Getting a Head Start: High-Fidelity, Simulation-Based Operating Room Team Training of Interprofessional Students

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BACKGROUND: Effective teamwork in the operating room (OR) is often undermined by the "silo mentality" of the differing professions. Such thinking is formed early in one's professional experience and is fostered by undergraduate medical and nursing curricula lacking interprofessional education. We investigated the immediate impact of conducting interprofessional student OR team training using high-fidelity simulation (HFS) on students' team-related attitudes and behaviors.

STUDY DESIGN: Ten HFS OR interprofessional student team training sessions were conducted involving 2 standardized HFS scenarios, each of which was followed by a structured debriefing that targeted team-based competencies. Pre- and post-session mean scores were calculated and analyzed for 15 Likert-type items measuring self-efficacy in teamwork competencies using the *t*-test. Additionally, mean scores of observer ratings of team performance after each scenario and participant ratings after the second scenario for an 11-item Likert-type teamwork scale were calculated and analyzed using one-way ANOVA and *t*-test.

RESULTS: Eighteen nursing students, 20 nurse anesthetist students, and 28 medical students participated in the training. Statistically significant gains from mean pre- to post-training scores occurred on 11 of the 15 self-efficacy items. Statistically significant gains in mean observer performance scores were present on all 3 subscales of the teamwork scale from the first scenario to the second. A statistically significant difference was found in comparisons of mean observer scores with mean participant scores for the team-based behaviors subscale.

CONCLUSIONS: High-fidelity simulation OR interprofessional student team training improves students' team-based attitudes and behaviors. Students tend to overestimate their team-based behaviors. (J Am Coll Surg 2014;218:140−149. © 2014 by the American College of Surgeons)

Although effective operating room (OR) teamwork is a critical component for the safe delivery of care, its implementation in practice is far from ideal. Frequently, failed communication,[1] ineffective interpersonal skills,[2] interprofessional tension,[3] poor team interaction,[4] and divergent interprofessional interpretations of the quality of collaboration[5] combine to impact both patient care processes[6,7] and outcomes.[8] Consequently, the Joint Commission[9] and the AHRQ[10] have made teamwork a priority.

A major contributor to the inadequate teamwork of ORs is a culture characterized by interprofessional friction, a "silo mentality,"[11] and "tribalism" among the professions.[12] Multiprofessional interaction is favored over true interprofessional collaboration,[13] abetted by a rigid hierarchical structure impeding meaningful communication and collaboration.[14] This toxic environment profoundly influences health care professional students as a "hidden curriculum."

One approach to counteracting negative cultural traits within the OR is to increase opportunities for positive practice and modeling of effective team-based competencies by

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Abbreviations and Acronyms

ACR = adaptive communication and response
HFS = high-fidelity simulation
HPS = human patient simulator
IPE = interprofessional education
IPS = interprofessional students
OR = operating room
ORTAS = Operating Room Teamwork Assessment Scales
SBT = simulation-based training
TBB = team-based behavior
VOR = virtual operating room

students in an interprofessional education (IPE) setting. Interprofessional education improves students' attitudes toward teamwork skills[15] and has led to gains related to professional practice and patient care.[16] Both the Lucien Leape Institute[17] and the Institute of Medicine[18] have emphasized IPE and teamwork.

High-fidelity simulation (HFS) is an attractive methodology for IPE. It provides a realistic and safe learning environment in which students can encounter uncommon clinical situations and learn from "mistakes" without repercussions.[19] Numerous IPE formats of simulation-based training (SBT) have demonstrated improvement in students' team-based attitudes,[20-23] perceptions of collaboration,[22-27] and team-based performance.[28-30] Simulation-based training has been used to teach senior medical students team-based competencies during a surgical elective.[31] It has not focused, however, on the interprofessional OR team for training students. This article investigates the feasibility and effectiveness of HFS interprofessional student (IPS) OR team training.

METHODS

Study design

A quasi-experimental pre-/post-intervention comparison design was used for this study. It was chosen for several reasons. Foremost, such a design allowed each student to participate in the learning intervention. In this manner, no individual was excluded from the HFS experience to satisfy randomized controlled design requirements. The quasi-experimental structure allowed for each participant to serve as his/her own control because pre-intervention data were matched with post-intervention data for each individual. In this manner, demographic variables were the pre-intervention (ie, no training) and post-intervention (ie, training) "groups." Second, given the time structure of the intervention (ie, occurring as one part of intensive, time-limited electives in the Schools of Medicine and Nursing), it was more feasible than performing a crossover study. Finally, the quasi-experimental design made IRB approval relatively straightforward as compared with a randomized controlled design.

Training setting

Training occurred at an academic urban health sciences center during spring 2009 within a previously described virtual OR (VOR)[32] at the School of Medicine's Russell C Klein MD ('59) Center for Advanced Practice. Equipment included a full-scale computer-operated human patient simulator (HPS) mannequin (CAE Inc.) and an inanimate torso procedural training model (Simulab Corporation). The HPS mimics complex physiologic responses. The torso model has a replaceable outer skin, an upper abdomen mold, removable small bowel, and a replaceable model of an abdominal aorta capable of "bleeding" via a portable pump and fluid reservoir. Additionally, a recess in the HPS upper arm allowed placement of a hollowed-out tissue pad (Simulab Corporation) to simulate a soft-tissue mass. Simulator set up has been described previously.[33]

Training format

Each 2-hour training session involved a dual-scenario format without any preceding didactic teaching. A brief orientation preceded the first scenario. Students then participated in a facilitator-led, focused debriefing within the VOR immediately after the scenario. They engaged in reflective practice related to the following team-based competencies: shared mental model, role clarity, situation awareness, cross monitoring, open communication, resource management, flattened hierarchy, anticipatory response, and mental rehearsal. The debriefing structure drew on Thiagi's 6 phases of debriefing,[34] Pearson and Smith's 3 questions,[35] and the plus/delta technique.[36] After another scenario with debriefing, the session concluded with student reflection on strategies for translation of skills to clinical practice.

At least 3 instructors facilitated a session. One (VK) operated the HPS simulator. Two (JTP, DDG) served as debriefing facilitators. Trained observers rated student team-based behavior.

Expedited IRB approval was obtained before initiation of the study protocol.

Training participants

Twenty-eight (43% of all participants) 4th-year medical students who were enrolled in a senior elective course in surgical anatomy participated in the SBT. Eighteen (27% total) undergraduate nursing students taking a perioperative nursing course, and 20 junior-level nurse anesthesia students (30% total, 300 to 350 OR case average) also participated.