

Research Article

Should Surgical Skills Be Taught in the Medical School Curriculum? Insights from a Peer-Led Suturing Course for Medical Students

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Abstract

Background: Teaching surgical skills to medical students through peer-assisted learning has been shown to be efficacious in settings where participants are entirely voluntary. However, the efficacy of such courses when implemented into sanctioned medical school curricula is not well understood. Here, we describe a partly mandatory suturing and knot-tying course, with the goal of assessing the efficacy of peer-assisted learning to increase surgical competence as well as interest in surgery.

Materials and methods: A two-day suturing and knot-tying course was offered to second-year medical students as an option to fulfill their required elective course enrollment. The course was led by experienced second- and third-year medical students. Pre- and post-course questionnaires (Likert scale 1-5) were administered and mean scores were compared. Open-ended questionnaires were used to gather student feedback. The course took place at the clinical skills center at The Ohio State University College of Medicine. Twenty-eight second-year medical students enrolled in the course.

Results: Mean self-reported competence increased significantly for all suturing and knot-tying skills ($p < 0.0005$). Mean interest in surgery did not show a significant change pre-course (Likert=3.3/5) compared to post-course (Likert=3.6/5; $p > 0.05$). Overall, students reported very positive feedback regarding the course design and peer-assisted instruction.

Conclusion: Peer-assisted learning is an effective method of teaching surgical skills to medical students. However, not all benefits (i.e., interest in surgery) may carry over when implemented as a part of the sanctioned medical school curriculum. We recommend that surgical instructors take these findings into consideration when designing future courses.

Keywords: Peer-assisted learning; Medical student; Suturing; Knot-tying; Surgical skills; Education

Abbreviations

PAL: Peer-Assisted Learning; OSUCOM: Ohio State College of Medicine; NS: Not Significant

Background

There is growing concern that medical students are receiving insufficient surgical education [1]. This negatively impacts the ability of those entering surgical careers to perform well in residency and beyond. Moreover, lack of surgical exposure may reduce the recruitment of medical students into surgical careers [1]. Teaching surgical skills is a time-intensive task, making it difficult for attending physicians to teach medical students. To combat this issue, medical

students have taken it upon themselves to improve their surgical skills. Peer-Assisted Learning (PAL) is a technique in which teaching sessions are led by students' peers or those who are marginally more senior. This approach has been utilized by student-led groups to fill in the gap of surgical education. It has been demonstrated to be effective in teaching surgical skills, with benefits including high tutor: student ratio, a relaxed environment, and the ability to teach more students [2-4].

Given that PAL has been shown to be efficacious, it has been argued that PAL should be integrated into medical school curricula [5]. Unfortunately, the majority of studies to date have examined the efficacy of PAL to teach surgical skills in the setting of extra-curricular groups, where student enrollment is completely voluntary and students are frequently interested in a surgical career prior to course enrollment [6]. While many graduate medical education programs have begun to implement mandatory surgical skills courses, a clear gap in the literature exists regarding mandatory surgical skills courses in the medical school curriculum. Here, we describe a peer-led suturing and knot-tying course for second-year medical students and discuss its impact on students' self-perceived surgical competence and interest in surgery.

Materials and Methods

Twice a year, second-year medical students at the Ohio State

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College of Medicine (OSUCOM) are required to participate in an elective course. Students are provided with approximately 10 courses which they rank according to their preference. Students are then assigned to courses based on these rankings. Our introduction to surgical suturing and knot-tying course was held as one of these courses. The course was designed to provide students with an introduction to hands-on surgical suturing and knot-tying, with the goal of increasing technical competency and interest in surgery.

The course consisted of two sessions that were held on consecutive days, each being approximately three hours in length. The course was taught by senior medical students from OSUCOM who had previously completed the course for a teacher: student ratio of 1:4. The course covered the basics of surgical suturing and knot-tying techniques (Table 1). The supplies and the workspace were provided by the medical school. Students used knot-tying boards, scissors, needle drivers, forceps, and various sutures. Suturing was performed on ham hocks. Students completed a questionnaire before the course and within one week following course completion. The pre-course questionnaire collected information regarding demographics, handedness, prior experience, interest in surgery and self-perceived competence to perform certain sutures/knot-ties. The post-course questionnaire included identical questions related to self-perceived competence and interest in surgery, in addition to providing students the opportunity to provide course feedback.

