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Teaching Patient Safety Using an Interprofessional Team-Based Learning Simulation Model in Residency Training

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Abstract

Introduction: Teaching and learning patient safety require demonstration of competencies such as teamwork, communication skills, and recognition of systems error. This patient safety TBL simulation-training program was developed to fulfill core patient safety objectives outlined by the ACGME and ACGME Clinical Learning Environment Review Program. The goal of the program is to enhance patient safety and quality care concepts and facilitate hands-on teamwork skills and core attitudes towards patient safety. This program served as a mandatory part of the residency core curriculum. **Methods:** It was delivered as a 3-hour workshop session during medicine resident orientation. The workshop included an introductory presentation, one TBL activity, and three 1-hour interprofessional simulated application cases using either high-fidelity mannequins or standardized patients. Following each application case activity, trainees participated in a postcase scenario debriefing moderated by faculty facilitators. **Results:** A total of 76 trainees participated, and 20 interprofessional teams were created. An independent-samples t test revealed that the Group Readiness Assurance Test scores were significantly higher than the Individual Readiness Assurance Test scores. Although the Readiness for Interprofessional Learning Survey's Teamwork and Professional Identity subscale scores were higher postworkshop compared to preworkshop, the differences were not statistically significant. Over 90% of the participants agreed that the safety concepts they learned would likely improve the quality of care they provide to future patients. **Discussion:** A simulation model centered on an interprofessional team can be used as an important training technique to teach health care professionals realistic, hands-on principles of patient safety.

Keywords

Simulation, Interprofessional, Team-Based Learning, Residency Training, Patient Safety, Nursing, ACGME CLER Programs

Appendices

A. Simulation Case.docx
B. Reading Assignment.docx
C. IRAT GRAT.docx
D. Instructional Content Guide .docx
E. PowerPoint.pptx
F. Survey.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

By the end of the module, learners will be expected to do the following regarding medical knowledge:

1. Define and understand basic patient safety terms such as adverse event, near miss, and root cause analysis (RCA).
2. Recite the steps involved in error reporting at their institution.
3. Identify the potential for error within the system and the importance of learning how to effectively engage the system at multiple levels.
4. Recognize key elements of patient handoff and safe discharge planning.

By the end of the module, learners will be expected to do the following regarding hands-on resident skills:

1. Demonstrate effective teamwork skills involved in running a mock code.
2. Draw and illustrate a written diagram of an Ishikawa fishbone RCA to identify the root cause of a medication error.

3. Investigate a medical error resulting in death on a real patient case and develop an action plan for prevention of the error in the future based on the RCA.
4. Simulate handoff recipient and provider roles using mock patient vignette and simulation mannequin.
5. Demonstrate safe discharge counseling in a team-based manner using standardized patient model.

By the end of the module, learners will be expected to do the following regarding core attitudes and culture:

1. Recognize that the health care system increases the risk of errors, including barriers to optimal care.
2. Identify areas in their own practice and local system that can be changed to improve the processes and outcomes of care.
3. Develop collaborative teamwork skills using a shared learning model with other health care professionals.

Introduction

Patient safety training and education of health care professionals have not kept pace with advances in patient safety or workforce requirements. The introduction of patient safety in health care professional training is therefore extremely necessary and timely. Education in safety is traditionally left to the discretion of the residency program and institution. Although online resources such as e-modules are available and are commonly utilized by residency programs to fulfill patient safety requirements, there are, however, no specific guidelines in the literature to date on how to conduct patient safety training.

Learning and teaching about patient safety and quality care require an understanding of their concepts and principles, but equally as important is the ability to demonstrate competencies such as teamwork and communication skills. TBL is a multiphase pedagogical approach that requires active learner/trainee participation and collaboration. This instructional strategy is an ideal way to promote a collaborative working environment to facilitate safe patient care. Furthermore, although there have been successful efforts to promote interprofessional learning and practice, there are still too few opportunities to systematically bring faculty and trainees from multiple disciplines together in a meaningful way for the purpose of improving the quality of patient care by learning about each other's roles, cultivating communication, practicing collaboration, and fostering teamwork. Medical simulation, another recent innovative development in health care education, allows learners/trainees to apply their knowledge and experience to scenarios they will encounter in their professional lives while using a combination of high-fidelity and standardized patient (SP) simulation techniques.

