Simulation-Based Training for Interprofessional Teams of Practicing Clinicians

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Introduction

Team training fosters communication skills and teamwork, thereby improving patient safety in a variety of healthcare settings [1]. In the operating room (OR), communication breakdowns have been identified as a leading cause of intraoperative error [2–4]. Analysis of closed-claims data from malpractice insurers have shown that communication issues are associated with malpractice claims against both surgeons and anesthesiologists [3]. More importantly, the majority of the injuries and errors that occur as a result of communication breakdowns are considered preventable.

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Interprofessional education (IPE) in communication and teamwork for residents has been employed in the OR setting, with teams of surgical and anesthesia trainees working together or teams of surgical trainees and nurses working together [5, 6]. Less frequently, full teams that include attending surgeons, anesthesiologists and nursing staff, have trained together in formal programs [7].

There are numerous barriers to providing simulation-based training to attending physicians together in an interprofessional setting. First, securing time away from clinical activities for multiple professional groups at the same time is difficult. There is a high opportunity cost for individuals to be out of the OR and clinic for any significant period of time due to the loss of revenue. Second, time scheduled for out-of-OR activities is typically taken up by faculty meetings, teaching, continuing education courses and other administrative responsibilities. Third, arranging schedules to allow all participants to be away from clinical requirements at the same time requires a great deal of planning, support, and administrative effort in order to achieve the program goals. Finally, simulation centers often do not have the money or expertise that is necessary to run programs at this level. Space limitations, technical resources, and staffing are all considerations for the level of fidelity necessary to engage learners from all disciplines in the simulation.

At Brigham and Women's Hospital in Boston, Massachusetts, we have been running an interprofessional team training program for full OR teams since 2011. Sponsored by The Risk Management Foundation of the Harvard Medical Institutions Incorporated (CRICO/RMF), the malpractice insurer of the Harvard-affiliated hospitals, these team-training sessions have provided training in closed-loop and directed communication, leadership and followership, and speaking-up regarding patient safety concerns to teams of attending surgeons, attending anesthesiologists, and practicing OR nurses and surgical technicians. This chapter will cover the process and strategies used in the planning and implemention of our interprofessional OR team training program.

Planning

Bringing together diverse professions and disciplines to participate in a half-day course on communication and teamwork is a daunting task. It is both labor- and cost-intensive to take time away from clinical practice to engage in continuing education. Despite this, the importance of providing training for teams that work together in a high-stakes environment similar to their actual practice is well established [8]. In 2010, CRICO/RMF, the malpractice insurer of the Harvard-affiliated hospitals, began the process of developing a simulation-based team training course to train OR teams within the Harvard system.

CRICO/RMF met with surgery and simulation leaders in Boston to discuss the feasibility of conducting simulation-based OR team training with full OR teams, including attending surgeons, attending anesthesiologists and OR nurses [9]. As a result, four test sites (Brigham and Women's Hospital, Beth Israel Deaconess Medical Center, Boston Children's Hospital and Massachusetts General Hospital)

were chosen to participate in an eighteen-month pilot study to determine whether full OR team training was feasible.

The pilot study successfully trained 221 individuals from the four participating hospitals. Each hospital implemented their own version of the OR team training with simulation program, utilizing simulation and faculty resources within their institution. While each program was unique, they all included key elements within the learning objectives and simulation scenarios. The objectives of the course were to utilize the safe surgical checklist, speak up about patient safety concerns in the OR and to use closed-loop communication. The details of the scenarios in the program were ultimately left up to the faculty but were required to include one case that occurred in an out-of-OR environment, such as the pre- or post-operative care unit, and a case that involved significant blood loss.

Participant responses on the course evaluations overwhelmingly indicated that the course was both valuable and beneficial. In addition, the simulation teams demonstrated that they were able to create a high-fidelity environment for all of the participants, with 94% reporting that they found the scenarios realistic and 93% reporting that the scenarios prompted realistic responses.

After successful completion of the pilot program, CRICO/RMF created a grant to help fund a full team-training program for 3 years. The Harvard-affiliated hospitals, including Brigham and Women's Hospital, received funding for OR team training with simulation. In March 2014, our team at Brigham and Women's Hospital began training full OR teams using high-fidelity simulation. In preparation, we assembled the faculty expertise, institutional support and simulation collateral necessary to run a successful program.

