .These experiences would also have an impact on who a student perceives they are able to learn from.

"[the] teaching philosophy teaching style, all of those things can be quite instrumental in determining whether people do or don't [use PAL]. So it can be either a fear based process, where students are literally terrified, so they're bound together for support, or it can be a, you know, peer assisted learning is no good, it's not where the action's at. Or it can be, I've been encouraged and supported to seek help from my peers." E3

"a student's experience of expert assisted learning will sort of drive their responses to peer learning" E4

"I think they would always prefer to be not put on the spot and shamed publicly. And I think they would always prefer to study with their peers, consequently." E4

Strategy: transform students into educators

There was a standout strategy raised to deal with these aspects of epistemic authority: to equip students to be educators. Teaching on teaching would have to be relevant to their current level of learning, and given an appropriate "spin" by linking peer interaction to assessment and performance outcomes.

"it's a really hard question of 'do the learners need to know about the educational theory?' […]I think what's useful to students is what has been shown to improve performance. So if you framed it in a – "we know that students who see more than ten patients in their third year, do better in their OSCEs than students who see less than ten patients", it might be not causal, but we know it's a link, we know it's something, I think you'd see a lot of students seeing a lot of patients. So framing educational theory in outcomes I think is by far the best way to do it." E3

"[I would] just say "look, I know you've only got ten minutes, here's what we want to do. We already know it's important, there's a lot of literature behind that. I'm not going to bore you

with that today. However, you're going to learn faster and better if you get better at this. You're going to get better marks, you have to say to medical students you're going to get a higher mark if you get good at this. And here's some of the ways you can do it. Here's three simple things in a toolkit for feedback", you know. E3

"Feedback skills I don't think they are hard to teach. You could have someone teach them formally, or it could be a video on [the online learning system], or you could have something about feedback skills….I think the first thing is learning how to give feedback that is negative, but also constructive, and the second is perspective sometimes is missing, see, you've got to be careful about what you get them to feed back on. " E4

Theme 3: Patient-Centred Care

Patient-centred care was seen as core to learning in a clinical environment. Participants indicated the shift from educator-student dyads in the classroom, to a patient-student-educator triad in the clinical setting. Participants reinforced that the focus on patient needs ultimately determines what can and cannot be undertaken within a clinical setting, with regards to learner education, and this included peer learning.

Symbiotic relationships

Participants raised the importance of being mindful of the patient's needs, and devising activities for the learner that contribute to patient care without significantly increasing the workload for the clinician. However, some participants indicated this could be difficult when the educator was unfamiliar with the student's level of ability.

"I'll try and involve them in a way that's symbiotic for me. So you have to make a rapid judgement about the student's capability right at the start and you have to almost have a bit of a gestalt because you don't know that student. And you have to sort of say, you look a bit kind of nervous and uncertain to me, maybe I won't ask you to do too much, you know, because that's also very bad for the patient, you know the patient, your number one responsibility is to the patient, patient or patients, so you know you don't want to compromise their care experience." E3

Strategy: Set expectations for PAL use

Similar to other teaching modalities, setting expectations for learner achievement and teaching episodes (including the use of peer learning) was seen as paramount to balancing patient and student needs. Educators could assist in the identification of situations that afforded or restricted the use of PAL. Participants reported that this could result in less disappointment, by ensuring students know where they might learn from, and also their

expected level of performance. Ultimately this structuring of expectations might also help the learner understand their learning goals.

> *"the problem is that I think you have to set the learner's expectations. And the best thing you can possibly do is say to them – right, this is what you're going to feel like. […] You know, it's like someone putting a book in front of you and saying "read that" but you haven't learn how to spell. […]it's best if you understand that you'll encounter a range of teachers with very different expectations. And you have to go into that world and develop these skills one by one, but yes I think if we gave them a toolkit that is probably the most likely way it's going to happen. Like, send it in with the learner, I would say. "* E3

> *"how to get the best out of peer assisted learning. […] Having a road map of all the different ways they'll learn. And trying to work out each way can give them. And not to expect the ward round to be like a tutorial, or the peer assisted learning to be like a tutorial. Because that's what they do. They sort of go, oh let's do a mini tute on this, rather than let's sit down and say what happened this week? What happened to you in clinic? Tell me about the patients you saw, what did you do on the ward round, was there anything we didn't understand there. "* E3

Discussion

This study has identified barriers in the "real world" for implementing PAL, and has also revealed facilitators and strategies for implementing PAL activities in a clinical setting. Ross & Cameron (2007) highlight the importance of identifying pitfalls and barriers in their planning and implementation framework for PAL. The impact of culture, perceived epistemic authority, and the patient-centred environment were found to be important considerations. The framework of considerations and strategies (Figure 7.3) developed from the thematic analysis of these barriers and facilitators may also be relevant to the realisation of other novel educational methods. The framework is presented as having some cross-over and related themes and strategies. However, the "real world" has even more interplay between these concepts, and we attempt to untangle some of these ideas in the following discussion.

Participants discussed a variety of different cultural aspects which impacted on learning in the clinical environment. Whilst traditional gender stereotypes with regards to PAL have been discussed elsewhere (Tai, Canny, Molloy, & Haines, 2015), the confirmation of this aspect by study participants suggests that a greater awareness of ingrained and unconscious biases is required (Giles & Hill, 2015). A shared ethnicity or language was also seen as promoting safety in learning, which has been previously demonstrated in this cohort (Lindley, McCall, & Abu-Arab, 2012). These aspects could be used to create safety when

doing PAL through careful structure and "scaffolding" of student group configuration. Homogenous groups may be used initially to promote confidence. Students have previously been hesitant to expose vulnerabilities and deficiencies to peers (Hulsman et al., 2009). Peer groups may then become more diverse to present incremental challenges to students. This acculturation may be beneficial to student performance (Green, 2014).

The suggestions for creating a culture of safety included paying attention to those supports and providing physical spaces for PAL to occur. However, psychological safety is also a key facilitator of learning (Kolb, 2015). The damaging effect of misusing the "Socratic method of questioning" as "pimping"[26] in medical education has been well established (Oh & Reamy, 2014), and some PAL may be a direct response to this toxic culture of humiliation. Creating a culture of safety could also include changing attitudes towards sub-standard performances (e.g. giving constructive feedback rather than belittling the student) and inviting other students' opinions on performance (rather than being a top-down taught culture). These strategies may also assist in reducing the influence of hierarchy on clinical education.

Tackling resistance to change and an established hierarchy were seen as obstacles to the implementation of PAL. While it is difficult to create instantaneous willingness to change, this dilemma was seen as best approached from both sides: the students, and the educators. Suggestions for both groups centred on the need for clever persuasion that learning to learn with and from peers isn't "soft stuff" which is peripheral to the practice of medicine. This might include recognising present difficulties, presenting the "hard" evidence for PAL (e.g. previous results of systematic reviews, especially information about improved performance (Burgess et al., 2014; Yu et al., 2011)), and involving both groups in the development of PAL activities appropriate to the context. Introducing a peer assessment on abilities to undertake PAL was also suggested as a potential motivator for the use of PAL, which corresponds to the concept of an aligned curriculum (Biggs, 1996).

The requirement for students to possess educator skills has been enshrined in curricular frameworks, such as CanMEDs (Royal College of Physicians and Surgeons of Canada, 2014) and the Australian Curriculum Framework for Junior Doctors (Confederation of Postgraduate Medical Education Councils, 2009). Study participants suggested that such educational skills could be built from the very beginning of the medical program. An integrated teaching and learning stream may reduce the need for basic clinical educator

[26] Oh & Reamy (2014) write that "Pimping […] can be loosely understood as a form of questioning of junior colleagues by a person in power that affirms the hierarchal order in medicine" (p182). Pimping may therefore provoke anxiety, for, if a student does not demonstrate their knowledge, they are then negatively perceived, even though the topic may be obscure and not necessary at their level of practice.

programs at a postgraduate level. This could be especially useful for the future when staff are increasingly busy, and the demand for competent clinical supervisors is high (Tai et al., 2015). Learning about good educational practice while students are still experiencing a curriculum may also lead to improved engagement, and therefore effectiveness of training (Sorinola, Thistlethwaite, Davies, & Peile, 2014).

Recognition of educator skills at a postgraduate level may also provide impetus for both students and clinician to engage in educator training, and therefore buy-in to novel methods of education. Some fellowship schemes are being developed (e.g. the AMEE Fellowship (AMEE, 2015) and ANZAHPE Fellowship (ANZAHPE, 2015)), and this may herald a new generation of motivated medical educators. This then may also feed into the traditional hierarchical model: if education is given status, then more people will want to do it.

Another benefit of students acting in an educator role may be the development of their own internal conception of what constitutes adequate performance in clinical medicine. Data in Phase 2 of the larger PAL study suggested that PAL plays a key role in developing evaluative judgement, or capacity to understand and detect quality (Tai, Canny, Haines, & Molloy, 2015a). There is also evidence that performance does improve when students are oriented to both good and poor performances (Domuracki, Wong, Olivieri, & Grierson, 2015). This may extend also to the performance of PAL, and so assessment by peers of peers may help develop educator skills in this manner.

