Peer Assisted Learning in Undergraduate Clinical Medical Education: a mixed methods study

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Introduction: 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 (1). Medical students at Monash University are required to engage in PAL in their pre-clinical years however PAL activities in clinical placements are not formalised. This research aimed to identify students’ and educators’ use and perceptions of PAL during clinical placements to develop recommendations for PAL in clinical settings.

Methods: 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).

Results: 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 that 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 subsequent implementation framework for PAL in clinical education.

Discussion: This multi-phase 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.

Conclusion: 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, including the postgraduate level.

measures), performance phase (metacognitive monitoring measure) and self-reflection phase (causal attributions and adaptive inferences measures) were asked before, during and after completing the task, respectively. Verbal responses were recorded verbatim and afterwards coded by two independent assessors. Kappa coefficient of 0.89-0.98 was attained by two coders. Information was processed by descriptive and inferential statistics.

**Results:** Descriptive statistics showed that most participants (88.2–43.4%) reported task-specific processes for SRL measures. Multiple logistic regression analyses revealed that students who exhibited higher self-efficacy (odds ratio [OR] 1.48, 95% confidence interval [CI] 1.03–2.12) and reported task-specific processes for metacognitive monitoring (OR 9.04, 95% CI 1.37–59.64) and causal attributions (OR 9.8, 95% CI 1.96–39.34) measures were more likely to be high previous performers. Only the causal attributions measure (OR 23, 95% CI 4.57–115.76) was associated with the learning task performance. Univariate analyses demonstrated that low previous female performers had significantly lower self-efficacy beliefs than low previous male performers (p = 0.035). There were no sex differences on any of the other microanalytic measures (p > 0.05). Phi coefficient revealed significant correlations between several SRL measures within and across the three phases.

**Discussion:** We identified important associations between SRL microanalytic measures and previous biomedical science performance and subsequent performance on a biomedical science learning task. We also recognized high levels of inter-rater reliability and significant relationships between the SRL measures of three phases of self-regulation. Comparing our findings with wider context of using SRL microanalytic approaches in science learning demonstrated that a SRL microanalytic protocol can detect differences in self-regulatory processes throughout the three phases of cyclical model of SRL among participants at different levels of prior science achievement (2).

**Conclusion:** These findings have implications to offer the educators a framework for providing feedback on SRL processes which is essential for effective feedback and improving performance. There are also potential applications for directing the content of formal remediation interventions in the early years of medical school.

**References:**

#9F3 (125960)
Developing an optimal model for sequential OSCE using CTT and IRT based psychometric properties

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**Introduction:** In objective structured clinical examination (OSCE), an increase in the number of stations is associated with an increase in reliability, but is more resource-consuming. Hence, sequential testing has been proposed in which all students first participate in a short test. Students who fail this test will participate in the supplementary OSCE. The results of the screening test should be able to predict the students’ performance in the main test with a reasonable accuracy. The purpose of this dissertation was to introduce an optimal screening test based on the following factors: number of screening test stations, method of selecting screening test stations, and the cut-scores of the screening test.

**Methods:** We used two datasets from a 10-station OSCE. Psychometric properties of stations were determined according to classical test theory (CTT) and item response theory (IRT). Then, several hypothetical screening tests were designed with different numbers of stations (three modes), different psychometric properties (5 modes in CTT and 2 modes in IRT), and different cut-scores (two levels: normal and stringent). Each hypothetical screening was compared to the main test. A desirable composite outcome was defined for each screening test, comprising of: passing percentage of more than 50%, positive predictive value (PPV) equal to one, and negative predictive value (NPV) greater than 0.25.

**Results:** The OSCEs failure rates were 5.7% (n=6) and 10.9% (n=29) in 2011 and 2013, respectively. According to CTT-based screening tests, 20 out of 60 hypothetical OSCEs yielded the desirable outcome. Fourteen out of these 20 tests had stringent pass levels. The number of stations were as follows: 9 tests had five stations, 5 tests had four stations and 6 tests had three stations. According to IRT-based screening tests, 2 out of 6 OSCEs had the desirable outcome. Both these tests were composed of stations with high discrimination value and had stringent cut-score. One test had 5 stations, and the other had 4 stations.

**Discussion:** We proposed and evaluated an optimal model for the sequential design of an OSCE. While several studies have investigated different aspects of sequential OSCE, we believe this dissertation adds to the existing literature in several ways: For designing the screening OSCEs, we simultaneously considered three factors: number of stations, criteria for selection, and the cut-off score. None of the previous studies have taken all three parameters into account in their model. We also defined a composite outcome for evaluating the accuracy of the screening tests, while previous studies have considered various separate
outcomes without providing one single measure on which a decision can be based.

**Conclusion:** According to the results of this dissertation, sequential testing can be an efficient and feasible method for conducting OSCEs. In order to design screening OSCEs with minimal error, good accuracy, and economic efficiency the following factors must be considered: selection of stations based on discrimination coefficient or item total correlation (ITC) in CTT or discrimination parameters in IRT, and applying stringent cut-scores. If students pass such a screening test, one can be completely confident that they are truly competent candidate and no further testing is needed for them.