In the 3 years since then, the program has changed and expanded. Though the course objectives and teaching points remain the same, the course and simulation training sessions have matured as the simulation center has grown and expanded its expertise. We have developed higher fidelity surgical training models, allowing our operations team to better control the rate of blood loss during simulated surgery. Additionally, we have iteratively added equipment and medications commonly requested by the teams during the scenarios. We have also adjusted the order in which the scenarios are presented to the participants. Originally, we had participants complete the out-of-OR scenario first. After several iterations, we instead chose to complete one of the OR scenarios first, offering participants an opportunity to work in a typical work environment as they adjust to the simulation setting.

Logistics

Participant Recruitment

Support from department chairs and division chiefs, as well as other key members of departments, has been key to the success of our program. The endorsement by these high-level members of the institution encourages participation and also ensures that participants take their engagement in the course seriously. Presentations

during faculty meetings and grand rounds events, in addition to other means of encouragement have greatly contributed to participation in the program. Most department chairs and division chiefs have taken the course themselves and personally recommended it to the rest of their staff. In addition to these methods, we hear from participants that they specifically signed up for the course because colleagues who had participated in the course recommended and endorsed it. As planning begins for training for a new surgical specialty, leaders of that department are contacted. The course director meets with the division chief and any other key leadership figures to discuss the program, answer questions, and encourage participation.

Each session of our OR team training course includes a full OR team of two attending surgeons, two attending anesthesiologists, and two members of the OR nursing staff. After dates are arranged with the simulation center, emails are sent to the scheduling offices of each surgical department. Typically, emails listing the available dates are sent out to the members of the department and they are asked to sign-up for an available timeslot.

Anesthesiologists have a long history of simulation-based education. This type of training is an expectation of all attending anesthesiologists at Brigham and Women's Hospital and mandated by CRICO in order to obtain medical malpractice insurance at a reduced rate. Our anesthesiologists are divided into "pods" and routinely work with the same sub-specialty services. Whenever possible we attempt to schedule the anesthesiologist with surgeons, nurses and scrub technologists from the pod where they routinely work. However, when an anesthesiologist requires training to stay current with their CRICO requirements, they may be scheduled with a service with which they work less frequently. The Anesthesiology Scheduling Office, who makes the daily operating room schedule, does all scheduling for the anesthesiologists. Anesthesiologists are emailed available dates when they are due for training and have been eager to participate in the simulation training.

OR nurses and surgical technicians who attend the course receive relief from that portion of their shift for the day. As the nursing staff is key to the success of this program, we have worked closely with the OR nurse educators and nurse managers to identify staff to attend and ensure that the program is beneficial for their staff and educators. Nurses and OR techs are scheduled a month in advance to accommodate OR staffing. The nurses and OR techs are chosen, in most circumstances, by specialty area.

Participant Benefits

CRICO/RMF provides incentives to attendees in the form of malpractice insurance refunds. For surgeons who participant in the course, they receive 10% off their malpractice insurance rate for the year. Surgeons at our institution are not mandated to attend the course, but the rebate does provide incentive for the surgeon and their department. In the initial planning stages, we predicted that two-thirds of eligible surgeons would register for the course. So far, we have been successful in getting

roughly 90% of eligible surgeons to attend, with nearly 100% participation from certain surgical divisions.

Anesthesiologists who participate in the course also receive a malpractice insurance discount for attending; however, at our institution the anesthesia department pays the malpractice insurance for providers in the department. As such, the anesthesia department mandates that all attending anesthesiologists attend simulation-based courses in order to receive the discount. Most anesthesiologists choose this course as they appreciate the interprofessional team approach, which is absent from most other qualifying courses.

Both surgeons and anesthesiologists receive 4.5 Category I Continuing Medical Education (CME) credits, which are designated as Risk Management. Nursing participants receive 4.5 Continuing Education credits from our institution for attending the course. Nurses attend during their normal paid work hours and are given leave from the OR for the duration of the course.

