Unanticipated Teaching Demands Rise with Simulation Training: Strategies for Managing Faculty Workload

Robert D. Acton, MD, Jeffrey G. Chipman, MD, Michelle Lunden, and Connie C. Schmitz, PhD

Department of Surgery, University of Minnesota, Minneapolis, Minnesota

INTRODUCTION: Using simulation to teach and assess learners represents a powerful approach to training, but one that comes with hidden costs in terms of faculty time, even if programs adopt existing curricula. Some simulators are built to be used independently by learners, but much of the surgical simulation curricula developed for cognitive and psychomotor tasks requires active faculty involvement and low learner-to-faculty teaching ratios to ensure sufficient practice with feedback. The authors hypothesize that the added teaching demands related to simulation have resulted in a significant financial burden to surgery training programs. To date, the effect of simulation-based training on faculty workload has not been estimated objectively and reported in the literature.

METHODS: To test their hypothesis, the authors analyzed data from 2 sources: (1) changes over time (2006-2014) in formal teaching hours and estimated faculty costs at the University of Minnesota, General Surgery Department and (2) a 2014 online survey of general surgery program directors on their use of simulation for teaching and assessment and their perceptions of workload effects.

RESULTS: At the University of Minnesota, the total number of hours spent by department faculty in resident and student simulation events increased from 81 in annual year 2006 to 365 in annual year 2013. Estimated full-time equivalent faculty costs rose by 350% during the same period. Program directors ($n = 48$) of Association of Program Directors in Surgery reported either a slight (60%) or a significant (33%) increase in faculty workload with the advent of simulation, and moderate difficulty in finding enough instructors to meet this increase. Calling upon leadership for support, using diverse instructor types, and relying on "the dedicated few" represent the most common strategies.

CONCLUSION: To avoid faculty burnout and successfully sustain faculty investment in simulation-based training over time, programs need to be creative in building, sustaining, and managing the instructor workforce. (J Surg 72:522-529. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: Simulation, Cost, Resident Education, Faculty, Surgery

COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement

INTRODUCTION

Using simulation for teaching and assessing learners represents a powerful approach to training. Simulation has been widely incorporated by various industries as an efficient and a cost-effective way to teach new skills, improve safety, and reduce costs.[1,2] The airline industry is often referenced in the simulation literature, and United Parcel Services has built a simulated town to teach new drivers how to efficiently and safely deliver packages with the goal of improving driver retention and safety.[1,3] Simulation has proven effective in surgery at decreasing the time it takes for medical students and beginning surgeons to become proficient at basic tasks such as suturing, placing catheters, and early laparoscopic skills.[4-9]

There is no doubt that simulation is here to stay and is a valuable part of surgical education. In 2008, the Residency Review Committee mandated that a surgical skills laboratory be available for all general surgery residency programs. To meet the needs for simulation training, the American College of Surgeons, the Association of Program Directors in Surgery (APDS), and the Association of Surgical Education have put tremendous resources into building accessible surgical simulation-based curricula for residents and medical students.[10-12] Since 2010, the American Board of Surgery has stated that surgical chiefs (graduates) must pass the Fundamentals of Laparoscopic Surgery in a simulated environment to sit for their boards, and by 2017 to 2018

Correspondence: Inquiries to Robert D. Acton, MD, Division of Pediatric Surgery, MMC 195, 420 Delaware Street, SE, Minneapolis, MN 55455; e-mail: acton002@umn.edu

  1931-7204/$30.00 http://dx.doi.org/10.1016/j.jsurg.2014.10.013

they will also be required to pass the Fundamentals of Endoscopic Surgery using endoscopic trainers. It is likely that assessment in simulated environments will become more (not less) prevalent in future years as programs seek to measure competencies needed for semiannual milestone reviews for residents and fellows.

