

Residency Prep Course Instills Confidence in Interns

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ABSTRACT

Introduction. Physicians entering surgical residency often feel unprepared for tasks expected of them beginning July 1, including responding to pages, writing orders, doing procedures independently, and a multitude of other requirements. Our aim was to design a surgical boot camp to help graduating senior medical students feel more confident entering residency.

Methods. A two-week intensive surgery residency prep course was conducted in the spring of 2019 at an Accreditation Council for Graduate Medical Education-accredited General Surgery residency program. The course was designed combining aspects from existing prep courses and innovative ideas tailored to resources available at our institution. Medical students participated in the Surgery Residency Prep Course as an elective at the end of their fourth year of medical school. An anonymous survey was given pre- and post-prep course completion evaluating confidence in medical knowledge, clinical skills, and surgical skills. Data were compared using Wilcoxon Signed-Rank Test.

Results. Six students completed the course as a medical elective. Students felt more confident at course completion in most aspects, were significantly more confident in all areas of surgical skills taught and evaluated, and nearly all areas of medical knowledge. Subjectively, students felt as though the course was beneficial and helped them feel more prepared for starting internship.

Conclusions. This course designed at our institution was successful in helping prepare and instill confidence in graduating medical students prior to starting their internship. *Kans J Med* 2021;14:149-152

INTRODUCTION

American surgical societies have long recognized the need for an internship preparatory (prep) course to help graduating medical students' transition to residency. Numerous institutions offer a surgical boot camp, sometimes called a "prep course", for senior medical students entering a surgical residency, and the American College of Surgeons (ACS), American Board of Surgery (ABS), Association of Program Directors in Surgery (APDS), and Association for Surgical Education (ASE) have developed a prep course curriculum with modules deemed necessary for physicians to know prior to beginning residency. However, these prep courses have not been implemented at all institutions and the feasibility of creating these courses at facilities with limited resources has not been addressed.

ACS, ABS, APDS, and ASE issued a joint statement in 2015 indicating that all graduating medical students entering a surgical residency should complete a prep course prior to the beginning of their residency program.¹ Some of the design in these courses has been aimed at

helping students achieve core skills or competencies as defined by the Association of American Medical Colleges (AAMC) or Accreditation Council for Graduate Medical Education (ACGME).^{2,3} Many other specialties have begun to develop such prep courses as well, and students who have completed these courses recognize their benefit and feel all students should participate in such preparation.⁴

The boot camps taught at different institutions vary in their duration, from one day to four weeks, but are similar in the areas of focus, including basic medical and technical knowledge needed for intern year. The courses previously described have not addressed the success of using all volunteer instructors, and none has described incorporating surgical technology students or their facilities.

Our aim was to utilize the available resources as a model and tailor our own prep course, based on our institution's capabilities, with the goal of increasing students' confidence levels prior to starting residency. We also collaborated with the local surgical technology school and students to enhance the multidisciplinary aspect of the surgical field.

METHODS

This study involved administering a survey prior to and following completion of a two-week intensive surgery residency prep course that was developed for graduating fourth-year medical students entering a surgery internship. The prep course was based on existing "boot camps" at other medical schools, as well as the curriculum developed by the ACS/APDS/ASE. Our course was divided into three broad categories: clinical skills (dictating, writing orders, communication, and answering pages), medical knowledge (pharmacy, radiology interpretation, mechanical ventilation, code management, noninvasive vascular studies, nutrition, and total parenteral nutrition), and surgical skills (sterile technique and setup, wound care, punch biopsies, ultrasound, line access, suturing, knot tying, endoscopy, and anastomoses).

A multidisciplinary approach was used with various medical professionals involved in teaching, including pharmacists, residents, surgical attendings, surgical technology instructors and students, wound care nurses, and dietitians. Didactics and workshops were used throughout the course. The residency program's surgical skills lab was utilized with its existing resources, such as basic sutures and surgical instruments, and students were given access to the Fundamentals of Laparoscopic Surgery machine. Some sessions were held at the local surgical technology school utilizing their simulation materials, such as synthetic bowel and vessels, simulation man, and mock operating rooms. The code management portion was held at the School of Medicine in the code simulation laboratory.