A total of 64 OR teams, consisting of 112 attending surgeons, 119 attending anesthesiologists, 122 OR nurses/scrub technicians, have attended the course since March 2014. As scheduled cases, sick leave, vacations and other events occasionally keep the course from scheduling a full team of individuals, we sometimes substitute residents or fellows into the course in order to ensure that course runs properly. During this time, five senior surgical residents participated in the course in place of an attending surgeon. While the course is designed for attending physicians to learn from and with one another, cancelling a course limits the number of sessions we are able to run each year and potentially means that others who originally signed up for that date will no longer be able to participate. We have found that senior residents and fellows are able to fully participate in the course and engage in the debriefings. We occasionally encounter hierarchical issues when trainees and attendings participate in training together. While the course is not an evaluation of performance for any team member, trainees may be concerned that their performance during the simulation and comments on institutional practice and culture in the debriefing will be used outside of the course. To counter this issue, we always discuss confidentiality at the beginning and end of the course, stressing that performance in the simulation center is not discussed outside of the simulation center. In our experience, the course is valuable experience for all involved, including trainees.

Scenario Design

One of the key features of our team training program is that there are very few prescribed features of the program. Each institution brings a range of knowledge, experience and resources to the project, in addition to a unique population of physicians with distinct needs. As a result, each of the affiliated institutions has had the ability to create a program that best fits the strengths and expertise of the faculty and simulation center.

Learning Objectives and Case Requirements

For our program, CRICO identified three major learning objectives: (1) consistent use of closed loop communication for communicating important information and requests to the team; (2) speaking up with new or changing information related to concerns for patient safety; and (3) proper and consistent use of the WHO Safe Surgery Checklist. In addition, at least one scenario needed to be an event outside of the operating room and one scenario needed to involve hemorrhage.

The initial scenarios were developed by an interprofessional team that included a surgeon, OR nurse, simulation operations specialists, anesthesiologist, and medical education expert. The combined expertise in simulation technology, clinical medicine, technical skills, role assignments and clarity for each team member, educational principles and evidence-based practice allowed for robust scenarios designed to achieve the learning objectives. In development of the initial scenarios, a key concern was to ensure that each one included elements to challenge and engage all member of the OR team as equally as possible. As such, no scenario is simply an "anesthesia problem" or a "surgery problem". It was important to include multiple opportunities for participants to demonstrate and practice each of the learning objectives for the session. Each scenario includes multiple areas where members of various teams need to communicate critical pieces of information in a timely fashion. In addition, there are multiple opportunities for various individuals to speak up about potential patient safety issues that have been built into the scenarios.

Scenarios

Two of the three cases included in the course are conducted in the OR. For each of these cases, participants receive a specialty-specific (surgeon, anesthesiologist, or nurse perspective) handout to read prior to the start of the case. These handouts include basic information on the patient, including chief complaint, history and physical exam, pre-operative lab results and a plan for the surgery. Each specialty also receives some unique pieces of information that is specific to their role and which they might normally have more knowledge of than other team members in the clinical environment. For example, the anesthesia handout includes information about the airway exam and any history of a difficult airway that is not included in the surgery or nursing handouts.

The first OR case is designed to be a tumor resection that results in massive blood loss during the case. The learning objectives of the case are as follows: (1) Describe the correct use of the surgical safety checklist, (2) demonstrate speaking up about new information during a case, and (3) provide examples of good closed-loop communication. The participants enter the room after the patient has been prepped, draped and induced. They are told that they have a few minutes to orient themselves to the room and the equipment and that they should begin the case by going through the surgery portion of the Safe Surgery Checklist. Once they complete the checklist, the surgery begins. A model made of gelatin, IV tubing, a simulated tumor and fake

blood is used to create surgical fidelity during the case [10]. There are several pieces of information about the patient that must be effectively communicated during the case. For example, the nursing staff read prior to the scenario that the patient reported a penicillin allergy to a nurse at the last minute. This is in contrast to the printed records and other handouts that reported that the patient had no known drug allergies. During the case, one of the units of blood that is sent into the case when requested is actually labeled for the wrong patient. The scenario concludes when either the team is able to stop the bleeding or when the participants are in a holding pattern waiting for additional support from another service.

