



INTERNATIONAL JOURNAL OF CLINICAL SKILLS



A Peer Reviewed International Journal for the Advancement of Clinical Skills
- *'docendo ac discendo'* - *'by teaching and learning'*



In this issue:

Emotion and concealed motivation in the clinical interview

Peripheral cannulation: what's the benefit and what's important?

Adapting clinical skills training to an Arabian Gulf setting

Role of clinical nurse educators in medical education

Simulation learning in health care

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The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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Foreword

Clinical skills change lives...



Dr. Abigail Boys & Regina (October 2010)

Amidst the fast paced achievements in international healthcare and education, it is important not to forget what clinical skills mean in reality for our patients – clinical skills change lives.

After having initiated the charitable society Willing and Abel in 2008, many health care professionals have had the pleasure of using their specialised and expert clinical skills to help children of developing nations requiring specialist surgery. An example is 13 year old Regina who was born with a tumour fatally spreading across her face (congenital lymphangioma) – she successfully underwent major surgery at The Royal London Hospital (United Kingdom) in December 2010 and now continues to lead a normal life in Ghana, West Africa (www.bbctelevision.co.uk).

Such success exemplifies a fundamental strength of the clinical skills community in its ability to evolve and adapt to meet the challenges and expectations of a modern healthcare arena. Healthcare professionals need to have clinical skills training which will allow them to meet present and future challenges, which include an ageing population, multiple morbidities and increasing patient expectations.

There is no doubt that the International Journal of Clinical Skills provides an excellent forum for the global healthcare community to further clinical skills research, as well as advancing the training of students, academics and health professionals. I wish the International Journal of Clinical Skills continued success for its admirable work in this important field.

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A 'near-peer' assisted learning approach to teaching undergraduate basic surgical skills

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Abstract

Objectives: The benefits of peer and near-peer assisted learning (PAL and NPAL) are recognised across numerous areas of medical education, and particularly in the USA. However, no literature currently exists as to their effectiveness in teaching basic surgical skills to medical students. This prospective study assessed the efficacy of UK Foundation Year 1 doctors writing and teaching a pilot surgical skills course to senior medical students.

Design: The course comprised single sessions covering the theoretical and practical components of: surgical scrubbing and patient positioning, suturing & knot tying, minimal access surgery and minor surgical procedures e.g. skin excisions. 30 students enrolled onto the course. Student outcome measures comprised online case-based assessments and a pass/fail objective structured clinical examination (OSCE); tutor outcome measures comprised a competence and attitudinal parameter questionnaire.

Results: Significant improvements in online assessment scores were demonstrated for each course component (scrubbing and positioning 34.2%, suturing and knot tying 42.8%, minimal access surgery 30.1% and minor surgical procedures 58.5%; $p = 0.000$). There were no differences between undergraduate entry and postgraduate entry students. All students passed the OSCE. Qualitative improvements were reported in tutor skills and teaching parameters.

Conclusions: Foundation Year 1 doctors can develop and teach a near-peer assisted course to significantly improve the knowledge and basic surgical skills of students and tutors alike. We advocate its development and further assessment in both undergraduate and postgraduate surgical education.

Introduction

Peer Assisted Learning (PAL) is defined as an approach in which, 'people from similar social groupings who are not professional teachers help each other to learn and learn themselves by teaching' [1]. Its efficacy in numerous areas of medical education, including that of teaching clinical and laboratory skills to medical students [2 – 5] have been well documented, having found particular favour in the USA. Its unique approach has been shown to modulate numerous psychological parameters (such as levels of stress) facilitating the acquisition of knowledge and skills for both tutee and tutor alike [6, 7]. Indeed, its efficacy is not confined to the student; a number of studies have demonstrated the significant educational and psychological benefit to tutors [8].

The terms 'peer' and 'near-peer' are often used interchangeably in numerous studies. The definition of 'near -peer' has recently been described by Bulte et al [9] as 'one of the same level of education as the tutee, but one to two years their senior within the same broad grade.' Thus far no studies have assessed either a peer or near-peer method of teaching basic surgical skills at the undergraduate level.

Surgical education and training in the UK, Europe and USA has changed greatly over recent years. Whilst the demonstrable acquisition of both surgical and educational skills are essential components of professional development, reforms of undergraduate and postgraduate training (particularly the advent of the European Working Time Directive and UK Modernising Medical Careers, with more trainees competing for fewer training hours), combined with reductions in educational resources, have reduced the opportunities for students and trainees to engage in such activities in the UK [10], with similar problems amid residency training reported in the USA [11].