Finally, expectations must be set for PAL use. This aligns the curriculum in concert with the provision of a PAL activity matrix, and assessment of students' PAL capacity. Doing this also gives permission to students and educators to use PAL as a valid means of learning, and thus increases the epistemic authority of students. Much like our focus on what is achievable in the "real world", expectations for the use of PAL should also be reasonable. The giving of feedback on clinical performance is a complex process, which requires simultaneous attention to a multitude of aspects. It is unlikely that students will be able to provide as good feedback as an experienced educator-clinician. Setting expectations for what students stand to gain for PAL will also aid both educator and student buy-in, so that they can see that it will not in fact, be the "blind leading the blind".

Strengths and Limitations

This study built upon previous work undertaken in the same setting, to identify potential barriers, facilitators, and strategies for the implementation of PAL in a clinical setting. The iterative nature of taking empirically generated findings to a range of expert educators, to

develop an empirically based framework for PAL implementation, is a strength of this work. By acknowledging the inherent issues in clinical education, such as the hierarchy, clinician workload, and students' perceptions of educational skills, this research provides "real world" strategies rather than a range of theories that are distant from practice.

While this work was conducted at a single university, many of the themes identified from the interviews have also been extensively covered in the literature. The principles and strategies raised may have applicability to other universities' clinical settings.

The framework we have presented has not yet been tested in any teaching situation. This would represent the single next best step. Measurements of learner outcomes in the short term (such as clinical reasoning, teamwork, work based assessment) and longer term (e.g. retention in the workforce, specialisation, teaching interest, job satisfaction), and of clinician outcomes (time spent teaching, satisfaction with teaching, evaluations of teaching by students/staff) would provide evidence for its effectiveness.

Conclusion

This research identified a range of barriers and facilitators to PAL within clinical settings, in a "real world" analysis for the implementation of novel PAL strategies. Strategies to help navigate these barriers were elicited from the experts participating in this study. A framework was subsequently developed, which may have application to a range of settings. Future work could assess the utility of such a framework for PAL in the clinical setting.

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Summary

This chapter has demonstrated that expert educators' experiences of PAL are largely aligned with student perceptions and experiences of PAL. This phase of the research has not only supported the findings from Phases 1 & 2, in the curriculum map, student survey, and observational study, but also highlighted the issues that warrant consideration when implementing peer learning in clinical medical education. The framework developed from these results may assist in the successful implementation of a peer learning initiative.

While this final results chapter has built upon the findings presented in previous chapters, the data have not yet been synthesised as a whole. Findings from this program of research have also not yet been interpreted through the Constructive Alignment framework initially used to determine the areas for investigation and therefore the methods. The following chapter will develop an overall understanding of the findings and develop some broad-based recommendations using the Constructive Alignment framework.

Chapter 8
Implications for Practice

"It is a timeless argument, after all, present in most educational institutions and seldom solved. Students see things one way; faculty another"

(Becker et al., 1961, p. 110)

Chapter 8 Implications for Practice

The results of this mixed methods study suggest that both educators and students shared similar perceptions of the current place of peer assisted learning within undergraduate clinical medical education, unlike the participants in Becker et al's (1961) study. In this work, both groups viewed PAL as a legitimate learning method, yet they had reservations as to its usefulness, especially in an unstructured format. This chapter identifies the tensions apparent within the thesis findings and draws on experiential learning theories to pinpoint potential foci for broader intervention and change.

Tensions in clinical learning

This study revealed a tension between the utility of PAL as a learning method, and the traditional culture and environment within which medical education is undertaken. Kolb (2015, p. 40) pointed out that "the process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world": for PAL to be effective, students (and educators) must resolve its surrounding conflicts. PAL is seen as a lesser device in the arsenal of learning mechanisms, due to a strong preference for the *status quo* and the maintenance of traditional learning and teaching practices. There are also tensions arising from balancing student and patient needs, and the need to maintain peer relationships while simultaneously providing critical feedback on performance (Table 8.1). While students bore most of these tensions, they were also seen to affect how educators viewed PAL.

Table 8.1 Tensions arising from the use of PAL

Educational		
"novel" learning method of PAL	vs	"traditional" didactic expert-led teaching
the student as an equal partner in learning	vs	the student as an "absorber" of teaching
the student as a contributor to peers' learning	vs	the student as a novice in the hierarchy of clinical expertise
Relational		
students providing each other with honest (but potentially critical) feedback	vs	students maintaining collegial relationships and supporting each other
student needs (education focus)	vs	patient needs (clinical task focus)

Educational tension

The educational tension was manifest in all research phases. Firstly, the curriculum map did not emphasise PAL as a primary learning method. Especially throughout the clinical years, the curriculum only alluded to PAL through its potential to contribute to the

development of professional outcomes such as teamwork and communication skills. This adherence to traditional teaching and learning methods in the stated curriculum may send a strong message to students about what is appropriate, recommended, and required learning within the course (Biggs, 1996), despite an overarching encouragement of learning with peers. The prevalence of PAL external to the intended curriculum, as identified in the introduction, may also signal to students that PAL is a lesser strategy.

Students responding to the survey reported that learning from peers was useful, but heavily preferred teaching from senior staff. This competition between expert and peer learning has been previously reported (Bennett et al., 2014). Students also reported concerns about the use of PAL, in terms of receiving correct information and being able to make accurate judgements themselves. Students' perceptions also differed by gender, perhaps through an additional overlay of tradition, where women are encouraged to be more co-operative in their efforts (Wayne et al., 2010). This may also signal the impact hierarchy has had on female students, with past experiences of expert learning potentially driving them towards peer learning as a safer option. The preference for educator guidance even extended to the perceived value of PAL, as reported by students in the observational study, where PAL episodes with an educator present were perceived to be more useful for learning than those with no educator.

There was an additional internal struggle for both students and educators identified surrounding individual epistemology. Students have to believe that their knowledge or skills are appropriate and sufficient to be taught to others to gain confidence about PAL, and so too do their peers and educators. Without appropriate beliefs around the creation of knowledge and therefore the motivation to learn from peers, PAL cannot be successful, in the same way that personal epistemology influences the ability to learn through work (Billett, 2009). This was identified within the experts' interviews in the "epistemic authority" theme, whereas students expressed this as "I'm not qualified to judge", a theme arising from the survey data and reflected also in the student interviews.

Relational tension

The observational study revealed that students balanced a fine line in more than one aspect of their clinical education. Not only did they have to make decisions about whose information they took on board; how to be an active learner when assigned a passive role; they also had to determine how to provide effective feedback to peers, whilst minimising psychological damage. Concern about peer relationships has been frequently verbalised by

students, especially when peer assessment contributes to marks (Bennett et al., 2014; Kovach et al., 2009).

The experts who were interviewed also highlighted conflicts between the wish to employ PAL, and the potentially serious obstacles to its use. Here, the patient was also brought in to the balancing act of PAL: educators have trouble finding the "sweet spot" for student involvement in traditional clinical education models ,and PAL may add another level of complexity.

The gap between theory and reality

This thesis has presented an overview of learning theories related to workplace based learning in Chapter 2 –Background, with additional concepts introduced in the discussion sections of the results, particularly regarding the development of evaluative judgement in Chapter 6. While the reader may now be somewhat acquainted with the ideas and activities underpinning learning in the workplace, the same may not be true of the clinicians and students attempting to work and learn together on clinical placements.

The role of observation has been proposed as vital to understanding what constitutes "work" in any particular environment. Billett (1996) describes observation as an indirect form of proximal guidance, where learners comprehend tasks. Rogoff (1994) also includes observation as a key first step in moving from novice to expert. Educators and students may not be aware of this aspect of apprenticeship learning: they may adhere to adage of "see one, do one, teach one" as the optimal means for learning: that is, observation is reserved for those who are absolute beginners, and that learners are expected to be personally involved in the doing. This may influence the perception of what is a useful learning or teaching activity, and through the "hidden curriculum", may devalue the active observation role for learning. For observation to be active, it needs to be less "hearing" and more "listening" – that is, mindful watching, and reflection on the witnessed performance. The observational study highlighted the types of cues that made students "watch mindfully", such as educator questions, probes, checklists, the expectation that they would be involved in feedback provision, or that they would be next to "have a go" at a performance. These cues were not as frequently employed as one might expect, given that the self-reported data suggested that both learners and educators saw PAL as an important part of clinical education. Kolb (2015) included active observation as the phase "reflective observation" in his model of experiential learning. While the thesis has identified that students used peer discussion as a type of reflection on observed activities, and found these interactions useful for their learning, this was not explicitly stated by students themselves.

Parallel to clinical placements, reflective assignments or 'critical learning incident' essays are a requirement of the MBBS course. However, though students complete these written reflective assignments, they may not make the connection between such a task and its potential benefits for workplace learning (Maloney, Tai, Lo, Molloy, & Ilic, 2013). Moreover, this does not constitute the everyday, continuous practice of reflection on observation that Kolb (2015) describes as contributing to experiential learning. The purpose and process of reflective observation is not well conveyed to students.

Interactions with peers, especially discussion of what constitutes appropriate performance, have also been suggested as a feature of recent higher education best practice (Boud & Molloy, 2013b; Carless, 2013a; Nicol et al., 2014; Sadler, 2010). This may be particularly applicable in a skills-based curriculum, where many outcomes are tangible or at least, observable. Peer discussion and interaction has been suggested as contributing to better understanding of practice goals and the ability to self-manage learning (Sadler, 2010). While the educators and students interviewed for this thesis have already begun to recognise the benefits of peer observation and discussion for learning, the connection to lifelong learning practices and self-regulation of learning could be made clearer. This may of particular benefit to students at both extremes of the achievement spectrum: internal evaluation alone in these groups is unlikely to be accurate due to flaws in reasoning (Kruger & Dunning, 1999). Developing a culture where PAL is a commonplace, everyday occurrence is likely to facilitate these peer interactions about quality of performance.