The second case occurs in the post-anesthesia care unit (PACU). The specific learning objectives for this case are as follows: (1) speaking up about new and changing clinical events, (2) use closed-loop and directed communication in a critical situation, and (3) explain the role of a leader in a critical situation. Unlike the OR cases, the participants do not receive handouts or have time to prepare before the start of this case. Instead, a non-clinical team-based activity is interrupted by a faculty member who informs the team that one of their patients in the PACU is having difficulty breathing and needs help. In most cases, this scenario involves a post-surgery patient that develops a pulmonary embolism (PE) and goes into a pulseless electrical activity (PEA) arrest. As the team treats the patient with cardiopulmonary resuscitation (CPR) and medications, the patient's rhythm converts to ventricular fibrillation. After appropriate CPR and defibrillation, the patient recovers.

The third case (and second OR scenario) begins prior to the anesthesia huddle that occurs prior to intubation and induction. The learning objectives for the case are as follows: (1) discuss patient care concerns collaboratively in an interprofessional team, (2) display use of closed-loop communication during a crisis, and (3) speak up about potentially unsafe patient care situations. In this case, the participants meet an awake patient who is able to answer basic questions and confirm information. The patient is undergoing surgery on a specific side of his or her body, but the surgeons' prior knowledge of the side is opposite to what the other team members read. In addition, the patient is site marked on the incorrect side. The team must agree on the appropriate course of action, after talking to the patient, looking at the available imaging and consulting the patient chart and consent forms. No matter what the participants decide, the next phase of the scenario involves the patient suffering from an allergic reaction to one of the pre-medications given prior to the start of the scenario. The patient suffers airway compromise, and the team is forced to begin the difficult airway algorithm. In most cases, the result is that the surgeons must perform an emergent cricothyroidotomy. Once the patient's airway is restored, the team must decide whether or not to continue with the procedure or cancel the case and send the patient to one of the hospital units.

Specialty Adjustments

As we have progressed through various surgical specialties, we have modified the above scenarios in order to meet the needs of the new group. In each case, we try and retain the overall structure of the scenarios in order to continue to include the

elements that have been tried, tested and reviewed over the course of numerous trainings. However, each specialty has required multiple tweaks to the cases in order to allow the surgeons to perform simulated operations that would be within their practice parameters. For example, where general surgeons were asked to perform an inguinal hernia repair, thoracic surgeons were asked to perform wedge resection of a lung mass.

Though many of the elements of the scenarios remain consistent within each of the specialties, careful attention is paid to ensure that we maintain fidelity for each of the scenarios as they are changed. As a result, careful review of the equipment found in both the anesthesia cart as well as on the surgical instrument table in the real ORs is done to ensure the simulated environment closely approximates the real thing. Special trays of medications are created to provide the medications that would typically be present in these cases, as well as items that we anticipate may be requested throughout the surgery. Though it is impossible for the simulation center to obtain and stock all of the specialized surgical equipment that each surgeon might request during the surgery, we try to have at least the standard equipment prepared and ready to go.

As cases are developed for new surgical specialties, our simulation center performs two "dry runs" to practice the scenarios. The first dry run is a tabletop activity where faculty and operations staff go through each of the pieces and ensure that information is consistent throughout the curriculum, participant handouts, operation notes, and patient chart. This provides the chance for everyone to ask questions and ensure that there is a shared mental model about the flow of the scenarios. The second dry run is done with the rooms and manikins prepped as they would be on the day of the course. Faculty members stand in for participants during the run through and go through all of the actions that are expected to occur during the session. This is the last chance to identify items or information that are out of place or missing.

After the final dry run, all of the materials, including scenario and debriefing handouts for faculty members and participant handouts are finalized. Faculty guides are created with scenario write-ups, schedules and note pages to be used during the actual course.

Materials and Handouts

Paper copies of the patient chart are constructed with all of the standard forms and surgeon office notes that might be available for the case. Though much of the information contained in the chart is irrelevant and not reviewed by the participants, the availability of the records creates a certain level of fidelity as well as a rich patient background that they are able to draw upon during the case. Information about past surgical history, medication, history of present illness, living situation, social history, family medical history and preferred language are all included in the background information.