Consequently, earlier introduction of surgical skills and teaching programmes have become widely advocated and shown to be successful [9, 12, 13]. However, no evidence currently exists as to whether a near-peer approach is effective in teaching undergraduate basic surgical skills. This study aimed to assess the potential of a near-peer approach in this regard, by assessing its efficacy in a course, developed and delivered by Foundation Year 1 (FY1) doctors, in teaching basic surgical skills to senior medical students.

Methods

Study design

This was a prospective study, taking place at a UK district general hospital.

Course design

To maximise the hypothesised educational benefits of PAL, the course incorporated Harden's twelve roles of the teacher (Figure 1) [14].

Figure 1: Harden's 12 roles of the teacher – the course aimed to enable each tutor (FY1 doctor) to act in each of the roles from inception of their module to its completion [17]

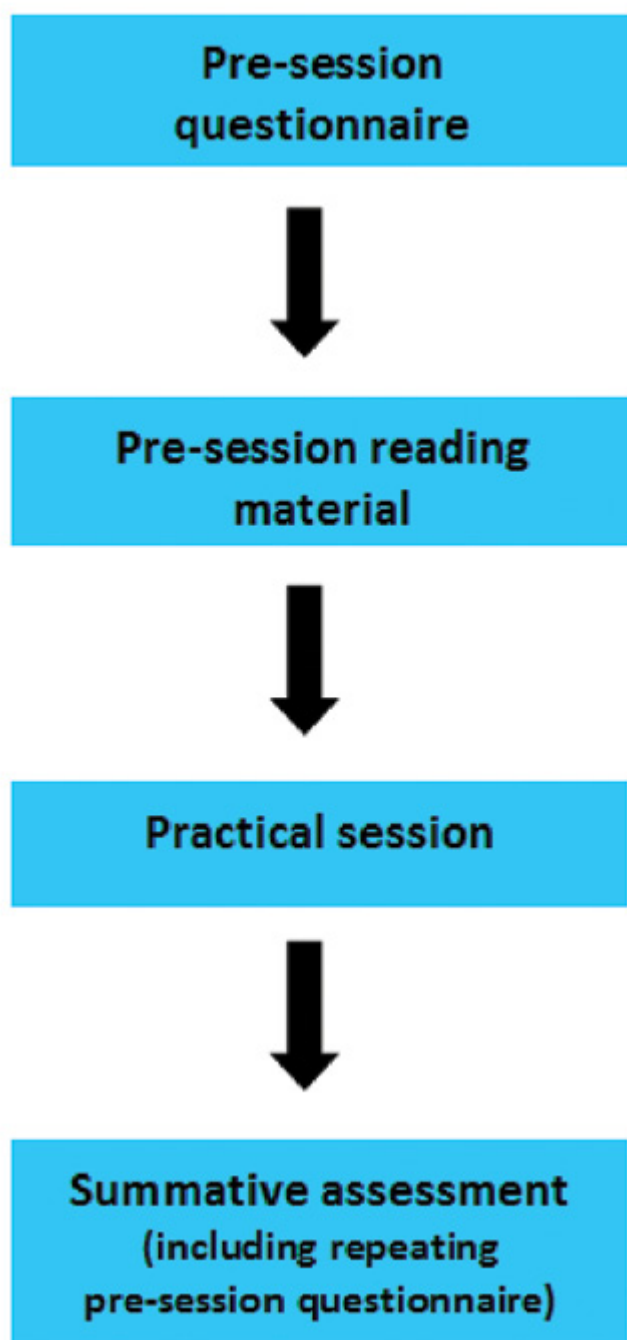
Harden's 12 Roles of the Teacher	
(1)	Lecturer
(2)	Teacher – clinical
(3)	Role model – clinical
(4)	Role model – teaching
(5)	Tutor / mentor
(6)	Learning facilitator
(7)	Examiner
(8)	Evaluator
(9)	Planner
(10)	Organiser
(11)	Developing study guides
(12)	Developing learning resource material

Five 3 hour sessions ran over sequential weeks, with each session covering a different aspect of basic surgical skills: scrubbing and patient positioning, suturing & knot tying, minimal access surgery, minor surgery, and a final OSCE assessing all of the aforementioned components. Foundation Year 1 (FY1) doctors (postgraduate) were recruited at random from those responding to an e-mail advertisement within the hospital deanery. They proceeded to act as a tutor for each session and examiner for the final OSCE assessment. Each tutor developed the pre-course online questionnaire and study material. To ensure educational validity, each was allocated a consultant (attending) general surgeon who oversaw all aspects of the session. The course ran twice, with a total 30 medical students studying at the University of Nottingham (UK) enrolled. Of these, 13 were on the undergraduate course, and 17 on the postgraduate course/graduate entry course.