Six students enrolled in the course for Spring 2019. Four were entering a general surgery residency, one entering obstetrics/gynecology, and one entering emergency medicine. Prior to the start of the course, an institutional review board (IRB) approved survey was given to the students evaluating their areas of most interest and their confidence levels on different subjects. Their confidence was ranked on a five-point Likert scale (1 = poor, 2 = fair, 3 = okay, 4 = good, 5 = very good) in

20 different areas under the basic categories of clinical skills, medical knowledge, and surgical skills. They were asked open-ended questions about their biggest concerns for residency. At the completion of the course, they were given a similar IRB approved survey with the same Likert-scale questions regarding confidence levels in each area, with an additional question asking them to list the three most helpful sessions of the course and an area to write additional comments and feedback.

A Wilcoxon signed-rank test was used to assess the difference in confidence level among the medical students. Each area within surgical skills, medical knowledge, and clinical skills were assessed individually. Indexes were created to assess the pre- and post-course survey confidence level within each category (surgical skills, medical knowledge, and clinical skills), as well as assess an overall course confidence level. The rest of the data was listed as frequency counts. All analyses were conducted using SPSS release 19.0 (IBM Corp., Armonk, New York).

This survey study was approved for implementation by the Ascension Via Christi Hospitals Wichita, Inc. Institutional Review Board.

RESULTS

When asked pre-course what three areas were of most interest to them, the most commonly cited responses were “pharmacy” and “anastomoses”. Students also were asked about areas of least confidence. The areas of least confidence prior to starting the course were “pharmacy” and “writing orders”. Additional responses are detailed in Table 1. The surveys showed students were overall more confident after the course in all areas, increasing their confidence overall from a median score of 2.4 pre-course to a median post-course score of 3.8, for an overall increase in confidence of 58.3% (p = 0.028).

Table 1. Areas of most interest and least confidence identified in pre-course survey.*

Areas of most interest		Areas of least confidence	
Area	Frequency	Area	Frequency
Pharmacy	4	Pharmacy	3
Anastomoses	3	Writing orders	3
Answering pages	2	Anastomoses	2
Medical knowledge	2	Code management	2
Line access	1	Ultrasound	2
Surgical skills	1	Medical knowledge	1
Suturing/Knot tying	1	Dictating	1
Clinical skills	1	Line access	1
Dictating	1	Surgical skills	1
Endoscopy	1	Clinical skills	1
Radiology interpretation	1	Radiology	1
Total	18	Total	18

*Each student allowed to give three answers for each question.

Students demonstrated statistically significant improvement in confidence in all areas of surgical skills with a 70.8% improvement in the overall surgical skills confidence rating increasing from a median of

2.4 to a median of 4.1 (Table 2; p = 0.027). Areas of most significant improvement were ultrasound and anastomoses (both showing 166.7% improvement) and line access and endoscopy (both showing 100.0% improvement).

Table 2. Comparison of surgical skills confidence levels pre- and post-course.

Areas of surgical skills	Pre-course median (IQR)	Post-course median (IQR)	% Improvement	p Value
Ultrasound	1.5 (1.0-2.25)	4 (3.0-5.0)	166.7%	0.023
Anastomoses	1.5 (1.0-2.25)	4 (3.0-4.0)	166.7%	0.026
Line access	2 (1.0-2.0)	4 (3.75-4.25)	100.0%	0.026
Endoscopy	2 (1.75-3.0)	4 (3.0-4.25)	100.0%	0.039
Sterile technique - set up	3 (3.0-4.0)	5 (4.75-5.0)	66.7%	0.024
Wound care/wound vacs	2.5 (2.0-3.25)	4 (3.75-5.0)	60.0%	0.024
Punch biopsies	3 (2.75-3.5)	4.5 (4.0-5.0)	50.0%	0.039
Suturing/knot tying	3.5 (3.0-4.0)	5 (4.75-5.0)	42.9%	0.023
Overall score	2.4 (2.3-2.8)	4.1 (4.0-4.7)	70.8%	0.027

Students showed statistically significant improvement in their confidence in all areas of medical knowledge except noninvasive vascular study results and electrolytes (Table 3). Their overall confidence score for medical knowledge increased from 2.1 pre-course to 3.8 post-course (p = 0.028), representing an 81.0% overall increase in confidence. Areas of most significant improvement were code management, pressors and sedation, and anticoagulants/reversal (each showing 100% improvement), and mechanical ventilation (75% improvement).