To accommodate differences in the composition of teams that work in the OR together we sometimes have to make additional adjustments in order to ensure the

simulated experience is as close to the real OR as possible. For example, when we run the course for the cardiac surgery teams at our institutions, a full team included eight individuals due to the addition of a perfusionist and a physician assistant (PA). In order to continue to create an environment that was as close to the real OR as possible, we adjusted the composition and roles of the team in order to allow for them to train with the people they work with on a daily basis.

Faculty

We believe that having a faculty representative of the simulation participants is essential for conducting an OR team training curriculum. Just as we find that it is important for the participants to come together to learn from clinicians from different specialties and professions, we feel that our faculty greatly benefit from having a diverse range of background and experiences. Our faculty include an attending surgeon, attending anesthesiologists, OR nurse educators, simulation-based education experts and an organizational psychologist. Many, but not all, of our faculty members have an administrative function at the simulation center outside of teaching.

At any time, there are typically between five and seven members of our faculty who rotate facilitating sessions of the course, allowing for conferences, vacations, sick days and other competing priorities. This allows for us to staff each session with three to four faculty members. Faculty rotate roles throughout the session, providing didactic content, directing operations staff, serving as confederates, and debriefing the scenarios. As faculty members leave the institution for various reasons, efforts are made to replace them with a similarly qualified individual from the institution.

Faculty Roles

Faculty members take responsibility for course design, scenario development, didactic teaching, running scenarios and debriefing as part of their role in the course. Typically, each session is conducted with three to four faculty members present, allowing for faculty to rotate roles throughout the course. If multiple course sessions are envisaged, it makes sense to have a larger faculty than required, provide common training for the faculty, and then select specific faculty for each course. This reduces the burden on individual members and allows flexibility for multiple courses to be run at the same standard, with a different blend of faculty members.

On average, three to four members of our faculty participate in each session. One faculty member takes the lead on running the simulation scenario, including directing the simulation technicians in physiologic changes and other operational aspects of the scenario and answering the phone to talk to participants as the OR desk or blood bank. Two of the faculty members are focused on observing the actions and

communication in the scenario and preparing for the debriefing. Occasionally, faculty members are needed to serve in embedded simulated participant roles ("confederates") during the scenarios. Participants are not scored or graded on any rubric system, but faculty observers take notes during the scenario on behaviors related to the learning objectives of the case. These notes are used in the debriefing to guide the discussion.

Selecting faculty for a particular course that reflects the variety of professional backgrounds of participants (e.g. surgeons, anesthesiologists, nurses, perfusionists) allows for a deeper and more credible learning experience than single discipline faculty (e,g, all surgeons). It has the added benefit of allowing expert knowledge to augment non-technical skills during debrief. Clinical knowledge is not sufficient, however, and having expertise in psychology, education, and research represented in the faculty team is also important to ensure that learning objectives are met. This also allows the simulation scenarios to be designed in a way that optimizes the physical and psychological fidelity of the scenarios in a way that maximizes that training potential.

Faculty Training

Prior to becoming course faculty, individuals must complete a training process. Studies have shown that debriefing is a key element to the success of team communication courses, as well as other simulation-based training courses [11–13]. As a requirement to join our faculty for this course, faculty members must complete a course in scenario debriefing from an appropriate educational provider. Potential faculty members also observe several courses in order to gain an understanding of the way the course works, participant reactions and debriefing styles of the other faculty members. If a course is also focused on formative assessment of non-technical skills of team members using tools like the NOTSS (Non-technical Skills for Surgeons) [14], then specific faculty development advice is available [15].

Once faculty members have completed a debriefing course, they are slowly introduced to the course through a series of guided debriefing experiences. In most cases, faculty start by debriefing pre-determined portions of the course under the mentorship of a senior faculty member. Feedback is provided via the Debriefing Assessment for Simulation in Healthcare (DASH) form [16]. The DASH scores debriefers on six element that have been shown to correspond to high-quality simulation-based learning experiences. The elements are setting the stage for an engaging learning experience, maintaining an engaging context for learning, structuring the debriefing in an organized way, provoking in-depth discussions that led participants to reflect on their performance, identifying what participants did well or poorly and why, and helping participants see how to improve or how to sustain good performance. Scores for each element range from 1 (extremely ineffective/detrimental) to 7 (extremely effective/outstanding). Feedback is provided to faculty both in quantitative scores and qualitative comments with constructive recommendations for improvement.