Outcome measures

Outcome measures for students were: knowledge and skills (assessed by online assessments and an OSCE respectively) and for tutors knowledge and attitudes (assessed by a 5-point Likert questionnaire). Prior to each session, students sat an online multiple choice assessment of their initial knowledge of the topic (Figure 2). Subsequent to completing this they gained access to the pre-session online study material. Taking approximately 30 minutes to complete, this included videos, diagrams and reading material covering the theoretical and practical aspects of the session's topic (derived from the students' undergraduate curriculum). Students then attended a 3 hour session involving consolidation of the study material, and interactive demonstration of practical skills. A final pass/fail OSCE was used to assess the acquisition of practical skills and theory, with five stations (each 6 minutes in duration) assessing ability to scrub, perform interrupted, continuous and subcuticular suturing and instrument ties, placement and insertion of laparoscopic ports and excision of a simulated benign skin lesion. Students were then asked to retake their original pre-session online assessments during this final session.

Figure 2: Each week of the course began with a pre-session questionnaire available online 6 days before the practical session. Once the student had completed this, they were able to gain access to the online reading material for that particular topic. They would then attend the practical session at the end of the week and re-sit the same online questions as part of the final OSCE



The educational experience of the tutors (n = 10) were quantified by means of a knowledge and 5-point Likert questionnaire completed following the course (Table 1). The response rate to this questionnaire was 100%. All responses (100%) were positive with 0% of respondents reporting either 'neither agree nor disagree', 'disagree' or 'strongly disagree' to any question asked.

Table 1: Tutors' educational experiences (5-point Likert scale defined as (1) Strongly disagree, (2) Disagree, (3) Neither agree nor disagree, (4) Agree, and (5) Strongly agree)

Theme	Mean score (maximum 5)	Range
My overall confidence in lecturing / teaching to groups has been improved by this course	4.6	4 - 5
I feel more confident in demonstrating and teaching skills	5	5
I feel more confident in assessing and appraising skills and knowledge	5	5
I feel that my own surgical skills have improved	4.6	4 - 5
This course has increased my desire to undertake further teaching	4.4	4 - 5

Data were analysed with SPSS for Windows® (version 17.0.0). The Kolmogorov-Smirnov test was used to confirm the parametric nature of the data, with subsequent use of paired and independent t-test as appropriate.

Full consideration was given to the ethics of this research; after correspondence with the University Surgical Society, it was judged that ethical approval was unnecessary as this study should be classed as a course for medical student training.

Results

All 30 students attended each session, completed the course and passed each component of the OSCE. All 30 students completed the pre- and post-session assessments.

Knowledge outcomes

All 30 students (100%) completed the final knowledge assessment. Significant improvements in knowledge was seen for each component of the course (p = 0.000). Mean improvements were 32.2% for scrubbing and positioning, 42.8% for suturing and knot tying, 30.1% for minimal access surgery, and 58.5% for minor surgery (Table 2). Nature of entry to medical school (undergraduate versus post-graduate) did not affect any aspect of assessment in any area (pre-course marks, post-course marks and overall improvement). Scores improved for all students in all sessions.

Table 2: Knowledge outcomes. This table shows the pre- and post-course marks for the online theoretical component of the course. Significant improvements in pre- and post-course marks were seen in across all sessions

Session	Degree course	Pre-course mean mark (%)	Post-course mean mark (%)	Mean improvement (%)	Significance
Scrubbing & positioning	Undergraduate	41.6%	65.6%	27.5%	
	Postgraduate	36.3%	72.2%	38.4%	
	Overall	38.6%	69.9%	32.2%	0.000^d
	P value	$p = 0.934^a$	$p = 0.499^b$	$p = 0.185^c$	
Suturing & knot tying	Undergraduate	19.8%	55.9%	42.1%	
	Postgraduate	22.1%	61.6%	43.2%	
	Overall	21.1%	59.6%	42.8%	0.000
	P value	$p = 0.455$	$p = 0.772$	$p = 0.932$	
Minimal access Surgery	Undergraduate	29.0%	60.0%	37.4%	
	Postgraduate	30.0%	55.2%	26.2%	
	Overall	29.2%	56.7%	30.1%	0.000
	P value	$p = 0.914$	$p = 0.986$	$p = 0.100$	
Minor Surgery	Undergraduate	24.3%	72.3%	50.4%	
	Postgraduate	17.4%	75.1%	62.8%	
	Overall	20.1%	74.1%	58.5%	0.000
	P value	$p = 0.852$	$p = 0.809$	$p = 0.294$	