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Using Cognitive Load Theory to Understand and Improve Handovers

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**Introduction:** Transfers of patients from one physician to another (handovers) are ubiquitous and occur with increasing frequency. Handovers are a common source of communication failures, which lead to medical errors and harm to patients. Considerable attention has focused on interventions to improve patient safety during handovers. While interventions that bundle current best practices have resulted in reduced errors and improved educational outcomes, handovers remain a common source of error. Addressing the cognitive complexity of a patient handover can help develop new strategies that support learning and further improvements in patient safety. Informed by Cognitive Load Theory (CLT), we examine the cognitive challenges that trainees face when learning how to perform a handover. This work advances understanding of how cognitive load can be measured and managed during a handover.

**Methods:** This thesis used multiple methodologies. An AMEE guide (1) and subsequent analysis of handovers through the lens of CLT yielded a conceptual model of sign-out between the sending and receiving clinician. This conceptual model then informed two studies that described the development of a cognitive load inventory for handovers and collected evidence for validity. An experiment with early and advanced medical students explored the relative influence of learner knowledge and patient complexity on information loss and distortion during simulated handovers. A final study reported on a CLT-informed intervention to balance the mental workload associated with outpatient panels during the academic year-end handover of psychiatric continuity clinic patients.

**Results:** This work explored the implications of CLT for handovers education. Hypothesized drivers of intrinsic, extraneous, and germane load during a handover were identified. We demonstrated how current best practices primarily focus on reducing extraneous load. Managing intrinsic load and optimizing germane load are relatively under-addressed. Validity evidence obtained for the two versions of a cognitive load inventory for handovers yielded mixed results, with consistent support for the intrinsic load items, conflicting results on germane load, and poor performance by the extraneous load items. The experiment with early and advanced medical students suggested that learner knowledge influenced information loss and distortion more so than patient complexity. Our CLT-informed intervention showed that, compared to the traditional method, the workload-balancing method generated lower inter-caseload variation for each mental workload factor. The method reduced overall inter-caseload variation by 50%–61% in each of the four intervention years. (2)

**Discussion:** Examining handovers through the lens of CLT identified sources of cognitive load currently not addressed by best practices. The validity evidence collected for the cognitive load inventories highlighted construct challenges within CLT such as whether germane load is best understood as a separate type of load or a subset of intrinsic load. Learner knowledge may be more important than patient complexity in explaining information loss and distortion during a handover. If replicated, this has important implications for next generation handover instructional technique and protocols, including how clinicians are certified as competent. CLT-informed interventions have been demonstrated to be viable and sustainable in contexts such as the academic year-end handover.

**Conclusion:** Using CLT as the primary framework and lens, this thesis identifies the drivers of cognitive load during a handover, reports results of initial efforts to measure load types during a handover, and explores the interaction of learner knowledge and patient complexity in explaining information loss and distortion during a handover. The thesis also demonstrates a practical application of CLT to academic year-end handovers. The application of CLT to handovers suggests novel targets for the next generation of handover curricula and protocols.

**References:**
A cutting culture: why do women remain underrepresented in surgery?

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Introduction: Women form the majority of medical students in many countries worldwide. Over the last 25 years, this demographic change has also affected the proportion of female doctors in almost all medical specialties, with the notable exception of surgery. In the UK, only 7% of fully-trained surgeons are female. The emphasis of existing research has been on descriptive demography, an individualist approach to career decisions, and a biological definition of gender. This thesis aimed to move beyond these studies to a sociocultural understanding of how medical students and doctors build their careers, with particular reference to women in surgery.

Methods: The main theoretical framework of this thesis is Figured Worlds(1), an amalgam of sociocultural theories comprising elements from Vygotsky, Bakhtin and Bourdieu. Figured Worlds is a theory of ‘identity in practice’, meaning it concerns itself with how identity is constantly negotiated within sociocultural contexts. This qualitative thesis took a sociocultural approach to explore reasons underlying women’s underrepresentation in surgery, comprising four separate research studies: 1. A secondary analysis of interviews exploring clinical medical students’ experiences of surgery using Communities of Practice theory(2). 2. A constructivist grounded theory study exploring the hidden curriculum of surgical careers 3. An exploration of medical students’ stereotypes, ideas and preconceptions of surgeons and surgery 4. A Figured Worlds discourse analysis of women surgeons’ identities

Results: The figured world of surgery was strongly gendered; its culture privileged masculine dispositions and characteristics. Female medical students had differing access to the hidden curriculum of surgical careers and differing and negative experiences of the practice of surgery; the consequently struggled to imagine a future place for themselves in the career. For those women who were surgeons, being a surgeon and being a woman existed in discursive competition, making it difficult to combine the two; there was little discursive space to be a woman in surgery. Some women, through innovative ‘identity work’, successfully created new discursive spaces to be women-surgeons.

Discussion: Surgical culture was strongly masculine, which meant feminine dispositions and characteristics were disprivileged. Although a minority of women were creating new ways to be female in the masculine surgical domain, the prevailing discourses remained strong. Surgeons were required to fit the existing ideals in order to be legitimate in the surgical world, and did so by embodying the masculine ideals such as confidence, decisiveness and proactivity. The empirical findings of this thesis suggest that unless the discourses of surgery diversify to encompass other ways of being a surgeon, women will continue to be an underrepresented group.

Conclusion: The strongly gendered and reproductive nature of surgical culture means challenge to the status quo is difficult, and change slow. Women have differing and negative experiences of surgery, are unwilling or unable to access participation in the domain, and struggle to identify as surgeons. Surgery as a field must actively broaden its discourses of success, actively engage women and widen participation or risk recruitment crisis.