When the thesis findings are compared through the Constructive Alignment framework (Biggs, 1996) which was used to define the areas of inquiry, it is clear that while PAL is a small part of the intended curriculum, the enactment of this curriculum is highly variable, and it is perceived by both students and educators to be only partially effective in its aims. Finally, the curriculum mapping exercise revealed that is not well assessed. This could partially be due to a lack of understanding of what PAL activities or outcomes could be assessed; the systematic review in Chapter 2- Background may assist in identifying areas for assessment of peer learning. Though we cannot be so presumptuous as to say that the intended, enacted, and perceived curriculum will ever be exactly the same[27], by drawing the three aspects closer together, better educational outcomes may be achieved.

Overall, undergraduate medical training, as studied for this thesis, does not strictly follow an apprenticeship model of training: thus, the "gap" between what is theorised to be

[27] nor would we want them to be, as we would not want to anticipate and prescribe all aspects of the curriculum, nor would this be practical, given that students and patients will also influence the curriculum end result

beneficial in a workplace learning environment, and what has been observed in this research. Many factors could contribute to this, such as the requirements for a defined curriculum, assessments that occur away from the workplace (i.e. end of year written examinations, OSCEs which are assessed by clinicians not familiar to the students), time, and the rotational nature of placements which makes it harder for students to develop trusted relationships with others, to understand context-dependent targets for clinical practice and to demonstrate skills. This "standard" model of medical education does not afford students the opportunities to fully benefit from the types of learning that would naturally take place within a workplace based learning environment, where learners are gradually allowed more responsibility across a longitudinal placement.

Recommendations extending from this thesis could go as far as to a call to return to a true apprenticeship model, where individuals remain within a practice group until they are deemed to be fully skilled[28]. However, this is an unlikely and unrealistic scenario given the need for learner exposure to diverse areas of practice, and therefore, the more moderate recommendations could be implemented within the current 21st century model of university administered, hospital based clinical medical education which is common today.

Recommendations

Recommendation Zero: Make relevant theory accessible

For the recommendations to be functional, both educators and students need to be at least acquainted with the educational theories that have aided in the formulation of these suggestions. Therefore, we include Recommendation Zero as it is both a recommendation in itself, and also the basis for all others. Theory may be seen as dry and inaccessible; efforts should be made link theory to day-to-day practice. Topics could include, but are not limited to, theories of experiential learning (Kolb, 2015), communities of practice and legitimate peripheral participation (Lave & Wenger, 1991; Rogoff, 1990), and also curricular construction (Biggs, 1996) and appropriate feedback practices (e.g. Feedback Mark II, as proposed by Boud & Molloy (2013b)). This could be achieved through introductory sessions on "how to teach/learn effectively in clinical environments" for both students and clinicians, which could be run as a half day workshop that both groups attend. This could orientate both groups, not only to the activities they might undertake, but also to each other, and help build rapport between clinicians and students.

[28] which, to an extent, does occur at the postgraduate speciality training level – once accepted to a program, trainees tend to remain within that craft group.

In addition to basic educational theory, students and educators must also believe that PAL has value, and see that using PAL is a crucial part of learning to be a medical practitioner, in order for it to be used optimally. Given the empirical paradigm of medicine, evidence is likely to be required for both students and educators to value PAL. This information may come in a number of formats: systematic reviews of PAL, empirical studies, and perhaps most importantly, first-hand accounts of how PAL has helped individual students– which may be more powerful than the reported/published evidence, as a peer delivered rationale for peer learning. All of these may assist in building favourable perceptions of PAL, which may motivate both students and educators to undertake PAL.

Recommendation One: Equip both students and educators with the appropriate skills

More than just the underpinning theory, both students and educations require skills to undertake peer learning. Medical students will graduate and become the educators of the next generation of medical students; there is no reason that they cannot learn basic education and facilitation skills at an early stage of their medical careers. The call for medical students to learn to also be teachers has become stronger in recent years (Silbert et al., 2013), with partial implementation at some universities, including Monash University (Page, 2011; Tai, Cooray, & Kam, 2013). By educating students on education, students may also be orientated to the learning methods appropriate for the environment. Furthermore, it has been hypothesised that such education skills are useful not only for teaching junior staff, but also for patient education (Dandavino et al., 2007).

Phase 3 results reinforced that educators also require the appropriate skills to "do PAL". While they may be more *willing* to participate in the roll-out if they are involved in building places for PAL within the curriculum (as identified in Chapter 7), ultimately they also require the skillset to use PAL. Clinicians report requiring additional support to become effective educators, including access to appropriate training (Kilminster & Jolly, 2000), however time-poor clinicians may struggle to attend lengthy education sessions (Tai et al., 2015). Training may need to take the form of shorter sessions, and potentially incorporated as part of compulsory clinical activities such as departmental audit meetings or journal clubs, or during a protected education time (e.g. a rostered half-day workshop). Aside from education theory, including workplace-based learning and how peer learning is part of this, general skills that could be taught include small group facilitation, managing bedside interactions (i.e. with students and patients), and how to engage in a feedback dialogue. This may increase the likelihood of clinicians engaging in "best practice" education.

Recommendation Two: PAL should be integrated across the curriculum

Integration of PAL throughout the undergraduate curriculum will require students to use and build upon their communication and teamwork skills, in addition to their education skills. Integration should also emphasis the links and transfer between individual activities, and this could be done both horizontally (throughout the activities within a year level) and vertically (across year levels). This systemic approach to the implementation of PAL is likely to highlight the importance of PAL-related skills, especially if objectives, activities and assessments are aligned (Biggs, 1996). Students may be more motivated to participate in activities with peers if PAL is also assessed, as assessment is the "tail that wags the dog" of learning (Maloney et al., 2013). This explicit scaffolding through assignments and assessments linking back to PAL activities may assist in making PAL visible within the curriculum. Assessment would be not only of the learning outcomes of the activity (for example, the ability to perform a respiratory examination), but also of the quality of the peer interaction: students' ability to co-operate, explain concepts or skills simply, and give constructive feedback on performance. Several studies have investigated peer assessment of professionalism, however ability to participate in PAL was not within their remit (Louise Arnold et al., 2007; Cottrell, Diaz, Cather, & Shumway, 2006; Dannefer et al., 2005). In addition to peer assessment of peer interaction, supervised PAL activities could also be assessed by educators or clinicians observing those interactions. This recommendation also therefore links back to the two prior recommendations: all that is assessed should also be taught, and therefore both educational theory *and* practical education skills are required for this recommendation to be fulfilled.

Recommendation Three: The use, support and regard for PAL in the clinical environment should be explicit

Students may currently be spending too much time navigating the process of learning on clinical placements, rather than actually learning the clinical and professional skills they are there to attain. Cognitive load theory suggests that learning happens more efficiently if students are able to devote sufficient attention to the important aspects of a task (Tolsgaard, Bjørck, Rasmussen, Gustafsson, & Ringsted, 2013). By providing appropriate scaffolding and encouragement for PAL, this removes the *how* from the difficulty in learning, leaving students to focus on the *what*, as they have already been equipped with learning strategies.

Educators may be reluctant to "prescribe" learning activities on the wards, as learning is intended to be opportunistic. However, instead of prescribing the content of learning (which may vary depending on the hospital case mix), the *process* of learning could be made

more explicit, such as in the activity matrix developed in Chapter 6. Providing this type of support may reduce the need for students to trial different methods of learning which may or may not be successful, and focus their attention on educationally rich activities. Structured PAL, implemented by educators, may also pave the way for students to develop their own independent PAL activities, as described in the activity matrix.

While education to improve attitudes to PAL was mentioned in Recommendation Zero, regard for the usefulness of PAL should also be modelled by clinicians and educators. It should not be seen as a lesser activity for students to undertake, should an experienced educator be unavailable. PAL is a helpful form of learning to be undertaken *alongside* expert guided learning, and this regard for PAL needs to be demonstrated by educators and seniors. Students develop and assimilate values and attitudes through professional socialisation (Prince et al., 2005); this could include perceiving PAL as a useful learning format.

Summary

These recommendations are not Band-Aid fixes to the dilemma of increasing student numbers and decreasing clinical educator supervision time. Learning with and from peers is not really an additional component of workplace learning, it is theoretically, and should be in practice, part of the way that learners interact and involve themselves in an experiential process. Through learning with peers, students develop important lifelong, sustainable learning skills, which is one of the many goals of clinical education. Perhaps it could be said that it is not specifically peer learning, but just *learning*. It is therefore crucial that PAL becomes an integral part of the medical curriculum, both in pre-clinical and clinical settings.

This chapter presents a range of recommendations from the findings, which are supported by the literature, based on the identified tensions in the research. The following chapter will finally summarise the work in relation to the stated aims, describe its strengths and limitations, and provide some future directions for research. A conclusion to the work will then complete the thesis.

Chapter 9
Summary

"The purpose of a university education is not to teach to the student a subject, but to teach him how to learn it."