a - Independent t-test (significance of difference in pre-course scores between undergraduate and postgraduate entry students)

b - Independent t-test (significance of difference in post-course scores between undergraduate and postgraduate entry students)

c - Independent t-test (of difference in improvements between undergraduates and post-graduates)

d - Paired t-test (significance of overall improvement)

Practical Outcomes

Each OSCE station had a practical task graded as either a pass or fail (Table 3). All 30 candidates completed all 5 tasks successfully (100% pass rate).

Table 3: The OSCE examination consisted of 5 stations. An overall pass or fail grade was awarded for each practical station according to the examiner's mark scheme. 100% of the students (n = 30) passed each of the practical stations. Results of the online questions can be seen in Table 2 as post-course marks (pt = patients)

OSCE STATION TOPIC	SPECIFIC QUESTIONS
STATION 1: Scrubbing & patient positioning	<ul style="list-style-type: none"> On the diagram of the hand, which two areas are most commonly missed when scrubbing? Adjust the theatre table and model into a known operating position of your choice and name 3 specific complications attributable to that position? Please aseptically apply a set of surgical gloves
STATION 2: Suturing & knot tying	<ul style="list-style-type: none"> Choose 2 absorbable and 2 non absorbable sutures from the supply in front of you Please perform an instrument knot tie Please perform a one handed knot tie Please perform a mattress suture and give 2 indications for its use
STATION 3: Minimal Access Surgery	<ul style="list-style-type: none"> Describe possible contraindications and post operative complications of minimal access surgery Describe how to position and then place the initial port site Use the camera to find all 5 objects within the abdomen Please stack 3 cubes on top of each other
STATION 4: Skin excision & minor surgery	<ul style="list-style-type: none"> Please name the three lesions on seen on the card What risks should the patient be warned about with regard to excising this lesion? Please describe a suitable local anaesthetic agent and dose and demonstrate its application on the model Mark on the model your excision area and how you calculated this Please excise the lesion, perform appropriate sutures and describe what post operative instructions you would give the pt?
STATION 5: Online Questions	<ul style="list-style-type: none"> Please complete the online questions on the computer

Tutor outcomes

Tutor outcomes were highly favourable, with the course reported unanimously as 'definitely' (5/5) improving both the ability to teach skills and to assess and appraise. The tutors also reported that the course 'probably' to 'definitely' improved their own basic surgical skills and their desire to undertake further teaching (4.6 and 4.4/5.0 respectively) (Table 1).

Discussion

Our study of a pilot course has demonstrated that a 'near-peer' approach to teaching medical students surgical skills may be efficacious in improving both their underlying theoretical knowledge and practical basic skills. We also found strong subjective improvements in the basic surgical skills of the course tutors, their teaching and examination skills and attitudes towards teaching. Whilst a Peer Assisted Learning (PAL) approach has been previously shown to improve the teaching of clinical skills [2, 15] this is the first description to our knowledge of a similar approach in teaching undergraduate surgical skills.

It has been shown that medical students can have vast variations in their exposure to, and competence with, surgical procedures. In fact up to 92% are reported to fail to perform at least one basic procedure during their surgical attachment [16]. There is also growing concern in postgraduate surgery that newly qualified surgical trainees are not achieving the necessary skills training as a consequence of working hour restrictions and the increasingly complex nature of new procedures [10, 11]. Therefore bodies such as the American Surgical Association have publically stated their support for early exposure to surgical techniques and the introduction of new teaching methods at the undergraduate level to try and counteract this problem [17].

The literature shows that teaching medical students surgical skills may have far reaching effects including greater confidence on wards [18], together with objectively increased skills and improved perceived ability to commence work. The implementation of short surgical skills courses not only enables a basic acquisition of skills, but in fact can enable them to become comparable with established surgical trainees [19]. Such courses may also increase surgical career aspirations and recruitment into national surgical training programmes [18, 20].