Two-tailed unpaired t tests were performed to compare pre-and post-course data. Statistical analyses were performed on Microsoft Excel (Microsoft, Redmond, WA, USA). Graphs were made using Prism 9 software (GraphPad, La Jolla, CA, USA). Statistical significance was set at $p < 0.05$.

Results

Twenty-eight second-year medical students attended the course. The pre-course questionnaire was completed by 25 students (89%) with an average age of 24.3 years (range: 23 to 30 years). Of those that filled out the pre-course questionnaire, sixteen students were male (64%). Twenty-one students (84%) were right-handed, three left-handed (12%) and one ambidextrous (4%). Nine students (36%) reported previously scrubbing into a surgery. Seven students (28%) reported prior experience with suturing and/or knot-tying. The post-course questionnaire was completed by 22 students (79%) within one week of course completion.

Interest in surgery was assessed using a 1-5 Likert scale (1=no interest, 2=a little interest, 3=average interest, 4=very interested, 5=planning to pursue as a career). Student self-perceived competency to perform certain suturing and knot-tying skills was assessed using a 1-5 Likert scale (1=far below average, 2=somewhat below average, 3=average, 4=somewhat above average, 5=far above average). Students showed a significant improvement in their self-perceived competency to perform simple running/continuous sutures (Likert score +2), interrupted sutures (+2.2), deep dermal sutures (+2.4), one-handed knot tie (+1.8), two-handed knot-tie (+2.1), instrument tie (+2.3), and

handling suturing instruments (+2.3) upon completion of the course ($p < 0.0001$). Pre-course compared to post-course competency scores are summarized in Figure 1. Interestingly, mean interest in surgery did not significantly change pre-course (mean Likert=3.3, SD=1.1) as compared to post-course (mean Likert=3.6, SD=1; $p > 0.05$; Figure 2).

Feedback for the course was assessed on a 1-5 Likert scale (1=strongly disagree, 2=somewhat disagree, 3=neither agree nor disagree, 4=somewhat agree, 5=strongly agree). Overall feedback for the course was overwhelmingly positive. Nearly all students strongly agreed that they would recommend the course to a colleague (mean Likert=4.9), that the course was well paced (mean Likert=4.7) and that the course was well organized (mean Likert=4.7). Regarding the peer-taught aspect of the course, nearly all students strongly agreed that they would attend another peer-taught workshop (mean Likert=4.7), that peer instruction helped their learning (mean Likert=4.6) and that the course had knowledgeable teachers (mean Likert=4.9).

Discussion

Peer-assisted teaching of surgical skills is efficacious, so much so that authors have argued for its integration into sanctioned medical school curricula. However, most surgical education courses for medical students evaluated in the literature have been elective nature.

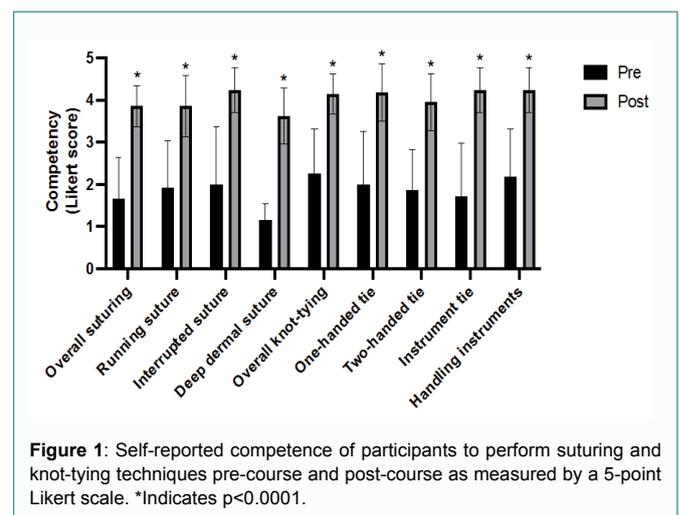


Figure 1: Self-reported competence of participants to perform suturing and knot-tying techniques pre-course and post-course as measured by a 5-point Likert scale. *Indicates $p < 0.0001$.

