Student vs. Resident Instructor Effectiveness In Teaching Basic Laparoscopy Tasks

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ABSTRACT

INTRODUCTION

This study is designed to assess if medical students can teach basic laparoscopic skills to their peers as adequately as surgical residents, and if early exposure to laparoscopic skills training can promote interest in surgical careers. As students have more access to their peers than residents, the utilization of peer instructors can provide students with more opportunities for guided practice and promote the development of peer-led curriculums.

METHODS AND PROCEDURES

Medical school students were recruited via email to participate in laparoscopic simulation workshops, blinded to instructor experience. Participants watched introduction videos for peg transfer and pattern cutting tasks and completed a pre-study questionnaire including demographics, interest in a surgical speciality, and previous exposure to laparoscopy. Student instructors practiced laparoscopic tasks and successfully completed the tasks according to Fundamentals of Laparoscopic Surgery (FLS) standards. Instructors were given open-ended guidelines to teach laparoscopy skills. Participants underwent 30-minute practice sessions for each task guided by either the student instructors or surgical residents, followed by a testing session. A post-study survey assessed changes in interest in a surgical field, helpfulness of the instructor, and perceived mastery of tasks. Participants were assessed based on FLS standards for time, penalties, and accuracy.

RESULTS

A total of 29 students were recruited (resident-led, n=16; student-led, n=13). Our study demonstrated no statistically significant differences between cohorts for time, penalties, or accuracy. Participants in the student-led group showed negligible change in interest in pursuing surgery while the resident-led group increased interest among participants to pursue surgery.

CONCLUSION

Our study suggests that student-led and resident-led laparoscopic skills workshops are equally effective in teaching basic laparoscopic skills; however, resident-led workshops also raised interest in surgical specialties.

INTRODUCTION

The purpose of our study is twofold; This study is designed to assess if medical students can teach basic laparoscopic skills to their peers as adequately as surgical residents, and if early exposure to laparoscopic skills training can promote interest in surgical careers.

Studies have shown that engaging medical students in surgical experience during pre-clerkship can promote basic skill acquisition and future operative confidence[1]. It has also been found that peer-led sessions can teach complex skills such as musculoskeletal ultrasound[3] and lumbar puncture[2] as proficiently as an experienced instructor.

As students have more access to their peers than they do to residents, the utilization of peer instructors can provide students with more opportunities for guided practice and promote the development of peer-led curriculums.

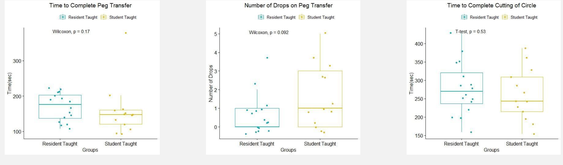
METHODS

- Medical students from all years were invited to participate in the study via email and blinded to the status of their instructors upon recruitment.
- Participants began by watching introductory videos to laparoscopic techniques and the tasks they would be performing (peg transfer and pattern cutting).
- After completing a pre-study questionnaire including demographics, previous laparoscopic experience, and interest in pursuing a surgical specialty, participants learned the tasks under the supervision of their assigned instructor.
- Participants were given 30 minutes to learn each task, after which they were transferred to the testing room where they underwent a timed assessment according to FLS standards.
- A post-study survey was conducted to identify the participants' perceived mastery of the tasks, their impression of the instructors, and any change to interest in pursuing a surgical specialty.
- *Wilcoxon signed rank tests*, *Student's t-tests*, and *Fisher's exact tests* were performed to compare both groups.

RESULTS

29 students (16 in the resident-led workshop and 13 students in the student-led workshop) participated in the training and assessment of peg transfer and circle cutting. Several variables including time to complete peg transfer, number of drops on peg transfer, and time to complete cutting a circle were recorded for each participant. Penalties according to FLS standards were also recorded as a binary measurement such that participants either did or did not receive a penalty.

Figure 1-3: Distribution of FLS standard measurements, resident-taught vs student-taught



The Wilcoxon test was run on R version 4.3.0 to calculate the mean, standard deviation, and p-value for time to complete peg transfer and number of drops on peg transfer. T-test was run to calculate the mean, standard deviation, and p-value for time to complete cutting of circle. Box and whisker plots were then generated for each variable on R version 4.3.0. The differences between the resident-taught and student-taught groups were not statistically significant.

Table 1: Proportion of participants with penalties, resident-taught vs student-taught

Penalty	Resident Taught (n=16)	Student Taught (n=13)	p-value
Peg transfer task exceeds 300 sec	0.00% (0/16)	7.69% (1/13)	0.4483
Peg dropped out of view	12.50% (2/16)	23.08% (3/13)	0.4424
Pattern cutting task exceeds 300 sec	31.25% (5/16)	30.80% (4/13)	1
Pattern-cutting accuracy exceeded 5 mm	12.50% (2/16)	7.69% (1/13)	1

Fisher's exact test was run to analyze each task exceeding 300 seconds and pattern-cutting accuracy exceeding 5 mm. The Wilcoxon test was run to analyze pegs dropped out of view P-values were calculated for all variables and showed no statistically significant differences between groups.

Analysis of pre- and post-survey results showed a statistically significant increase in interest in pursuing a surgical specialty after participating in the resident-taught workshop (Fisher's exact test, p = 0.0152). There is no significance in the change in surgical specialty interest among participants from the student-taught cohort (Fisher's exact test, p = 0.586.)

CONCLUSIONS

Student-led groups showed no significant differences in time for completion, penalties, nor accuracy of cutting when compared to resident-led groups. Resident-led groups showed an increase in interest in pursuing a surgical specialty while student-led groups showed negligible change. Similar to other studies which evaluated students' ability to teach tasks (such as lumbar puncture and musculoskeletal ultrasound), we concluded that students were also capable of teaching basic laparoscopic simulated tasks, including peg transfer and circle cutting. However, results showed that resident instructors were significantly more effective at increasing participants' interest in pursuing surgical specialties than student instructors.

Limitations include a small sample size (resident-led n=16, student-led n=13) and limited number of tasks trained and tested. This limits the significance of the findings and could potentially be mitigated if the study could be replicated with fewer restrictions on time and resources (number of laparoscopy simulation kits, availability of resident instructors, etc). Also, accuracy in circle cutting was measured by hand and could introduce a source of human error.

Future investigations may include measuring long-term retention and clinical implications. In our study, testing occurred on the same day as training, so long-term retention of skills was not evaluated. Longitudinal studies could potentially evaluate whether laparoscopic training in medical school has any effect on a student's likelihood of entering a surgical residency or their ability to learn laparoscopic skills in residency after initial exposure during medical school.

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