(Malleson, 1967)

Chapter 9 Summary

Thesis summary

This thesis commenced by outlining the impetuses for the project, from both the researcher's perspective in the introduction, and the prior research on PAL in undergraduate clinical medical education. Theories of learning supporting the use of PAL were explored, and the previously published reports of PAL in medical education were reviewed. Studies of PAL implementation were myriad, both in the classroom and clinical settings. The benefits of PAL were identified for students, staff and patients, in a systematic review. However, less was known about medical students' baseline PAL activity, and especially in the clinical education environment. Therefore, the overall aim of the thesis was to examine the phenomenon of PAL in the clinical learning environment, as enacted by third year Monash University medical students.

A three-phase mixed methods study involving four distinct methods was undertaken to address the aims. The key findings are summarised according to the specific aims of the research.

- *Describe the effects of same-level PAL in undergraduate clinical medical education*

This aim was achieved largely through the systematic literature review, presented in Chapter 2. The reported effects extended well beyond technical skill gain. Students developed their professional and communication skills, and gained confidence and support from peer interactions. Educators were able to interact with students more meaningfully, and while not well investigated, a direct benefit to patients was also identified, suggesting a need for further investigation of these flow-on effects to other stakeholder groups. The effects of same-level PAL were also identified in student self-report through the survey and interviews, and from observations made. PAL was reported to be valuable for student learning, and in particular, developing students' evaluative judgement.

- *Discover students and educators' attitudes to PAL in clinical medical education (i.e. perceptions of the impact of PAL on learning)*

Students identified that PAL was useful for their learning, but found it difficult to use without supporting strategies. Some PAL activities were perceived to be more useful than others; the perception of PAL's contribution to a safe learning environment differed between male and female students. Educators also perceived that PAL was a helpful learning strategy, encouraging and implementing PAL in their own tutorials and interactions with

students. Both students and educators did express reservations about the potential for inaccurate information to be perpetuated by students, if they were asked to go beyond their capacity in PAL interactions. These findings were then incorporated into the framework for PAL implementation, considering the importance of favourable perception to achieving both student and educator participation in PAL.

- *Describe the frequency and nature of PAL activities on clinical placements*

There were few learning objectives explicitly related to PAL in the clinical years. Despite this, students reported frequent PAL use over 20 times per week, which was confirmed in the direct observation of students. Discussion between students and observation of others' clinical performance occurred most frequently. These findings were combined with the findings on student perceptions of PAL to develop the PAL activity matrix, the "ideal" range of PAL activities that students could undertake during clinical placements.

- *Determine facilitators and barriers to using PAL in the clinical environment*

Students reported that being relegated to a passive observer was a barrier to learning overall, both in PAL and expert-led learning. A lack of confidence in peers' abilities also reduced students' willingness to use PAL. Educators were supportive of PAL, however acknowledged that culture, staff workload, and positivist epistemological beliefs were barriers to the more widespread use of PAL. In light of these findings, a framework to aid the implementation of PAL was created.

- *Examine if and how students' PAL practices in the clinical environment change over time*

This aim was primarily investigated through the interviews with students which were conducted as part of the observational study. Students related the requirement for trust in others to be built over time; concomitantly, students reported that their evaluative judgement improved. Therefore, PAL was perceived by students as less useful at the commencement of placements, and more useful as their clinical knowledge, familiarity with each other, and time spent doing PAL increased. These changes were however not directly observed, potentially due to the short time frame where both sets of observations occurred in one semester.

The thesis has described the phenomenon of PAL in clinical medical education, as originally intended by the aims. The intended, enacted, and perceived curriculum for PAL have been mapped through the research. The thesis findings have therefore built upon the existing body of PAL knowledge in a variety of ways. The work has developed an understanding of baseline PAL practice in hospital-based settings, and through this,

illuminated potential avenues for the expansion of PAL use in clinical education. In particular, it has articulated the importance of PAL in the development of evaluative judgement, and identified specific learning activities that students can undertake with peers. The work has also investigated and revealed contextual and systematic reasons for both students' and educators' reluctance to use PAL. In contrast to previous work, which has focussed on simple, one-off PAL interventions, this thesis has advocated for the broader incorporation and integration of PAL across the undergraduate curriculum. A PAL activity matrix and framework for the implementation of PAL have been developed, and broad-based recommendations for improving the use of PAL in undergraduate clinical medical education have been presented.

Strengths and limitations

The research undertaken for this thesis contains both strengths and limitations. The three phases of the study afforded robust triangulation of the data through a number of research methods. Document analysis, student surveys, observations, and interviews with both students and educators ensured that the multiple perspectives on PAL could be considered, and synthesised. The researcher's familiarity with the area of investigation, and previous experience as part of the study population, may also have reduced the possibility of misinterpretation of the data.

While it is acknowledged that researcher bias may tend towards reporting a phenomenon or novel intervention in a favourable light, the program of research intended also to explore the barriers, pitfalls and disadvantages to PAL from the outset, as an explicit aim, and category of findings. This balance in intention has extended to the reporting of results, and especially in the formulation of strategies. The "real world" has not been neglected in this research, and so realistic conclusions have been drawn from the research.

The research was undertaken at one university, and the observational component occurred at a single clinical school. Ideally, these observations would have occurred apart from each other to measure a greater change, and additional groups could have been recruited. However, the data from the survey intended to support the findings from the observational study, and responses were returned from all clinical schools. These schools, both metropolitan and rural, are varied in nature, and data are likely to be representative of the Year 3 MBBS student experience at Monash University. Therefore, this study remains true to its intentions: to illuminate the practices of PAL in Year 3 of the undergraduate MBBS program at Monash University.

Future research directions

This research has informed the development of a PAL activity matrix, and a framework of considerations and strategies for implementing PAL. However, neither the activity matrix, nor the framework, has been tested in the medical education environment. These two tools could be implemented in a medical program to test their utility and useability, through an evaluative trial. The best methods for this would be an audit of activities (both student and clinician), and analysis of examination results. An observational and interview component would assist in the refinement of the PAL activity matrix, to determine which activities yielded the best learning opportunities. As these may vary across different clinical environments (relating to both speciality of practice and locational/regional differences in protocols, policies and culture), a multi-institutional trial is suggested. Furthermore, the longer term effects of such a trial could be measured through a longitudinal study of involved cohort's PAL activities.

The research also identified a lack of consistent teaching on education skills across the five years of the MBBS. Fulfilling the "doctor as educator" competency (as stated in competency frameworks such as CanMEDs and the Australian Curriculum Framework for Junior Doctors (Confederation of Postgraduate Medical Education Councils, 2009; Royal College of Physicians and Surgeons of Canada, 2014)) through implementing education on education may indirectly support the use of PAL. The impact of a longitudinal integrated 'doctor as educator' program within which PAL is nested as a key set of skills, may be measured not only through examinations (both written and practical), but also through attitudes towards teaching and learning, and participation in education and supervision roles after graduation. While the decision to participate in educational activities may be multifactorial, such work may help to shape the future medical workforce into one with excellent educational capacity.

Conclusions

This thesis has developed an argument for the improved use of PAL in clinical medical education. PAL was investigated from both student and educator perspectives, using a variety of empirical methods, and was observed in situ by the primary researcher using an ethnographic approach. The many perceived uses and benefits of PAL were reported, reinforcing current literature on PAL. The systematic review also identified the potential role of PAL for improving educator and patient experience, in addition to developing learner attributes. This work has added to the PAL discourse in medical education, particularly in relation to the role of PAL in building learners' evaluative judgement. The

challenges in encouraging students to learn together were also documented. In particular, the preference of students in receiving feedback from experts over peers was reinforced by data from multiple study phases. Equally, expert educators described the reticence of some clinician educators to embrace facilitatory styles of teaching that deviated from traditional expert-led teaching. Drawing from the work, practical approaches to increasing PAL activity, and the perceived value of PAL activity, in clinical medical education were developed, comprising an activity matrix, a framework for implementation of PAL, and some broader recommendations for the vertical integration of 'teaching and learning' skills in the curriculum.

It is unlikely that PAL will ever be an easy undertaking for both students and educators. This thesis identified that PAL requires both parties to seek and balance information from various sources, and as such, there are tensions that perhaps cannot be fully resolved. Students have to grapple with weighing up multiple sources of knowledge, an increasing requirement in this information-rich world. Perhaps more importantly, they need to understand the limits of their own (and their peers') knowledge and abilities, and recognise where advice, help, or teaching from more expert others is required. Students reported that identifying competence and capability amongst ones' peers is challenging, accompanied by moments of self-doubt and a wish to rely on the knowledge of experienced clinicians. Despite this struggle, the data strongly suggested that PAL may help accelerate students' understandings of competency. Observing peers' performance, with a requirement to provide subsequent feedback made the students reflect more deeply on the standards of work for which they were aiming.

While it might be that PAL throws up more questions than definite answers, and at times generates discomfort for both learners and clinician educators, the data in this multi-phase research program suggest that PAL is a practice worthy of investment. While most of the benefit appears to be directed towards the learner, both in developing their skills, knowledge, and their "internal compass" for quality of work, potential benefits for patients and educators were also identified. This thesis has therefore advocated for the continued use and study of PAL in clinical medical education, while recognising the need for further longitudinal investigation of PAL and its outcomes.

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Appendices

A. Survey development

i. Initial draft survey & focus group questions, June 2012

Demographics

Age

Sex

Local/international

Current clinical site

Previous clinical placements

I have given/I have been given

Tutoring/teaching

Observation/monitoring

Feedback/assessment

It contributed to my learning

I will use this strategy in the future

Same-level peer vs senior?

Situations in which PAL occurred? (open ended?)

What type of PAL do you feel most comfortable with?

Looking back over the years, how has your use of PAL changed?

