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Teaching communication and supporting autonomy with a team-based operative simulator

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Abstract

BACKGROUND: Changing residency structure emphasizes the need for formal instruction on team leadership and intraoperative teaching skills. A high fidelity, multi-learner surgical simulation may offer opportunities for senior learners (SLs) to learn these skills while teaching technical skills to junior learners (JLs).

METHODS: We designed and optimized a low-cost inguinal hernia model that paired JLs and SLs as an operative team. This was tested in 3 pilot simulations. Participants' feedback was analyzed using qualitative methods.

RESULTS: JL feedback to SLs included the themes "guiding and instructing" and "allowing autonomy." Senior Learner feedback to JLs focused on "mechanics," "knowledge," and "perspective/flow." Both groups focused on "communication" and "professionalism."

CONCLUSIONS: A multi-learner simulation can successfully meet the technical learning needs of JLs and the teaching and communication learning needs of SLs. This model of resident-driven simulation may illustrate future opportunities for operative simulation.

As general surgery residency continues to evolve, it is imperative for general surgery residents to not only become technically proficient but also become effective teachers and team leaders. Likely, the progression from technician to instructor parallels the graduated responsibility of residency training. The importance of including team leadership and teaching skills into residency education has been highlighted in the Accreditation Council for Graduate Medical Education competency of Interpersonal and Communication skills.[1] Intraoperative teaching spans domains that may not be covered in traditional methods and developing intraoperative teaching skills may require a novel approach. Current simulation events tend to focus on technical skill acquisition and often do not include operative teaching elements. It may be that a properly constructed multi-learner simulation can meet the technical skill learning needs of junior learners (JLs) while facilitating senior learner (SL) developing team leadership and operative teaching skills.[2–5]

A recent analysis of our residency program's procedure feedback forms suggested a potential deficit in communication skills among postgraduate year (PGY) 3 residents.[6] With this need in mind, we sought to develop an open inguinal hernia simulator with the potential to simultaneously focus on

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the technical needs of JLs and the team leadership needs of SLs. It has never been demonstrated that a single simulation event involving multiple residents can meet different learning objectives for different level residents. This study was designed as a proof of concept study, and we hypothesized that an iterative approach to this simulation, including content expert feedback and pilot studies, could design a team-based, multi-learner surgical simulation potentially capable of simultaneously addressing the learning goals of JLs and SLs.

Methods

To determine if it was feasible to design a single simulation event to meet the learning goals of 2 different level learners, we selected an open inguinal hernia repair as our model. In addition to being a common general surgery operation, the high prevalence of inguinal hernias makes their diagnosis and management pertinent to all surgical trainees.[7]

Model development began with expert input from 6 senior surgeons with extensive experience in surgical education and inguinal hernia repair. We specifically asked our experts what they would expect JLs and SLs to know about the procedure and common intraoperative challenges. We then created and optimized a prototype through iterative testing and implementation of feedback. Following expert review of the model, we developed a pilot simulation curriculum.

The pilot curriculum paired JLs and SLs as an operative team. The goal was for the SL, either a PGY 3 or PGY 4 general surgery resident, to guide the JL, either a medical student or PGY 1 resident, through a Lichtenstein repair. The expectation was for the SL to take a role similar to a chief resident leading a teaching assistant case. This model included direct instruction and immediate feedback for JLs and SLs, a key component of technical skill acquisition for students and team leadership skills for senior residents.[8]

Pre-simulation reading was assigned to JLs that focused on the anatomy, pathophysiology, indications, and procedural steps of a Lichtenstein tension-free herniorraphy. Reading on adult learning, team leadership, and intraoperative communication was assigned to SLs, reinforced by a brief in-person, pre-simulation instruction session on intraoperative teaching led by a faculty surgeon.

The simulation event involved an SL guiding JL "A" through the repair as primary surgeon, whereas JL "B" served as scrub technician. At the completion of the activity, written evaluations using a standardized form were completed by the student and resident involving self-reflection and directed feedback to the learner and teacher. Then the SL would guide JL "B" through the repair, whereas JL "A" served as scrub technician. An attending surgeon observed the simulation experience and was instructed to hold their feedback until the conclusion of the procedure. This was to allow residents the opportunity to teach their students and struggle with the setup and conduct of the case—potentially, a key to transitioning to more advanced practice.

Following the simulation event, there was structured, bidirectional feedback between students and residents. This was guided by a procedure feedback form modified from the procedural feedback form used in the Oregon Health and Science University general surgery residency.[6] The form assessed 4 dimensions, medical knowledge, operative knowledge, communication skills, and professionalism, using a 3-point scale with opportunity for free text comments. Anchors were provided for the numerical evaluations (Table 1). The SL and JL were additionally asked to identify one thing each did well and one thing to improve on, a concept based on the Pendleton model for feedback.[9]

Summative activity content data were collected from all participants using a 5-point Likert scale response (1 = disagree; 5 = strongly agree) to indicate their agreement with statements about the simulation experience. Investigators also conducted a focus group with the participants to identify areas of simulation weakness and opportunities for model and simulation improvement.

The free text portions of the procedure feedback forms and the focus group comments were subjected to qualitative analysis using grounded theory with constant comparisons to identify themes associated with feedback, the model, and the

Table 1 Anchors for numerical scoring on the feedback sheet

Dimension	1	2	3
Medical Knowledge	Does not know basic information about presentation and indications.	Can discuss basic pathophysiology, diagnosis, and treatment options.	Understands disease process, treatment, and potential complications.
Operative Knowledge	Deficient knowledge. Required specific instruction at most steps of operation.	Knew all the important steps of operation.	Demonstrated familiarity with all steps of the operation.
Communication Skills	Unable to describe risks of surgery compared with risks of waiting. Cannot describe complications.	Can describe some general risks of surgery. Can describe general risks of nonoperative management.	Can describe specific complications. Can describe specific risks of nonoperative management.
Professionalism	Disrespects other team members. Speaks condescendingly to others. Not prepared for simulation.	Does not disrespect or berate others. Speaks respectfully. Moderately prepared for simulation.	Fosters team approach and collegiality. Treats others with respect. Very prepared for simulation.