However, the implementation of a brisk surgical skills simulation curriculum comes with a cost. Some authors suggest that education in the simulation suite is less expensive than the operating room.[4,13] Many authors working to address the issue of cost and have focused on strategies such as reducing the price of simulators, using low fidelity simulators, reducing the number of disposable items, taking advantage of free items or grants from industry, and developing regional training sites.[14-18] An issue commonly discussed but undocumented and unresolved in the literature is the issue of faculty time. We suspect that as surgical education moves from the operating room to the skills laboratory, it comes with a significant hidden cost in faculty time, even after curricula have been developed, adapted, and matured.[16-21] The accurate estimates of faculty time and related costs are difficult to obtain; values of $100 to $500 per faculty hour have been conservatively estimated.[16,22]

Some simulators are built to be used independently by learners. This method is very efficient for faculty, but it still requires faculty involvement for providing overall direction and motivation, coaching, and assessment of the learners' skills.[19,22] Most of the published surgical simulation curricula require hands-on involvement by faculty and low learner-to-instructor teaching ratios to ensure sufficient practice, feedback, and positive learner outcomes. Anecdotal, experiential wisdom strongly suggests, therefore, that the addition of required teaching assignments in the skills laboratory (on top of teaching during conferences and in the operating room) has resulted in increased faculty demands on their time and by extension, on costs to their departments. To our knowledge, however, the extent of these influences has not been formally reported in the literature. The purpose of this article is to estimate these influences by retrospectively studying changes in faculty workload that occurred at our own institution from 2006 to 2013, and by conducting a national survey of APDS program directors. Our research questions are:

(1) To what extent did the number of formal teaching assignments (hours) and associated teaching costs at the University of Minnesota (UMN), Department of Surgery, change with the advent of simulation-based training (2006-2014)?

(2) For what purposes do current APDS program directors use simulation-based approaches, and how do they staff these sessions?

(3) How do APDS program directors perceive the effect of simulation-based training on faculty teaching load?

(4) What strategies have APDS program directors found most effective for filling simulation teaching assignments and rewarding faculty for their involvement?

METHODS

This is a descriptive study involving administrative data from the UMN Department of Surgery, and a volunteer sample of APDS program directors responding to an anonymous survey. In terms of the UMN setting, we are an academic program with approximately 80 clinical (full-time and adjunct) faculty members located at 5 hospital sites in the Twin Cities. We are approved to enroll 6 categorical general surgery residents per year. Our post-graduate year (PGY)-1 class averages 25 individuals, including preliminary residents and residents who have matched into orthopedics, otolaryngology, neurosurgery, and urology. We have a 2-year research laboratory experience following PGY-3; at any given time, we have 9 to 11 residents in the research laboratory, for a total resident complement of approximately 62 residents. While in the research laboratory, our residents teach medical students in the surgery clerkship simulation skills laboratory. Our 6-week surgery clerkship, given 8 times a year, serves between 178 and 195 students annually.

Our simulation-based training occurs at the SimPORTAL, and at the Academic Health Center's Interprofessional Education Resource Center; together, these entities have earned ACS Level 1 Education Institute accreditation status since 2007. The resident (PGY-1 and PGY-2) skills laboratory curriculum, which was inaugurated in fall 2007, comprises 12 to 16 modules covering basic technical skills and procedures, critical response team training, and 2 Objective Structured Assessment of Technical Skills performance examinations.[23] A half-day professional communications Objective Structured Clinical Examination (OSCE) is given to PGY-1 and PGY-3 residents annually.[24] A half-day mock oral board examination is given to PGY-4 and PGY-5 residents twice a year. The surgery clerkship skills curriculum was inaugurated in May 2008. The curriculum comprises 3 afternoon laboratory sessions, 1 supervised practice laboratory session, and an objective structured assessment of technical skill performance examination.[25] Since 2009, a MS4 course invoslving a week of skills laboratory sessions has been taught.[26]

The scheduling and tracking of formal faculty teaching assignments for the Department of Surgery is managed by the Surgical Education Office (SEO). (The SEO does not track the teaching that occurs on service [e.g., journal clubs, teaching rounds, division-level conferences, and teaching in the operating room].) Annually, the SEO records the number of teaching events per year, the number of instructors needed per event ("slots"), and the number of total instructor hours per event. ("Hours" represents time