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More than a camera holder: teaching surgical skills to medical students

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ABSTRACT

Background: Students often experience passive learning in their surgical rotations as they are delegated to holding the camera during laparoscopic cases. We introduced a laparoscopic skills course to medical students to provide hands-on experience. We hypothesized that the course will improve basic laparoscopic skills and increase interest in a surgical career.

Materials and methods: All students on the core surgery rotation attended two sessions in the surgical simulation laboratory lead by Department of Surgery faculty members. Surveys were used before and after the course to assess video game (VG) use and interest in a surgical career. Course effectiveness was assessed with a laparoscopic peg transfer exercise.

Results: One hundred one students participated with 82 students documenting preinstruction and postinstruction peg transfer times. There was an overall improvement in median transfer times after instruction (before 63 s [interquartile range {IQR} 46–84.5] *versus* after 50.5 s [IQR 39–65.2], $P < 0.001$). When stratified by gender, men ($n = 40$) had faster median preintervention peg transfer times than women ($n = 61$; 65 s [IQR 51–88]) *versus* 81 s [IQR 65–98] ($P = 0.030$). However, both genders had equivalent postinstruction transfer times (men 48 s [IQR 36–61] *versus* women 51.3 s [IQR 43.2–68.3], $P = 0.478$). A similar trend was observed between students with and without prior VG use. Of the 50 students who completed both surveys, there was no significant increase (pre-24% *versus* post-34%, $P = 0.29$) or decrease (pre-32% *versus* post-22%, $P = 0.13$) in interest in a surgical career after the course.

Conclusions: A laparoscopic course for medical students is effective in improving laparoscopic skills. Although male gender and VG use may be associated with better intrinsic skills, instruction and practice allow female students and non-VG users to "catch up." A longer follow-up study is warranted to determine true interest in a surgical career.

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1. Introduction

Medical student interest in a surgical career has been decreasing in the past few years [1]. This may be attributed to students having minimal exposure to the operating room during their surgical rotation and delegation to passive tasks such as holding the laparoscopic camera or retracting. The lack of engagement leads to boredom and has adverse effects on a student's interest in a surgical career [2,3]. With the impending shortage of general surgeons, it is of utmost importance that education becomes active to stimulate medical students' interest in a surgical career early in their training. This is critical as medical students are most likely to choose careers early in their medical education [4,5].

To engage students and to provide an active learning environment, a simulation laboratory curriculum was developed at our institution in 2013. The simulation curriculum was administered to every medical student during the surgical core clerkship. Since students at Baylor College of Medicine start their core clerkships during their second year, this included both second- and third-year medical students who were on their first surgery rotation. In addition to engaging students with a hands-on learning experience, this course also provided students with an opportunity to interact directly with surgical faculty, which has been demonstrated to impact a student's decision on career choice [4]. Our study sought to observe the changes in career interest with the implementation of the simulation curriculum as well as to determine the effectiveness of the course in teaching and improving basic laparoscopic skills.

2. Material and methods

2.1. Participant information

After institutional review board approval (H-32793), a prospective observational study was performed of all second- and third-year medical students who attended the surgical skills laboratory during their core (first) general surgery rotation between July 2013 and July 2014.

2.2. Simulation laboratory curriculum

The curriculum consisted of two 1-h skills sessions 2-wk apart. Simulation skills included basic laparoscopic skills, which are taught as the Fundamentals of Laparoscopic Surgery curriculum for general surgery residents (peg transfer and circle cutting). Instruction was provided by a general surgery faculty member. Students had several opportunities to practice during the laboratory sessions (approximately 40–60 min total practice time) but the simulation laboratory was not available for students to practice in between sessions to ensure that all students had equal opportunity to improve postinstruction test time.

2.3. Assessment of course impact on interest in a surgical career and skill acquisition

Students completed a survey before the first session (preinstruction) and on completion of their second session (postinstruction). The first survey was administered to gauge interest in a surgical career and exposure to laparoscopic cases. The survey also assessed features that may affect technical skills such as gender and video game (VG) use (exposure, years of VG use, and hours per week of play time during the maximum playing years). The second survey followed interest in a surgical career and the overall attitude toward the simulation course. Course effectiveness was assessed by comparing preinstruction and postinstruction laparoscopic peg transfer times. This task required students to transfer six pegs one time while switching hands without a time limit, which is modified from the resident Fundamentals of Laparoscopic Surgery curriculum criteria. Successful task completion was defined as transfer of all six pegs back and forth while switching hands during the transfer. Laparoscopic peg transfer proficiency was chosen as the skill test over circle cutting because the faculty members felt that it was more intuitive than circle cutting for a novice. Both surveys and transfer time results were collected in an anonymous fashion. Students performed a preinstruction peg transfer test at the beginning of the first session and the postinstruction test at the end of the second session.

2.4. Statistical analysis

Statistical analyses were performed using SPSS version 22 (IBM Corp, Armonk, NY). Categorical variables are reported as proportions, and continuous variables are reported as medians with interquartile range (IQR). The proportion of students interested in a surgical career before and after the course was analyzed using chi-squared test of proportions. The changes in preinstruction and postinstruction laparoscopic peg transfer times were analyzed using a paired Student *t*-test. Students were then stratified by gender and VG history for analysis of laparoscopic peg transfer times. Students were analyzed using a paired Student *t*-test to compare within the groups and a Student *t*-test to compare between the groups. A P value of <0.05 was considered statistically significant.

3. Results

3.1. Precourse information

One hundred twenty-nine students participated in the course with 101 students completing the preintervention survey. The majority were second-year medical students ($n = 66$) with the remaining 35 students in their third year, but this was the first surgery rotation for all the students. Characteristics obtained from the preintervention survey are described in Table 1. When assessing interest in a surgical career, the responses were nearly equally divided with 29 students (28.7%) strongly considering a surgical career, 37 students (36.6%) potentially