Prior to formal teaching of patient safety, we conducted a survey on all our medicine residents in 2013. Of 39 respondents, 36 (92%) reported a need for formal engagement in safety training, 38 (97%) had completed only zero to five error reports at our institution, and 35 (92%) gave themselves an overall rating of *small role* (2/5 on a Likert scale) in the patient safety process.[1] To address the need for formal education in safety, this patient safety TBL simulation-training program was integrated into our formal patient safety curriculum in residency training.

The purpose of this submission is to offer educators the opportunity to create an active, engaging, TBL, simulation-style learning environment, where trainees from interdisciplinary health care professions participate in simulated case scenarios and demonstrate skills and core attitudes pertaining to safety education. The goals of this training program are as follows:

- To facilitate the development of collaborative teamwork skills among in-training health care professionals with purposeful interprofessional socialization.

- To design and create a learning exercise on patient safety and quality care concepts using TBL pedagogy with simulated application case scenarios that allow trainees to apply learned knowledge and skills.
- To systematically evaluate and study the impact of the TBL simulation experience on trainees' knowledge, attitudes, and skills related to interprofessional collaborative practice as it concerns patient safety and quality care.

Although interprofessional simulation strategies are becoming more widely used, this training program demonstrates a unique way of teaching safety. It integrates three fundamental concepts: TBL pedagogy, interprofessional collaboration of trainees and faculty facilitators, and simulation education. The materials contained in the TBL simulation-training program are extremely relevant to resident learning and fulfill the requirements outlined by the ACGME,[2] ACGME Clinical Learning Environment Review Program (CLER),[3] and the Joint Commission.[4] Concepts are also adapted from the Agency for Healthcare Research and Quality's TeamSTEPPS safety program.[5]

Methods

TBL is an instructional educational strategy to enhance active learning and critical thinking.[6] A flipped classroom model is used in which trainees are expected to prepare and complete prereading materials before workshops (Appendix B). Trainees are organized into interprofessional teams that work together throughout the workshop.

The educational objectives for this module are aligned with and fulfill the ACGME system-based practice (SBP) and problem-based learning and improvement (PBLI) milestones[2] and ACGME CLER patient safety and care transitions pathways[3] milestone requirements for resident training, as outlined below. We encourage readers to write their own overarching goals to reflect segments of the workshop they adopt for the needs of their discipline and department.

ACGME/CLER Milestones

- SBP 2: Identify the potential for error within the system and the importance of learning how to effectively engage the system at multiple levels.
- PBLI 2: Identify areas in the resident's own practice and local system that can be changed to improve the processes and outcomes of care.
- CLER transitions pathway: Distinguish and identify key aspects of an effective handoff process.
- CLER patient safety pathway: Recite the steps involved on how to report an error in the resident's institution.

Trainees participate in an Individual Readiness Assurance Test (IRAT) followed by an identical Group Readiness Assurance Test (GRAT; Appendix C). The content of the test is based on patient safety literature and evidence contained in prereading assignments. Following the simulation/SP application cases (Appendix A), students will participate in postscenario debriefing in order to permit the team members to reflect upon their experience and learn from it.

Learners must first read the instructional content guide (Appendix D) to gain an understanding of how to prepare for and implement the training program. This guide contains materials for the workshop, including instructor preparation, case overview and objectives aligned with the designated ACGME milestones for the corresponding simulated application case, step-by-step the agenda for the simulated cases, required materials for the corresponding simulation/SP case, interprofessional team safety checklist for the corresponding simulation/SP case that includes critical action items and an adapted version of the TeamSTEPPS Team Performance Observation tool, and faculty reference guides.

The level of trainees must be decided on next. Any cohort of residents may be used. At our institution, the workshop was delivered to all incoming medicine interns and senior-level undergraduate nursing students. The content is relevant for all PGY levels.

A simulation/clinical skills center where small groups of three to six trainees can gather for discussion and group activity is needed. See the required materials section in the instructional content guide (Appendix D) for necessary resources to complete the activity.

Users should refer to the safety training program content for the actual content of the workshop. There are a total of three simulated application cases, each formatted for a 1-hour time frame. Each simulated case contains case overview/objectives, required materials, step-by-step agenda, interprofessional team safety checklist, and a faculty reference guide.