Session Logistics

The course begins with a brief introductory set of slides that include an introduction to the day, background on communication breakdowns and medical errors, course objectives and ground roles for simulation. Finally, participants engage in a non-clinical activity to prompt discussions of teamwork and role-clarity in the OR environment. A sample timeline is included in Table 14.1.

As many of the participants have not previously participated in a simulation course, we devote 10 minutes prior to the start of the simulations for introducing the participants to the simulation space, manikins, and supplies available at the center. A simulation specialist carefully explains the process of obtaining vital signs, listening for heart and respiratory sounds and performing procedures on the manikin. We also emphasize the process for calling consults and other phone numbers from the room and using the basic available supplies. The participants are encouraged to spend several minutes examining the manikin to gain comfort with the simulated environment. The tour ends in the OR when the participants are divided into professional groups for a more specific introduction to the equipment that they will be using. Specifically, the surgeons are introduced to the available surgical instruments as well as the surgical field and the process for making an incision in the model. Anesthesiologists are given basic instruction for use of the anesthesia machine in the room, as well as time to ensure that the anesthesia cart is stocked appropriately. Nursing staff are provided with information on making phone calls, obtaining equipment and working various machines around the OR.

Each of the three cases takes roughly 20 minutes and is followed by a 40 minute debriefing led by two of the faculty members. There is an additional set of slides covering closed-loop communication and speaking-up that are taught between the end of the first debriefing and the start of the second case. Along with these slides, participants engage in a teambuilding activity meant to help stimulate continued discussion.

Once all three cases and debriefings have concluded, participants are asked to go around the room and identify one learning point that they will take away from the session and back to their OR. This point can be related to the course objectives or to any other part of the course that the participant found useful. Finally, before they

Table 14.1 Sample Course Agenda

7:00 AM	Arrival and Breakfast
7:10 AM	Introductions and Course Overview
7:40 AM	Tour of Simulation Lab
8:00 AM	Scenario 1
8:20 AM	Debrief Scenario 1
9:00 AM	Break
9:20 AM	Didactic: Communication and Speaking-Up
9:40 AM	Scenario 2
10:00 AM	Debrief Scenario 2
10:40 AM	Break
11:00 AM	Scenario 3
11:20 AM	Debrief Scenario 3
11:50 AM	Wrap-Up

leave participants must complete an anonymous course evaluation. This is required in order to provide them with CME credit and the malpractice insurance discount. The evaluation asks 26 Likert-type questions about general impressions, quality of simulation scenarios, quality of debriefing, learning outcomes from the session, and whether the course improved their ability to function as a team. There are also sections for qualitative comments and suggestions for the course.

Conclusion

Our OR Team Training Program has been successful in engaging surgeons, anesthesiologists, OR nurses, and scrub technologists over the past 3 years. One of the major keys to our success is the creation of an interprofessional faculty to design and implement the course. Our group is composed of surgeons, anesthesiologists, nurses and educators, who lend credibility to the training program for the attendees from their field, serve as advocates for the program in their department, and provide valuable insight during the planning stages. The careful planning and design of the simulations themselves is time- and resource-intensive, but essential to creating a high quality program that is engaging, educational and well-received. Frequent comments from participants about the realism of the scenario and their ability to see beyond the manikins demonstrate the importance of the planning stages. While there are numerous logistical difficulties in bringing together groups from around the hospital, including timing, money and training priorities, we have found that incentives help diminish some of these issues. Though we are able to provide malpractice insurance discounts to those who attend, incentives can also be provided through departmental leadership and continuing education hours. In summary, our team training program has continued to develop and expand over the last 3 years as a result of careful planning, hospital engagement and faculty commitment. This program has created a beneficial training tool for the staff, departments and hospital.

The course focuses on high-priority patient safety concerns for the hospital. By providing OR teams the opportunity to discuss in-depth the teamwork, communication and leadership skills that have been shown to lower errors in the operating room, this course seeks to create a culture within our institution that values the nontechnical skills that lead to safer patient care. Like any skill, the use of directed and closed-loop communication, proper setting of expectations around patient care, and use of the safe surgery checklist require ongoing training and preparation [1, 14]. This simulation session provides an opportunity for reflective practice to key members of OR teams at our institutions. Participants are encouraged to continue practicing skills from the course during their daily clinical practice.