Participation in VESPA (years 1 & 2)

Participation in VESPA nights

Participation in a study group (same year level)

Participation in a study group (multi-year level) – younger or older

Focus group questions

What do you see as peer learning?

Describe times when this has been helpful/unhelpful

How could it be improved?

What type of activities do you think peers could help with? Tutoring, observation, assessment, feedback in history, examination, clinical decision making?

How comfortable do you feel with PAL?

Would you be happy to have peers contribute to your grades/marks/logbooks?

What types of learning and teaching do you prefer? (from peers, seniors, tutors etc), in what settings? (bedside tute, study group, etc)

Do you feel a record of learning (logbook, feedback sheets) helps you to get more out of a learning experience? What do you think would happen if it there was a peer logbook?

ii. Revised survey questions, July 2012 (submitted for ethics approval)

Demographics

Age

Sex

Local/international student

School leaver/graduate entry

Current clinical site (Alfred, Cabrini, Monash Medical Centre, Dandenong Hospital, Casey Hospital, Box Hill Hospital, Maroondah Hospital, Angliss Hospital, LRH, Sale, Bairnsdale, Bendigo, Mildura, Johor Bahru)

"Peer assisted learning" is a term which encompasses a number of different learning methods, including but not limited to: peer tutoring, peer collaboration, peer feedback and peer assessment. Topping (1996) defines peer assisted learning as "'people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching".

This survey is going to ask you about your peer assisted learning experiences on your clinical placements.

Types of Peer Assisted Learning

For each type of learning activity, please complete the following table:

Activity	How many times in 1 week would you do this? (choose one option)	Why did you participate in this activity? (choose one option)	Where did it happen? (can choose more than one option)	How useful was this for your learning needs? (choose one option)	Why? (free text)
• I observed a peer performing a history/examination • I was observed by a peer performing a history/examination • I taught a peer about a topic • I was taught by a peer about a topic • I demonstrated a skill to a peer • A peer demonstrated a skill to me • I gave feedback to a peer on their performance/knowledge • I received feedback from a peer on their performance/knowledge • I discussed a case with a peer • A peer discussed a case with me	Never Less than 1 1 2 3 4 5 More than 5	I chose to do it I was asked to do it I was told to do it	On the wards/in clinics by ourselves In a bedside tutorial In tutorial (not bedside) Student common room Cafeteria Outside the hospital	Scale 1-5	

Benefits of Peer Assisted Learning

Please rate to what extent you feel the following qualities are a feature of the peer assisted learning you've experienced. (benefits taken from Krych et al 2005, Weyrich et al 2008, Lincoln & McAllister, 1993) – Likert scale 1-5 (strongly disagree to strongly agree)

Takes the pressure off me to know everything (less threatening learning situation)

Increases confidence & self-esteem

Reassures me that I am at an appropriate stage of learning (allows me to measure my progress against my peers?)

I get support from my peers

Allows me to ask dumb questions

It's easier to learn from someone closer in skill level/knowledge to you

Peers understand my learning struggles better

Gives me extra time to increase my understanding

Gives me different strategies and perspectives on how to learn material

Teaching a concept helps me to understand a concept better/more deeply

Teaching a skill helps me to perform it better

Improves my communication skills

Improves my teaching skills

Improves my decision making

Improves my leadership skills

Helps me to reflect on my learning

Allows me to debrief with other students

Increases my respect for peers

Preferences for learning

Who do you get the most clinical teaching from?

Whose clinical teaching you like the best?

Why is this the best form of clinical teaching for you?

List: (peer, near peer (e.g. senior medical student), intern/HMO, registrar, consultant on ward, tutor)

Thank you for completing this survey. If you would like to go into the draw to win two movie vouchers, please click on this link to supply your email address.

iii. Final survey, paper version distributed to students in 2013

What is your age? _____ years

What is your gender?
☐ Male ☐ Female ☐ Other

What is your enrolment type?
☐ Local student
☐ International student

Q4 What was your course entry?
☐ School leaver
☐ Graduate entry

What is your current clinical site?
☐ Monash Medical Centre
☐ Dandenong Hospital
☐ Casey Hospital

Q6 Have you consented to being observed during your day-to-day placement activities as part of this study?
☐ Yes
☐ No

To be able to link this survey to a follow-up at the end of the semester, please enter your day of birth, last two digits of your mobile number, and your postcode, as an eight digit string - e.g. if I were born on 28 November, my number is 0432 880 177 and my postcode is 3127, my linking number would be 28773127.

Peer assisted learning is defined as "people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching" (Topping, 1996). Peer assisted learning is a term which encompasses a number of different learning methods, including but not limited to: peer tutoring, peer collaboration, peer feedback and peer assessment. This survey is going to ask you about your peer assisted learning experiences on your clinical placements.

Over the past week, who have you **learnt** the most from?

☐ peer
☐ near peer (e.g. senior medical student)
☐ intern/HMO/resident
☐ registrar
☐ consultant
☐ tutor
☐ patient
☐ nursing staff
☐ allied health
☐ self
☐ other (please write below)

Please explain your answer?

_____

_____

_____

Who do you get the most **clinical teaching** from?

☐ peer
☐ near peer (e.g. senior medical student)
☐ intern/HMO/resident
☐ registrar
☐ consultant
☐ tutor
☐ patient
☐ nursing staff
☐ allied health
☐ self

For each type of learning activity, please complete the following table on your learning activities in the past week

	How many times?	Why did you participate in this activity?	Where did it happen? (you may select more than one option)							
	Please enter a whole number.		On the wards	In clinics	In a bedside tutorial	In a tutorial (not bedside)	Student common room	Cafeteria	Outside the hospital	Other
I observed a peer performing a history/ examination		I chose to do it I was asked by a peer I was asked by an educator								
I was observed by a peer performing a history/ examination		I chose to do it I was asked by a peer I was asked by an educator								
I taught a peer about a topic		I chose to do it I was asked by a peer I was asked by an educator								
I was taught by a peer about a topic		I chose to do it I was asked by a peer I was asked by an educator								
I demonstrated a skill to a peer		I chose to do it I was asked by a peer I was asked by an educator								
A peer demonstrated a skill to me		I chose to do it I was asked by a peer I was asked by an educator								
I gave feedback to a peer on their performance/ knowledge		I chose to do it I was asked by a peer I was asked by an educator								
I received feedback from a peer on my performance/ knowledge		I chose to do it I was asked by a peer I was asked by an educator								
I discussed a case with a peer		I chose to do it I was asked by a peer I was asked by an educator								
A peer discussed a case with me		I chose to do it I was asked by a peer I was asked by an educator								

How useful was this type of PAL for your learning needs?

	Please rate each item					Why was this form of PAL useful?
	Not useful at all	A little useful	Moderately useful	Very useful	Extremely useful	Please explain your rating.
I observed a peer performing a history/examination						
I was observed by a peer performing a history/examination						
I taught a peer about a topic						
I was taught by a peer about a topic						
I demonstrated a skill to a peer						
A peer demonstrated a skill to me						
I gave feedback to a peer on their performance/knowledge						
I received feedback from a peer on my performance/knowledge						
I discussed a case with a peer						
A peer discussed a case with me						

The literature reports a number of benefits and drawbacks to peer assisted learning (Krych et al 2005, Weyrich et al 2008, Lincoln & McAllister, 1993). Based on your own experience on clinical placements, please rate to what extent you agree with the following statements.

Reported Advantages – Compared to traditional teacher-led learning, PAL …

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Is less threatening					
Increases confidence & self-esteem					
Reassures me that I am at an appropriate stage of learning (on the right track)					
Allows me to measure my progress against my peers					
Provides emotional support					
Allows me to ask ‘dumb’ questions that I might not be willing to ask of an expert					
Allows me to express myself/ let down my guard					
Gives me extra time to increase my understanding					
Gives me different strategies and perspectives on how to learn material					
Improves my communication skills					
Improves my teaching skills					

Improves my decision making					
Improves my leadership skills					
Helps me to reflect on my learning					
Increases my respect for peers					

Reported Disadvantages – Compared to traditional teacher-led learning, PAL IS NOT USEFUL because

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I cannot trust my own judgement about my peers' knowledge or performance					
I cannot trust my peers' judgement about my knowledge or performance					
Peers focus on aspects of my performance that I feel are not key to improvement					
It encourages unhealthy competition					
It increases strain on friendships					
It reduces opportunities to hear feedback or receive teaching from experts (ie supervisor)					
My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of performance)					
I feel uncomfortable giving my peers constructive feedback about their performance (i.e. identify negative aspects of performance)					

Based on your experience of learning in the clinical environment, please rate the following statements

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Peers understand my learning struggles					
Supervisors understand my learning struggles					
I learn well from someone closer in skill level knowledge to myself					
I learn well from a recognised expert					
Teaching a concept to a peer helps me to understand the concept					
Explaining/teaching a concept to an expert helps me to understand the concept					
Teaching a skill to a peer a skill helps me to perform the skill					
Demonstrating a skill to an expert helps me to perform the skill					

B. Factor Analysis & Variable List

```
. factor  var143 var144 var145 var146 var147 var148 var149 var150 var151 var152 var153
var154 var155 var156 var157 var158 var159 var160 var161 var162 var163 var164 var165 var166
var167 var168 var169 var170 var171 var172 var173, factors(10)  blanks(.3)

(obs=91)

Factor analysis/correlation                       Number of obs    =         91
    Method: principal factors                     Retained factors =         10
    Rotation: (unrotated)                         Number of params =        265
```