Table 3. Comparison of medical knowledge confidence levels pre-and post-course.

Areas of medical knowledge	Pre-course median (IQR)	Post-course median (IQR)	% Improvement	p Value
Code management	2 (1.75-2.0)	4 (4.0-5.0)	100.0%	0.024
Mechanical ventilation	2 (1.0-2.25)	3.5 (3.0-4.0)	75.0%	0.026
Pharmacy				
Pressors & Sedation	2 (1.0-2.25)	4 (3.75-4.25)	100.0%	0.026
Anticoagulants/Reversal	2 (2.0-3.0)	4 (3.75-4.0)	100.0%	0.024
Electrolytes	2.5 (1.75-4.0)	4 (3.0-4.0)	60.0%	0.109
Nutrition & TPN	2.5 (1.75-3.0)	4 (3.0-4.0)	60.0%	0.039
Non-invasive vascular studies	2 (2-3.25)	3 (2.75-3.5)	50.0%	0.257
Radiology interpretation	3 (2.0-3.0)	4 (3.75-4.25)	33.3%	0.038
Overall score	2.1 (2.0-2.6)	3.8 (3.4-4.2)	81.0%	0.028

Abbreviation: TPN, total parenteral nutrition.

While not statistically significant, there was a numerical increase in respondents' level of confidence regarding clinical skills in each area measured (Table 4; $p = 0.080$). Areas of greatest improvement were in answering pages and dictating (both showing 100% improvement) and writing orders (75% improvement). The sessions they felt were most helpful were answering pages and pharmacy (Table 5). The areas identified as least helpful were the noninvasive vascular studies ($n = 4$), sterile technique ($n = 2$), and communication ($n = 2$). Overall, students felt the course was helpful and should continue to be offered in the future.

Table 4. Comparison of clinical skills confidence levels pre- and post-course.

Areas of clinical skills	Pre-course median (IQR)	Post-course median (IQR)	% Improvement	p Value
Answering pages	2 (1.75-3.25)	4 (3.0-5.0)	100.0%	0.078
Dictating	1.5 (1.0-3.5)	3 (2.75-4.0)	100.0%	0.216
Writing orders	2 (1.75-2.25)	3.5 (2.75-4.0)	75.0%	0.066
Communication	3.5 (3.0-4.0)	4 (4.0-5.0)	14.3%	0.102
Overall score	2.1 (1.9-3.3)	3.5 (3.2-4.5)	66.7%	0.080

Table 5. Sessions identified as being most helpful post-course.*

Session	Frequency
Answering pages	5
Pharmacy	4
Medical knowledge (pharmacy, ventilation, codes)	1
Line access	1
Mechanical ventilation	1
Sterile technique/setup (instruments)	1
Anastomoses	1
Line access & anastomoses	1
Pressors/sedation	1
Radiology	1
Ultrasound	1
Total	18

*Each student allowed to give three answers.

DISCUSSION

The importance and need for a prep course, as well as the relative success of such courses, has been established, and our study appeared to be in agreement, although small study size gives a significant limitation to interpretation of our data. Our course showed students gained more confidence in nearly all areas evaluated. Based on responses to open-ended feedback about the course, students felt it was helpful and should be offered again for future students entering a surgery residency. One student wrote, "every fourth-year medical student that wants to apply into General Surgery should be encouraged to take this elective", a sentiment that has been echoed in other survey results from similar prep courses.^{4,5}

Clinical skills were the main areas that did not show a statistically significant increase in confidence, although small increases in confidence were observed for each of the categories. This may be due to a relatively high pre-course level of confidence, particularly seen with the communication skills. Other courses similarly have not seen an increase

in confidence in areas of communication and writing orders.⁴ Additionally, other course evaluations have rated didactics as the weakest portion of the prep course, perhaps reflecting on these students' preference to learn from hands-on or simulation experiences.⁶ It may be difficult for students to see the tangible effect of the knowledge gained in these clinical skills areas prior to starting internship and applying them to real clinical scenarios. We may be able to improve these sessions as well by using more case-based teaching to help it seem more applicable.