Whilst the case for undergraduate surgical skills courses is strong, who is best placed to provide them is less well defined. Increasing demands on senior clinicians' time, potentially diverting them from training to service provision, and continually evolving undergraduate curricula, provide universities with a complicated problem. However, a recent paper by Rodrigues et al [21] discussed and highlighted the potential benefits and feasibility of using Foundation doctors as a near-peer teaching solution on a regional scale within the UK. A common criticism of PAL is that its quality of teaching may not be comparable with that provided by more senior staff. However, PAL in a clinical skills setting has been shown on numerous occasions to be similarly effective as traditional senior-lead teaching [5, 15], and in the authors' opinions Foundation doctors are well placed to act as such (near) peers.

Although this study was not designed to ascertain the possible mechanisms of the effects seen, it has previously been postulated that students have significant anxiety towards the acquisition of practical skills [22, 23]. PAL has been shown to significantly reduce this anxiety [24] and promote a 'safe' environment in which to learn skills [25]. A second process through which such teaching may exert its effect is that of fostering a sense of collaboration within groups of students [3, 26]. This process, termed 'promotive interaction' is described as one in which a group encourages and facilitates its members' learning in order to achieve common goals [27]. We would hypothesise that these aspects were augmented within our course because unlike many formative undergraduate examinations, its assessments were graded as pass or fail, with students unaware of their final mark or questionnaire scores.

We also confirmed previous findings (outside surgical skills) that PAL can be beneficial to both students and tutors alike. In our course the tutors were encouraged to use examples from their own clinical practice and experience in their teaching programmes. Jamshidi described the significant interest in teaching shown by junior surgical doctors and how enabling them to teach amplifies their own education interests and effort [28]. Our study demonstrated similar benefits, in addition to perceived improvements in tutors' technical skills. Possible underlying mechanisms have previously been described for this consolidation and improvement in tutors' skills. Such mechanisms are interactive, involving iteration and reciprocal feedback from the students themselves, with tutors more motivated to acquire knowledge and skills in order to teach them, rather than merely be tested [29, 30].

In addition, our course incorporated a significant component of e-learning in its structure. Undergraduate curricula are constantly evolving in the face of challenges and utilise various new techniques to this end. E-learning is one such method, with students rating it highly as an educational technique for the acquisition of clinical skills [31]. Web-based procedural skills courses have also been shown to improve confidence in dealing with problems in on-call situations for newly qualified doctors [32]. In a postgraduate setting, e-learning is also becoming increasingly popular with universities and surgical colleges in providing surgical training, and uptake is expected to increase further [33].

As discussed, a potential weakness of PAL is teaching quality, as it is by necessity delivered by a non-expert. However, the efficacy of PAL tutors has been suggested to be due to a process of facilitation rather than traditional teaching and, as described earlier, proven to be of equal efficacy to traditional methods of teaching clinical skills. In this study, by using consultant (attending) surgeons as supervisors to oversee all components of the course, we would suggest that we were able to exploit this process of facilitation whilst ensuring the accuracy of the knowledge and skills taught. We also feel that their involvement may be further beneficial via acting as possible surgical mentors to medical students – a key factor in undergraduate surgical education [17].

Future recommendations

As this was a pilot programme, the study populations of students and tutors were by necessity small, and our findings shall require confirmation with larger courses. Such courses shall also allow comparison of the PAL approach with equivalent courses taught by more traditional senior-based methods; this control shall also allow assessment of the interesting observation that PAL can sometimes occur within and between students of such courses [34]. Furthermore, it shall be possible to include a control group, which undertakes the pre- and post-sessions assessments without receiving PAL; this shall be able to assess for any 'method-learning' rather than 'direct teaching' effect. Further courses shall also allow better delineation of skill acquisition, including parameters such as time taken to perform a task [12].

Conclusions

Our study has provisionally shown that a 'near-peer' approach may be an effective and novel approach in teaching undergraduate basic surgical skills, and that it may also confer subjective benefits in knowledge, skills and teaching abilities to peer tutors. The benefits of 'learning to teach' have been well described, as have the implications for reductions in training opportunities in surgical training. Further work shall better establish the efficacy and mechanisms of this approach, and determine whether incorporating it into undergraduate and early postgraduate education and existing courses may go some way to meeting the current challenges in providing tomorrow's surgeons with core skills. It shall also allow assessment of its role in teaching of similar technical skills within other disciplines and health professions.

Declarations

The authors have no financial or other interests to declare in relation to this paper.

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