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	8.81885	6.38989	0.4559	0.4559
Factor2	2.42896	0.58022	0.1256	0.5815
Factor3	1.84873	0.42086	0.0956	0.6771
Factor4	1.42787	0.26603	0.0738	0.7509
Factor5	1.16184	0.15902	0.0601	0.8109
Factor6	1.00283	0.23587	0.0518	0.8628
Factor7	0.76696	0.02707	0.0396	0.9024
Factor8	0.73989	0.10941	0.0383	0.9407
Factor9	0.63048	0.19268	0.0326	0.9733
Factor10	0.43780	0.05434	0.0226	0.9959
Factor11	0.38346	0.04588	0.0198	1.0157
Factor12	0.33758	0.04672	0.0175	1.0332
Factor13	0.29086	0.06122	0.0150	1.0482
Factor14	0.22965	0.07651	0.0119	1.0601
Factor15	0.15314	0.00803	0.0079	1.0680
Factor16	0.14511	0.04522	0.0075	1.0755
Factor17	0.09990	0.02378	0.0052	1.0807
Factor18	0.07611	0.06246	0.0039	1.0846
Factor19	0.01366	0.02389	0.0007	1.0853

```
   Factor20  |     -0.01024      0.04249           -0.0005       1.0848
   Factor21  |     -0.05272      0.00946           -0.0027       1.0821
   Factor22  |     -0.06218      0.01955           -0.0032       1.0788
   Factor23  |     -0.08173      0.03852           -0.0042       1.0746
   Factor24  |     -0.12026      0.00291           -0.0062       1.0684
   Factor25  |     -0.12316      0.01575           -0.0064       1.0620
   Factor26  |     -0.13891      0.04382           -0.0072       1.0549
   Factor27  |     -0.18273      0.00309           -0.0094       1.0454
   Factor28  |     -0.18582      0.02061           -0.0096       1.0358
   Factor29  |     -0.20643      0.01678           -0.0107       1.0251
   Factor30  |     -0.22320      0.03961           -0.0115       1.0136
   Factor31  |     -0.26281            .           -0.0136       1.0000
------------------------------------------------------------------------------

LR test: independent vs. saturated: chi2(465) = 1503.32 Prob>chi2 = 0.0000
```

Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
var143	0.6856				0.3179					
var144	0.7228			0.3138						
var145	0.5782			0.5167						
var146	0.5564					0.3242				
var147	0.6528									
var148	0.6945				0.3324					
var149	0.7789									
var150	0.7362									
var151	0.6126		-0.3275							
var152	0.6390						-0.3196			
var153	0.7586									
var154	0.6491							-0.3104		
var155	0.6195							-0.3218	-0.3049	
var156	0.6175									

```
      var157 |   0.6549                                                  0.3705
      var158 |  -0.4141    0.3274                          0.4958
      var159 |  -0.4700    0.3326                          0.4334
      var160 |  -0.4237    0.3371
      var161 |             0.4401             0.4529
      var162 |             0.4724             0.3737   -0.3678
      var163 |  -0.4059    0.4860
      var164 |             0.5110                       0.3501
      var165 |             0.4237   -0.3284              0.4281
      var166 |   0.4345
      var167 |                       0.4547
      var168 |   0.6795
      var169 |                       0.4607
      var170 |   0.4805    0.3787    0.3006
      var171 |             0.4254    0.3752
      var172 |   0.6024    0.3693
      var173 |             0.4545    0.4567                                                  0.3754
-------------------------------------------------------------------------------------------------------------
```

```
    ----------------------------                          var158 |      0.2848
        Variable |   Uniqueness                           var159 |      0.2993
    -------------+--------------                          var160 |      0.6063
          var143 |      0.2145                            var161 |      0.4478
          var144 |      0.2491                            var162 |      0.3132
          var145 |      0.2105                            var163 |      0.5192
          var146 |      0.4332                            var164 |      0.4206
          var147 |      0.4137                            var165 |      0.4039
          var148 |      0.2609                            var166 |      0.5397
          var149 |      0.2452                            var167 |      0.5667
          var150 |      0.2139                            var168 |      0.4232
          var151 |      0.3797                            var169 |      0.5642
          var152 |      0.3019                            var170 |      0.3687
          var153 |      0.3139                            var171 |      0.5466
          var154 |      0.3521                            var172 |      0.2898
          var155 |      0.2821                            var173 |      0.4035
          var156 |      0.5407                          ----------------------------
          var157 |      0.3270                          (blanks represent abs(loading)<.3)


factor  var143 var144 var145 var146 var147 var148 var149 var150 var151 var152 var153
var154 var155 var156 var157 var158 var159 var160 var161 var162 va

> r163 var164 var165, factors(10)  blanks(.3)

(obs=138)


Factor analysis/correlation                       Number of obs    =      138
    Method: principal factors                     Retained factors =       10
    Rotation: (unrotated)                         Number of params =      185

    --------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
```

Factor1	7.27362	5.21928	0.5518	0.5518
Factor2	2.05434	0.71871	0.1558	0.7076
Factor3	1.33563	0.38809	0.1013	0.8089
Factor4	0.94754	0.18491	0.0719	0.8808
Factor5	0.76263	0.10572	0.0579	0.9386
Factor6	0.65691	0.18669	0.0498	0.9885
Factor7	0.47021	0.13885	0.0357	1.0241
Factor8	0.33136	0.08391	0.0251	1.0493
Factor9	0.24746	0.07067	0.0188	1.0680
Factor10	0.17679	0.03468	0.0134	1.0814
Factor11	0.14210	0.05731	0.0108	1.0922
Factor12	0.08479	0.04110	0.0064	1.0987
Factor13	0.04369	0.05789	0.0033	1.1020
Factor14	-0.01419	0.02463	-0.0011	1.1009
Factor15	-0.03882	0.03681	-0.0029	1.0979
Factor16	-0.07564	0.02351	-0.0057	1.0922
Factor17	-0.09915	0.00700	-0.0075	1.0847
Factor18	-0.10615	0.03409	-0.0081	1.0766
Factor19	-0.14024	0.02742	-0.0106	1.0660
Factor20	-0.16766	0.01537	-0.0127	1.0533
Factor21	-0.18302	0.04504	-0.0139	1.0394
Factor22	-0.22806	0.06326	-0.0173	1.0221
Factor23	-0.29133	.	-0.0221	1.0000

LR test: independent vs. saturated: chi2(253) = 1602.53 Prob>chi2 = 0.0000

Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
var143	0.6222		-0.3648							
var144	0.7148			0.3113						
var145	0.5724			0.4645	0.3019					
var146	0.5705				0.3518					
var147	0.6615									
var148	0.6758									
var149	0.7204									
var150	0.7236					0.4019				
var151	0.6192									
var152	0.6741									
var153	0.7374									
var154	0.6877									
var155	0.6004			-0.3224						

```
      var156 |   0.5590
      var157 |   0.6095
      var158 |  -0.4214    0.5278
      var159 |  -0.4541    0.4535   -0.3609              0.3330
      var160 |  -0.4023    0.3894
      var161 |             0.3776    0.4985
      var162 |             0.4237    0.5680
      var163 |  -0.3901    0.4670
      var164 |             0.5552                                -0.3056
      var165 |             0.5228                       -0.3314
-------------------------------------------------------------------------------------------------------------------
```

Variable	Uniqueness
var143	0.3390
var144	0.3093
var145	0.3176
var146	0.4605
var147	0.4084
var148	0.2850
var149	0.2895
var150	0.2278
var151	0.4019
var152	0.3484
var153	0.3263
var154	0.3681
var155	0.3476
var156	0.5711
var157	0.3833
var158	0.2801
var159	0.2525
var160	0.6146
var161	0.4233
var162	0.3511
var163	0.5408
var164	0.4327
var165	0.4647

(blanks represent abs(loading)<.3)

Variable number	Question text
143	Is less threatening
144	Increases confidence & self-esteem
145	Reassures me that I am at an appropriate stage of learning (on the right track)
146	Allows me to measure my progress against my peers
147	Provides emotional support
148	Allows me to ask 'dumb' questions that I might not be willing to ask of an expert
149	Allows me to express myself/ let down my guard
150	Gives me extra time to increase my understanding
151	Gives me different strategies and perspectives on how to learn material
152	Improves my communication skills
153	Improves my teaching skills
154	Improves my decision making
155	Improves my leadership skills
156	Helps me to reflect on my learning
157	Increases my respect for peers
158	I cannot trust my own judgement about my peers' knowledge or performance
159	I cannot trust my peers' judgement about my knowledge or performance
160	Peers focus on aspects of my performance that I feel are not key to improvement
161	It encourages unhealthy competition
162	It increases strain on friendships
163	It reduces opportunities to hear feedback or receive teaching from experts (ie supervisor)
164	My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of performance)
165	I feel uncomfortable giving my peers constructive feedback about their performance (i.e. identify negative aspects of performance)
166	Peers understand my learning struggles
167	Supervisors understand my learning struggles
168	I learn well from someone closer in skill level knowledge to myself
169	I learn well from a recognised expert
170	Teaching a concept to a peer helps me to understand the concept
171	Explaining/teaching a concept to an expert helps me to understand the concept
172	Teaching a skill to a peer a skill helps me to perform the skill
173	Demonstrating a skill to an expert helps me to perform the skill

C. Ethics approval letters

The four ethics approval letters are contained within this appendix, in order of application and receipt.