The following surveys and assessment tools were used in addition to the interprofessional team safety checklists that were created for each simulation/standardized application case: the patient safety quiz, which serves as both IRAT and GRAT; the Readiness for Interprofessional Learning Survey (RIPLS; Appendix F)[7]; and the evaluation survey of the workshop (Appendix F).

The agenda for the workshop session is as follows:

- 10 minutes: introductory PowerPoint presentation (Appendix E).
- 5 minutes: presurvey (RIPLS; Appendix F).
- 10 minutes: TBL IRAT (Appendix C).
- 15 minutes: TBL GRAT (Appendix C).
- 45 minutes: simulated application case 1: systematic analysis of a medical error (Appendix A).
- 45 minutes: simulated application case 2: interprofessional handoff (Appendix A).
- 45 minutes: simulated application case 3: safe discharge (Appendix A).
- 10 minutes: wrap-up, questions/postsurvey (RIPLS and workshop evaluation; Appendix F).

One faculty facilitator is needed for each simulated case. Three faculty facilitators are needed if the simulated cases occur simultaneously. At our institution, the three simulation cases occurred simultaneously in different rooms while the trainees rotated in groups of four to six. The size of small groups will vary depending on the number of trainees present in the residency program. As an example, each small group can contain anywhere from two to three medicine interns and two to three nursing trainees. Smaller groups can be created if simulation rooms and resources are available.

Results

A total of 76 trainees (26 medicine interns and 50 nursing students) participated in the interprofessional patient safety TBL simulation-training program, creating 20 interprofessional teams. The IRAT/GRAT consisted of 10 questions, with each question worth 1 point, for a total score of 10 points. An independent-samples *t* test was conducted to compare IRAT and GRAT scores. The GRAT scores ($M = 7.7$, $SD = 1.8$) were significantly higher than the IRAT scores ($M = 5.6$, $SD = 1.7$; $t(94) = -4.9$, $p = .001$). Chi-square tests were used to compare the number of correct responses for each IRAT/GRAT question item. A significantly higher number of correct responses were selected on the GRAT compared to the IRAT on questions related to patient safety concepts: preventable adverse events, cognitive biases, and patient handoff concepts. Aggregate pre-post responses for the RIPLS[7] were analyzed using an independent-samples *t* test. Although the RIPLS subscale scores for Teamwork (preworkshop $M = 41.9$ vs. postworkshop $M = 42.9$, $p = .14$) and Professional Identity (preworkshop $M = 22.0$ vs. postworkshop $M = 22.8$, $p = .10$) were higher on the postworkshop survey compared to the preworkshop survey, the differences were not statistically significant. The Roles and Responsibilities subscale scores were the same before and after the workshop ($M = 9.8$). When asked whether or not the safety concepts they learned would likely improve the quality of care they provide to future patients, over 90% of the trainees either *agreed* or *strongly agreed*.

Discussion

We learned that a collaborative interprofessional TBL simulation is an effective method for teaching patient safety fundamentals. A simulation model centered on an interprofessional team can be used as an important training technique to teach health care professionals realistic, hands-on principles of patient

safety. Trainees are able to actively participate and engage in learning and promoting safety. Implementation of an interprofessional TBL simulated workshop is an important teaching tool that can be used to increase health care trainees' excitement and to motivate them to learn about patient safety. This training program not only will fulfill educational requirements but also will instill needed skills and help to develop lifelong habits to effectively reduce medical errors.

To measure the effectiveness of this safety training program, we measured pre- and postsurvey data to assess overall satisfaction and effectiveness. The majority of trainees reported that content of the workshop would impact their clinical practice. We did not assess trainees' ability to apply key principles of patient safety in real clinical settings. Ideas to improve this curriculum include the development of patient safety direct observation tools and other assessment tools to evaluate whether trainees are applying the learned skills in their practice. This can be done during routine patient care on the wards; events such as error disclosure, participation in multidisciplinary meetings, providing instructions on discharge, and patient counseling on safety issues can be observed and evaluated. In addition, this training program can be used as a way to assess residents' achievement of the common ACGME milestones, specifically for SBP and practice-based learning.

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