References

1. Burke CS, Salas E, Wilson-Donnelly K, Priest H. How to turn a team of experts into an expert medical team: guidance from the aviation and military communities. Qual Saf Health Care. 2004;13(Suppl 1):i96–104. https://doi.org/10.1136/qhc.13.suppl_1.i96.

2. Rogers SOJ, Gawande AA, Kwaan M, et al. Analysis of surgical errors in closed malpractice claims at 4 liability insurers. Surgery. 2006;140(1):25–33. https://doi.org/10.1016/j.surg.2006.01.008.
3. Griffen FD, Stephens LS, Alexander JB, et al. Violations of behavioral practices revealed in closed claims reviews. Ann Surg. 2008;248(3):468–74. https://doi.org/10.1097/SLA.0b013e318185e196.
4. Gawande AA, Zinner MJ, Studdert DM, Brennan TA. Analysis of errors reported by surgeons at three teaching hospitals. Surgery. 2003;133(6):614–21. https://doi.org/10.1067/msy.2003.169.
5. Tan SB, Pena G, Altree M, Maddern GJ. Multidisciplinary team simulation for the operating theatre: a review of the literature. ANZ J Surg. 2014;84(7–8):515–22. https://doi.org/10.1111/ans.12478.
6. Cumin D, Boyd MJ, Webster CS, Weller JM. A systematic review of simulation for multidisciplinary team training in operating rooms. Simul Healthc. 2013;8(3):171–9. https://doi.org/10.1097/SIH.0b013e31827e2f4c.
7. Robertson JM, Dias RD, Yule S, Smink DS. Operating room team training with simulation: a systematic review. J Laparoendosc Adv Surg Tech A. 2017;27(5):475–80. https://doi.org/10.1089/lap.2017.0043.
8. Kohn LT, Corrigan JM, Donaldson MS, editors. To Err Is Human: Building a Safer Health System. Washington, D.C.: National Academies Press; 2000. https://doi.org/10.17226/9728.
9. Arriaga AF, Gawande AA, Raemer DB, et al. Pilot testing of a model for insurer-driven, large-scale multicenter simulation training for operating room teams. Ann Surg. 2014;259(3):403–10. https://doi.org/10.1097/SLA.0000000000000342.
10. Berry W, Raemer D. The tumor: a simulator for open surgery. Simul Healthc. 2006;1(2):115.
11. Rudolph JW, Simon R, Dufresne RL, Raemer DB. There's no such thing as "nonjudgmental" debriefing: a theory and method for debriefing with good judgment. Simul Healthc. 2006;1(1):49–55.
12. Rudolph JW, Simon R, Rivard P, Dufresne RL, Raemer DB. Debriefing with good judgment: combining rigorous feedback with genuine inquiry. Anesthesiol Clin. 2007;25(2):361–76. https://doi.org/10.1016/j.anclin.2007.03.007.
13. Rudolph JW, Simon R, Raemer DB, Eppich WJ. Debriefing as formative assessment: closing performance gaps in medical education. Acad Emerg Med. 2008;15(11):1010–6. https://doi.org/10.1111/j.1553-2712.2008.00248.x.
14. Yule S, Flin R, Maran N, Rowley D, Youngson G, Paterson-Brown S. Surgeons' non-technical skills in the operating room: reliability testing of the NOTSS behavior rating system. World J Surg. 2008;32(4):548–56. https://doi.org/10.1007/s00268-007-9320-z.
15. Hull L, Arora S, Symons NRA, et al. Training faculty in nontechnical skill assessment: national guidelines on program requirements. Ann Surg. 2013;258(2):370–5. https://doi.org/10.1097/SLA.0b013e318279560b.
16. Brett-Fleegler M, Rudolph J, Eppich W, et al. Debriefing assessment for simulation in healthcare: development and psychometric properties. Simul Healthc. 2012;7(5):288–94. https://doi.org/10.1097/SIH.0b013e3182620228.