Monash University Human Research Ethics Committee (MUHREC)
Research Office

Human Ethics Certificate of Approval

Date: **28 August 2012**

Project Number: **CF12/2429 – 2012001312**

Project Title: **Investigating Peer-Assisted Learning on Clinical Placements in Undergraduate Medicine**

Chief Investigator: **Assoc Prof Elizabeth Molloy**

Approved: **From: 28 August 2012** **To: 28 August 2017**

Terms of approval

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, and a copy forwarded to MUHREC before any data collection can occur at the specified organisation. **Failure to provide permission letters to MUHREC before data collection commences is in breach of the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research**.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must contain your project number.
6. **Amendments to the approved project (including changes in personnel):** Requires the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

[redacted]

Associate Professor Marg Lindorff
Associate Chair, MUHREC

cc: Dr Joanna Tai, Assoc Prof Terry Haines, Prof Ben Canny

MonashHealth

Research Directorate
Monash Health
Monash Medical Centre
246 Clayton Road
Clayton Victoria 3168
Australia

Postal address:
Locked Bag 29
Clayton South Vic 3169
Australia

Tel (03) 9594 4611
Fax (03) 9594 6306

10 July 2013

Dr Joanne Tai
Nursing and Health Sciences
HealthPEER,
Faculty of Medicine
Nursing and Health Sciences
Building 13C G06,
Monash University Vic 3800

Dear Dr Tai

Study title: Investigating peer learning in Undergraduate Clinical Medical Education : perceptions and acceptability

Monash Health HREC Ref: 13167L

The Monash Health HREC Low Risk Review Panel reviewed the above application and are also satisfied that the responses to our correspondence of 30 May 2013 have been sufficiently addressed.

The HREC approved the above application on the basis of the information provided in the application form, protocol and supporting documentation.

This reviewing HREC is accredited by the Consultative Council for Human Research Ethics under the single ethical review system.

Approval

The HREC and Site Specific Authorisation approval is from 10 July 2013.

Approval is given in accordance with the research conforming to the *National Health and Medical Research Council Act 1992* and the *National Statement on Ethical Conduct in Human Research (2007)*. The HREC has ethically approved this research according to the Memorandum of Understanding between the Consultative Council and the participating organisations conducting the research.

Approval is given for this research project to be conducted at the following sites and campuses:

- Monash Health
    - Monash Medical Centre, Clayton
    - Casey Hospital

You must comply with the following conditions:

The Principal Investigator is required to notify the Research Directorate, Monash Health of the following:

1. Any change in protocol and the reason for that change together with an indication of ethical implications (if any)

2. Serious or unexpected adverse effects of project on subjects and steps taken to deal with them
3. Any unforeseen events that might affect continued ethical acceptability of the project
4. Any expiry of the insurance coverage provided in respect of sponsored trials
5. Discontinuation of the project before the expected date of completion, giving reasons
6. Any change in personnel involved in the research project including any study member resigning from Monash Health &/or the study team.

At the conclusion of the project or every twelve months if the project continues, the Principal Investigator is required to complete and forward an annual progress report to the Committee.

Annual progress report reminder letters will be forwarded to the researcher.

Approved documents

Documents reviewed and approved by the Low Risk Review Panel were:

Document	*Version*	*Date*
Participant Information and Consent Form – Student Groups	2	4 July 2013
Consent Form	2	4 July 2013
Withdrawal of Participation	2	4 July 2013
Participant Information and Consent Form – Student participating in questionnaire	2	4 July 2013
Participant Information and Consent Form – Tutors	2	4 July 2013
Consent Form	2	4 July 2013
Withdrawal of Participation	2	4 July 2013

If you should have any queries about your project please contact Julie Gephart by email julie.gephart @southernhealth.org.au

The HREC wishes you and your colleagues every success in your research.

Yours sincerely

[redacted]

Prof Mel Korman
Chairman (HREC A)

cc: A/Prof Terry Haines

MonashHealth

Research Directorate
Monash Health
Monash Medical Centre
246 Clayton Road
Clayton Victoria 3168
Australia

Postal address:
Locked Bag 29
Clayton South Vic 3169
Australia

[redacted]

08 August 2013

Dr Joanna Tai
Nursing and Health Sciences
HealthPEER,
Faculty of Medicine
Nursing and Health Sciences
Building 13C G06,
Monash University Vic 3800

Dear Researcher,

Research Project Application No. 13167L: Investigating peer learning in Undergraduate Clinical Medical Education : perceptions and acceptability

We thank you for your email of 02 August 2013. We advise that the following documents:

i. HREC Amendment Form to include Moorabbin Campus as a site for the project;

in respect of this study have been reviewed and approved subject to the Participant Information and Consent Form under section 4 to include Moorabbin Hospital.

We request a clean copy of the revised Information Statement & Consent Forms with version no. date updated to reflect this amendment to be emailed to [redacted] so that the barcode for scanned medical records may be inserted.

Should you have any queries please contact me on [redacted]

Yours sincerely

[redacted]

DEBORAH DELL
Manager, Human Research Ethics Committees
Research Directorate

Please Note: All responses/correspondence must be submitted in hard copy with the project number and title

MONASH University

Joanna Tai [redacted]

MUHREC Amendment CF12/2429 - 2012001312 - Investigating Peer-Assisted Learning on Clinical Placements in Undergraduate Medicine

MRO Human Ethics Team [redacted] 5 February 2014 at 11:55
To: [redacted], Elizabeth Molloy [redacted]

PLEASE NOTE: To ensure speedy turnaround time, this correspondence is being sent by email only. MUHREC will endeavour to copy all investigators on correspondence relating to this project, but it is the responsibility of the first-named investigator to ensure that their co-investigators are aware of the content of the correspondence.

Dear Researchers

Thank you for submitting a Request for Amendment to the above named project.

This is to advise that the following amendments have been approved:

Changes to Procedures

– Additional data will be collected from the 2014 Year 3 MBBS student cohort.

– The 2014 participants will complete the same anonymous online survey on peer-assisted learning activities they have undertaken during their clinical rotations, at two time points during the year; April and August.

Changes to Recruitment

– The project will be advertised during a lecture.

Other changes

– Two sets of movie vouchers will be offered, one at each time point, as opposed to the original offer of one set for one survey round.

– The electronic survey will be distributed via Qualtrics.

Approved Documents

– Revised Explanatory Statement

Thank you for keeping the Committee informed.

Professor Nip Thomson
Chair, MUHREC

Human Ethics
Monash Research Office

Our aim is exceptional service

Monash University
Level 1, Building 3e, Clayton Campus
Wellington Rd
Clayton VIC 3800, Australia

[redacted]

D. Observational study data collection templates

Template for individual PAL interaction – discarded after pilot

Attribute	Fixed category	Free description
Activity	Tutorial/bedside tutorial/independent learning	
Location	War/clinic/classroom tutorial/common room/cafeteria/other	
Relevance of interaction	Peripheral/central	
Initiator	Peer/near peer/Tutor/staff member	
Intended target	Peer/near peer/tutor/staff member	
Others present	Peer/near peer/tutor/staff member	
Content	Information giving/ information seeking/ social	
Immediate impact	None/some	
Further change in behaviour		
Any other reactions	Initiator/ Target/ Others present	
Group stage	Forming/Storming/ Norming/Performing	
Researcher's impression of reason for interaction		
Initiator's reason for interaction		

Interview guide for students

Over one day:

Participation of individual group members measured in instances as above

Interviews at the conclusion of the day

Least/Most useful comment/interaction with a peer?

Why? (i.e. how do you think it helped/didn't help?)

How does this compare to comment/interaction with more senior staff?

What prevented you from contributing at X point?

What made you decide to contribute at X point?

In the tutorials over the past week, I have noticed (X). Why did you do it that way?

Tutor interview question guide (one interview per tutor, after week of observation)

What is your definition of peer assisted learning? (i.e. what activities come under PAL?)

What types of PAL have you used in your teaching sessions?

What has been effective?

What doesn't work?

What do you think are the benefits of PAL? What are the drawbacks?

What changes, if any, have there been in students' use of PAL as they spend more time on clinical placements?

This week, during the tutorials, I noticed (x). Why did you do that?

E. Focus group schedule

Focus group schedule (at conclusion of all observations – or both weeks?)

Welcome, ground rules, recording, consent

To get you started thinking about peer assisted learning, firstly let's discuss a definition of PAL. What is PAL? Who do you consider your peers? What types of activities do you see as peer assisted learning?

What are the benefits and drawbacks of using PAL?

How have you used PAL effectively?

Can you describe a situation where you've tried to use PAL and it didn't work?

How have your tutors encouraged or discourages different learning strategies? What about your friends/colleagues?

Thinking back to your preclinical years, (i.e. 1st and 2nd year), have any of your learning experiences then led you to use any particular style of learning? (e.g. has it made you use PAL more or less?)

How do strategies you've used on clinical placements differ from classroom learning?

