UNIVERSITY
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AUSTRALIA

Journal of Peer Learning

Volume 7 Article 6

2014

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Journal of Peer Learning (2014) 7: 57-80

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).

Published by the University of Wollongong
ISSN 2200-2359 (online)

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.

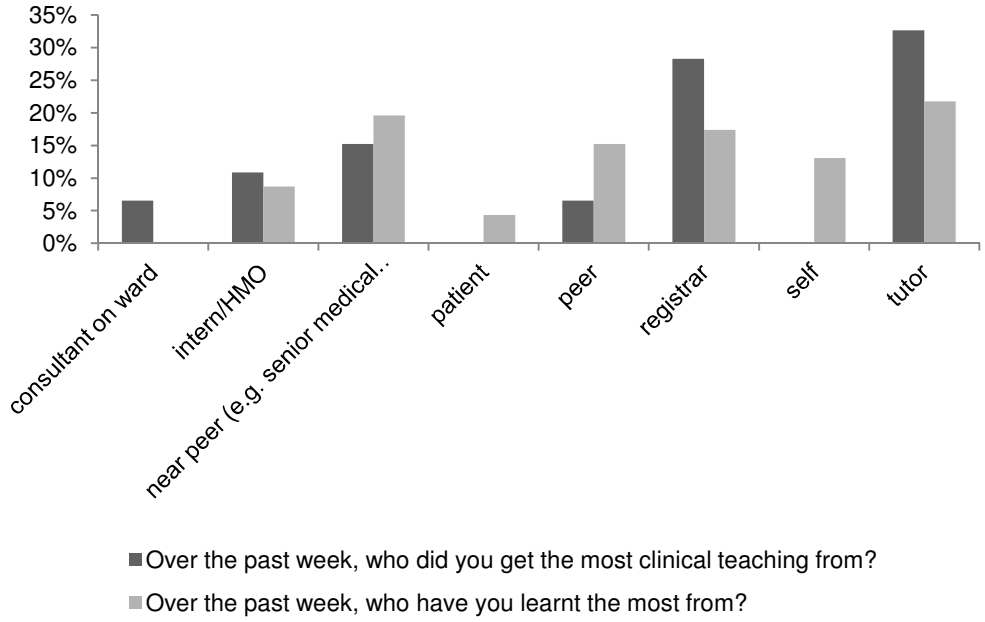

Figure 1. Reported clinical teaching vs learning.

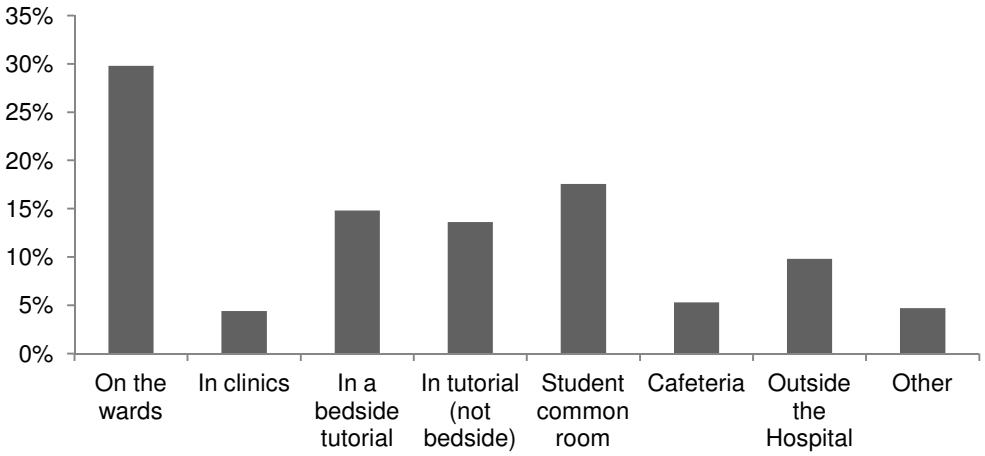

Figure 2. Reported PAL locations.

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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