Another consideration regarding our results was volunteer bias. We cannot say with certainty how closely those who volunteered for the course reflected the general population of graduating fourth year medical students preparing to enter a surgical residency. While it was possible that some component of volunteer bias existed in the study, because the tendency may be to think that those wanting to take the course may have a lower level of confidence than the students who deferred the opportunity, other possibilities were equally likely. For example, those taking the course may have had a more realistic assessment of the demands that were ahead of them and wanted to prepare in advance with every possible modality. This would be a benefit of having a control group who did not take the course to draw comparisons from, and this was a limitation of our study.

As we move forward in ensuring that medical students can meet the core competencies defined by ACGME,³ it is likely that courses like this will become mandatory rather than an elective. One concern nationwide, as well as in other countries, is the transition that comes with new interns each July. Studies variably have reported on increased morbidity and mortality, decreased efficiency, and increased medical errors with the cohort turnover each year.⁷⁻⁹ Some have proposed changes in the fourth-year medical school curriculum to decrease this effect. Increasing confidence and preparedness should mitigate some of the "July phenomenon", or the sometimes-controversial increase in morbidity and mortality, or decrease in efficiency seen with cohort turnover.¹⁰

To expound on the feasibility and basic framework for developing a prep course, our course was organized with the resources at our facility in conjunction with the local surgical technology school. The curriculum from ACS/APDS/ASE was used for several of the didactic sessions and as a guide for some of the workshops, including writing orders, mock pages, communication and handoffs, and radiology interpretation. Students from the local surgical technology school were utilized as assistants in some of the vascular suturing skills sessions, which was found to be beneficial from both medical students' and surgical technology students' viewpoints. We suggest these courses continue to be developed at all medical schools so all students entering residency will have completed a prep course.

Some of the challenge in developing the course came when finding teaching faculty for each session. We were fortunate enough to have interdisciplinary volunteers including surgical attendings and residents. Student feedback was that having residents at the sessions was one of the most valuable pieces. Other institutions have experimented with

mandatory resident-led boot camps;⁵ however, we solicited resident help solely on a volunteer basis. Moving forward, our program should be able to encourage more resident participation, although making resident participation mandatory may not be feasible due to their clinical obligations. Challenges in the future of this course include tailoring the course for students entering various surgical specialties, including urology, orthopedics, and obstetrics/gynecology. The number of students at our institution entering these specialties each year is likely not enough to necessitate separate prep courses for each of them, but some adaptations will need to be made to ensure that the material is applicable.

Limitations of this study included a small sample size and no control group for comparison. Ideally, the course will continue to garner interest and more students will be enrolled in subsequent years for further analysis and course development. We plan to continue future studies and will be able to make comparisons with control groups of students who did not take the course. We also would like to extend the study period and follow the students at least six months into residency to evaluate if their confidence remains elevated compared to controls. There have been mixed reviews on whether this increase in confidence is sustained. At least one study showed statistically significant sustained increase in confidence in only two out of nine surgical skills when compared to controls over a six-month period.¹⁰ In contrast, a neurosurgery course demonstrated that knowledge taught in the course was retained at six months and students continued to feel the course was beneficial.¹¹

CONCLUSIONS

Our study added to the evidence that prep courses increase confidence and preparedness in medical students before entering surgical residency. We developed and adapted our course with limited resources and believe that all medical schools can create a prep course utilizing curricula already available and examples published from various institutions. We also believe that incorporating multidisciplinary teams is a key component to early development of interpersonal relationships.

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