Do you like PAL ? Why/why not? What would encourage you to use PAL more? (e.g. resources, guidance, workshops on how to teach/give feedback)

F. Expert interview schedule

Schedule of questions – expert interviews

7. Presentation of key findings
    a. Are they valid? Can you speak to them from your own experience?
    b. Anything that I've missed?
8. The culture of medical education in the clinical world
    a. Can you describe the overall culture of learning?
        i. Pedagogical philosophy
        ii. Common ways that students are taught
        iii. Attitudes towards students
    b. Own experiences of PAL
        i. One success & why
        ii. One failure & why
9. Unresolved cloudy issues
    a. Gender differences in learning (e.g. males prefer authority)
    b. International student approaches to peer learning (e.g. preference for peer feedback as more supportive)
10. Presentation of conceptual model and framework for PAL
11. Practicalities of implementing PAL models
    a. How do you think the framework would fit into the clinical curriculum?
    b. Would you get buy in from staff & students?
    c. What resources would be useful to promote the use of peer learning?
    d. Is there a "best time" for learning educational skills (not just theory, but putting it into practice with peers & near peers)
12. Any other considerations?
    a. E.g. requirements of graduates

G. Presentation to experts

The following PowerPoint slides formed the basis for the presentation of research findings to the experts interviewed in Phase 3 of the project. The presentation lasted approximately 15 minutes.

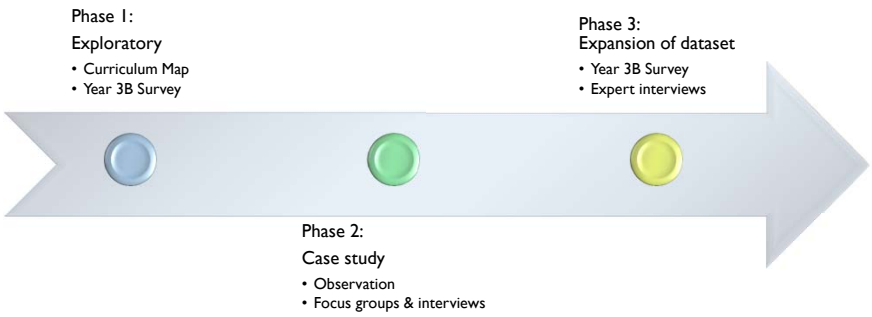
PAL presentation

Expert interviews
Joanna Tai PhD research December 2014

Overall rationale

- PAL is a potentially useful teaching method, used frequently in postgraduate medical education
- Students on clinical placements may benefit from using PAL – i.e. developing ability to use PAL from early stage
- We need to find out what PAL students are already doing on their clinical placements, before launching any interventions

Overview of research



Phase 1: Curriculum Map

- PAL found in all year level s of the course, in the objectives, teaching & learning activities, and assessment tasks

Outcome: Students are likely to be already using PAL

Phase 1: Pilot survey

- Peer learning activities occurred frequently (at least once a week, total average 20)
- largely perceived as useful
- occurred mainly in informal settings. It was mostly self-initiated (largest tutor initiated 30%).

Phase 1: Pilot survey

Themes arising from qualitative comments:

- Useful: Rehearsal, to teach is to learn twice, judgement building
- Not useful: I'm not qualified to judge, I have no framework for PAL

Outcomes: medical students value PAL, and use it as a strategy in clinical education. However, there is a lack of guidance and structure on how to use it appropriately

Phase 2: Observational study

- ~30 hours spent per week on placement
  - 12 hours on learning activities (focussing on student learning)
  - 9 hours on purely "work" activities (being involved in day to day activities)
  - 8 hours on meal breaks, independent study, social interactions, waiting.
- Two thirds of their time was spent with peers, but only 1/6th was spent learning with peers

Phase 2: Observational study

Four themes from observing PAL in the clinical environment

- Students realised the value of PAL in learning through watching – vicarious learning';
- The 'potency of educator prompts' increased the value of some activities;
- Students reported that "trust and judgement are built over time';
- Students also cited being 'the fly on the wall' as an impediment to learning, regardless of the presence of peers or experts.

Phase 2: Observational study

PAL supports overall development of medical students

- Peer story telling is an orientation to practice standards
- Peer observation & feedback contributes to learning
  - Evaluating performance in comparison to others
  - Learning different methods
  - Encourages deeper thought processes
- Peers provide a supportive learning environment
- The tension between tutor knowledge and peer knowledge

Phase 2: Observational Study

- Educators are not redundant in PAL, and in fact are key ingredients to success in facilitating students to learn with their peers by setting tasks or providing cues to encourage critical thinking and judgements about quality.
- PAL is more than just for transmission of knowledge:
  - builds students' ability to understand the standards of practice
  - to practise evaluating their own and others' performance in relation to these standards
  - Evaluation therefore doesn't have to be entirely accurate

Phase 3: Pooled data

- Significant survey results
- Utility of PAL activity "I observed a peer performing a history/examination"

Male	Female	Total	ologit P>|z|	N
43%	65%	55%	0.008	146

- For international students:
- "I observed a peer performing a history/examination" p = 0.003
- "I gave feedback to a peer on their performance/knowledge" p = 0.026

Phase 3: Pooled data

Allows me to ask 'dumb' questions that I might not be willing to ask of an expert	females more likely p=0.010
Allows me to express myself/ let down my guard	females more likely p=0.024
Gives me extra time to increase my understanding	females more likely p=0.012
Helps me to reflect on my learning	females more likely p=0.032
Peers focus on aspects of my performance that I feel are not key to improvement	males more likely p=0.040

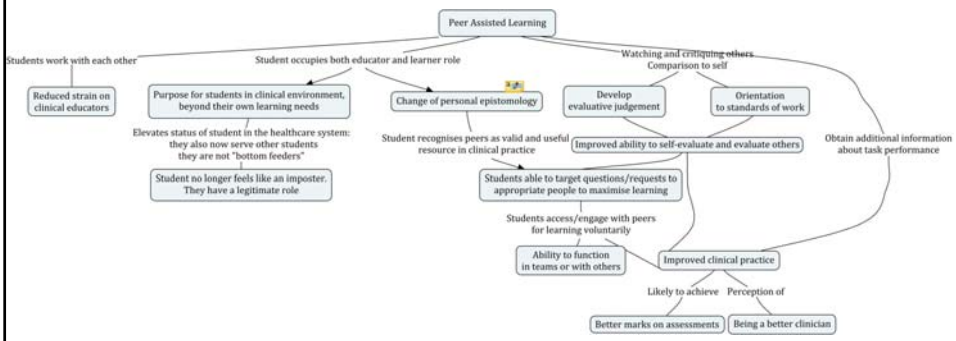
Unresolved cloudy issues

- Gender differences
  - Supervisors understand my learning struggles
  - I learn well from a recognised expert
  - Demonstrating a skill to an expert helps me to perform the skill

Unresolved cloudy issues

- International student approaches to learning
  - Allows me to measure my progress against my peers
  - Allows me to express myself/ let down my guard
  - Improves my decision making
  - Helps me to reflect on my learning
  - Increases my respect for peers
  - I cannot trust my peers' judgement about my knowledge or performance
  - *My peers hesitate to provide me with constructive feedback (i.e. identify negative aspects of performance)*
  - *I learn well from a recognised expert*

Conceptual model



Proposed PAL activities

		Structured teaching activities	
Learning through watching: the value of vicarious learning	Orientation to the purpose and expectations of PAL in clinical education	Initial informal discussion between educators and learners on strategies for learning in the clinical environment, including shared vision for use of PAL	Explicit orientation to expectations and use of PAL "authority instruction" allows students to request involvement of peers
	Observed history taking with a peer	Nominate one student in the tutorial to take the history. Nominate a second student to be the primary feedback provider on specific areas, as in independent history taking. Tutor to provide feedback after peer feedback given – comment on the same points (did they agree?) and any further points necessary.	Evaluative judgement and self-evaluation, supported by tutor feedback to confirm independent history taking with a peer Reinforces history taking

Proposed PAL activities

	During work activities		
The fly on the wall	Putting yourself in the doctor's shoes	When the team is seeing a new patient, "play along" in your head as they are taking the history. Would you ask the same questions that they are asking? Why did they ask the questions they did? What would come next, and what was omitted? Afterwards, discuss this with your ward round buddy (i.e. peer) to compare your thoughts.	Requires student to compare their own imagined performance to the doctor's performance – enabling them to identify gaps in their own knowledge. Peer comparison to assist with self-evaluation, either validates or expands students' knowledge.
	Working backwards	Frequently patients will have been on the ward for a while, and you will already know their diagnosis. But what symptoms and signs might they have had? Work backwards from the diagnosis and compare the patient notes to your list of signs and symptoms. Discuss your potential list of signs and symptoms with a peer, and see if they can come up with the diagnosis your patient had.	Unpacking clinical reasoning Case presentation skills

Proposed PAL activities

	Independent activities		
Potency of prompts, Trust and judgement are built over time	Shared history taking	See a patient with a peer from your bedside tutorial group. Choose a specific system to focus your questions on, preferably one you have done recently in your tutorial group Take it in turns to ask questions to generate a complete history for the patient.	Reduces pressure and scrutiny of one peer, improves teamwork, critical thinking, active listening. Develops a shared understanding of the intended goals of history taking
Trust and judgement are built over time	History presentation	Report back your shared history, one at a time. Choose some aspects to comment on – ask what was the justification for presenting the information in a specific order. What was done well?	Develops active listening and critical thinking skills. Feedback delivery for both students
Learning through watching: the value of vicarious learning	Independent history taking with a peer	Go with a peer to see a patient. Ask your peer to observe your history taking, and request feedback on two specific areas that you feel you require help on. Also ask them to provide feedback on an additional area. – "if you were me, what would you have done differently?"	Develops active listening and critical thinking skills. Feedback – asking, and for the peer, delivering Evaluative judgement and self-evaluation Reinforces history taking