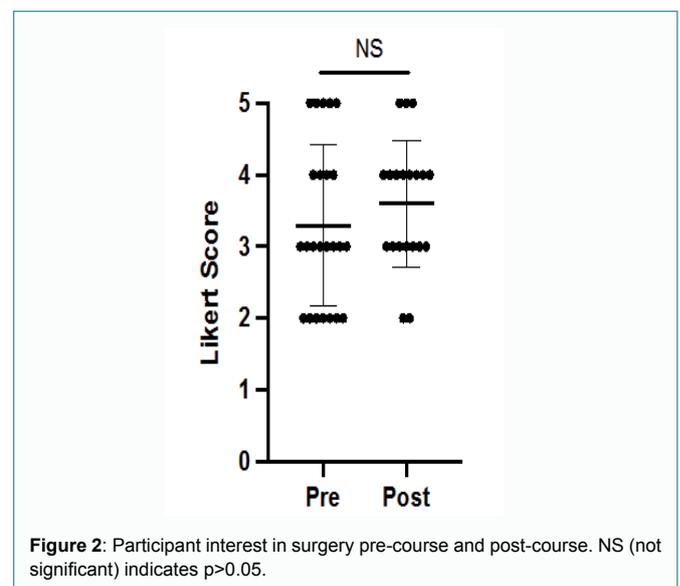


Figure 2: Participant interest in surgery pre-course and post-course. NS (not significant) indicates $p > 0.05$.

Table 1: Table showing an outline of the course curriculum.

Pre-course surveys distributed and completed prior to course start.	
Day 1	One-handed knot tie; Two-handed knot tie; Instrument tie; Handling suturing instruments.
Day 2	Simple running suture; Simple interrupted suture; Deep dermal suture.
Post-course surveys distributed and completed within one week of course completion.	

In the present study, we show that peer-led teaching of suturing and knot-tying in a semi-mandatory course leads to increases in self-reported competency of surgical techniques, though interest in surgery remains unchanged.

Numerous prior studies have demonstrated the efficacy of peer-assisted teaching of surgical skills through both subjective and objective assessments [3,6-8]. Bennett et al. [6] reported that following a half-day surgical skills course led by senior medical students, students (n=70) reported a significant increase in their confidence to perform knot-tying, interrupted sutures, continuous sutures, and vertical mattress sutures. Similarly, students in our course reported a significant increase in competency across all skills taught. Suturing and knot-tying are important skills to have—for students starting their surgical residency, medical students entering their surgical rotations, physicians in the emergency medicine field, and even for some providers in outpatient clinics. Peer-assisted learning represents an efficacious way to teach medical students these skills without having to rely on time-constrained faculty. This may allow for more surgical courses to be taught in medical school, which is important as there is evidence that medical students are graduating with insufficient surgical education [1].

Many studies have also demonstrated that early exposure to surgery through peer-led surgical skills courses significantly increases student interest in entering a surgical career [6,7,9]. Following a half-day surgical skills workshop that included suturing and knot-tying, Patel et al. showed that 29 of 33 medical students reported that the course increased their interest in surgery [9]. Interestingly, surgical interest did not significantly increase following completion of our course. This may be due to our course being part of the mandatory medical school curriculum, whereas courses reported in the literature have been performed in an entirely extracurricular setting [3,6,7]. That is, student enrollment in these courses is completely voluntary, thus risking self-selection bias; students are more likely to already be interested in surgery and more readily agree that participating in the course bolstered their surgical interest. Though our course was not entirely mandatory, as students could choose to enroll in different courses, students did report an “average interest” in surgery pre-course. This may indicate that selection bias was minimized. This provides some level of evidence that integrating surgical skills courses into the mandatory medical school curriculum may not demonstrate the same results as what has been seen from elective courses.

Conclusion

To our knowledge, this is the first description of a semi-mandatory peer-assisted suturing and knot-tying course for medical students in their preclinical training. Here, we demonstrate that while peer-assisted teaching of suturing and knot-tying increased the self-perceived competency of second-year medical students, interest in surgery was unaffected. These data suggest that while PAL is effective to teach surgical skills, integration into the pre-clerkship medical school curriculum may not result in the same outcomes as entirely elective courses. These results should be considered when designing future surgical skills courses. Future studies should evaluate the efficacy of similar courses when administered as an entirely mandatory medical school requirement.

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