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Should they stay or should they go now? Exploring the impact of team familiarity on interprofessional team training outcomes

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ABSTRACT

Introduction: Although simulation is an effective method for enhancing team competencies, it is unclear how team familiarity impacts this process. We examined how team familiarity impacted team competencies.

Methods: Trainees were assigned to stable or dynamic teams to participate in three simulated cases. Situation awareness (SA) data was collected through in-scenario freezes. The recorded performances were assessed for clinical effectiveness (ClinEff) and teamwork. All data are reported on a 1–100% (100% = perfect performance) scale.

Results: Forty-six trainees (23 General Surgery; 23 Emergency Medicine) were randomized by specialty into stable (N = 8) or dynamic (N = 7) groups. Overall changes from Sim 1 to Sim3 were 12.2% ($p < 0.01$), −1.1% (ns), and 7.1% ($p < 0.01$) for SA, ClinEff, and Teamwork, respectively. However, improvements differed by condition, with stable teams reflecting improvements in ClinEff (15.2%; $p < 0.05$), whereas dynamic team ClinEff improvement (8.7%) was not significant. Both groups demonstrated improvements in teamwork (stable = 9%, $p < 0.05$; dynamic = 4.9%, $p < 0.05$).

Conclusions: Teams who continued to work together demonstrated increased improvements in clinical effectiveness and teamwork, while dynamic teams only demonstrated improvements in teamwork.

1. Introduction

In clinical practice, critically ill patients are generally cared for by a multi-disciplinary team which may include nurses, technicians, and multiple physicians performing under dynamic and stressful conditions. In order to successfully and safely manage these high stakes situations, healthcare providers must demonstrate strong teamwork and communication skills. Simulation has been identified as an effective method for training teamwork skills and improving patient safety in the medical field.[1] As such, simulation based team training (SBTT) and assessment has been an intense focus of investigation.[2–8] SBTT has been shown to improve communication skills, teamwork, and clinical effectiveness.[2,7–10]

The majority of this foundational research has been done with teams whose members are stable (i.e., do not change) through the study.[2,7–10] However, many healthcare teams, such as those in the emergency room, operating room, and intensive care unit, change their composition from day to day or even patient to patient. It is currently unclear how the changing makeup of teams may affect the development of team competencies, and thus the extent to which previous research demonstrating the value of simulation for stable teams is generalizable to the clinical reality of dynamic team composition. It is likely that the extent to which teams who have had opportunities to practice together, witness each other's skills, and develop critical team competencies (i.e., team familiarity) has a direct impact on the knowledge collected by a team, the speed of development, as well as overall team effectiveness. Research in other domains has indeed demonstrated that teams work with greater coordination, effectiveness, and speed when individuals who are on the team are familiar with one another.[11–15] Other

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work, however, suggests that work environments that are characterized by highly turbulent and dynamic environments, such as acute care settings, do not require overly stable teams.[16] Under these circumstances, research suggests that moving individuals from team to team or bringing new people on a team can enhance individual performance, team performance, improve team learning, and accelerate speed.[17,18] Scholars note that this may occur because new team members may offer different perspectives, unique experiences, and can combat groupthink.[16,19,20] Thus, the specific role of team familiarity on team development and performance is unclear.

The goal of this study was to determine the degree to which team familiarity affected team competencies including teamwork, team clinical effectiveness, and team situation awareness. To achieve these aims, we created a series of interprofessional simulation-based training scenarios for trainees to complete as part of either stable or dynamic teams.

2. Methods

First year residents (R1s) were recruited during their pre-residency orientation from both the General Surgery and Emergency Medicine programs. The study was approved by the Institutional Review Board (IRB).

All residents had completed Advanced Trauma Life Support (ATLS©) training the week before this study. Three unique team-based trauma simulations were created for this study. Scenarios were developed to include airway management, hemodynamic support, and emergency procedures, and were reviewed by an interprofessional panel of actively practicing Emergency Medicine and General Surgery trained physicians for physiological accuracy and adherence to ATLS and clinical guidelines. In Scenario 1, the patient presented with multiple stab wounds, resulting in a pneumothorax requiring chest tube placement. The patient also had a positive abdominal ultrasound requiring resuscitation with blood products and disposition to the operating room. Trainees were then presented with a patient (Scenario 2) who had experienced blunt trauma causing an intracranial hemorrhage and an open fracture of the tibia and fibula, which required interaction with both neurosurgery and orthopedics while appropriately prioritizing the injuries. The third patient (Scenario 3) presented with severe facial trauma and pelvic fractures, requiring a cricothyrotomy, pelvic binder placement, and disposition to Interventional Radiology. Each case was constructed to be approximately 20 minutes long. Roles such as Team Leader, Airway, or Procedural physician were not specifically assigned or addressed ahead of time, but were left up to the participants to decide.

All scenarios were programmed into three separate human patient simulators which were stationed in three similarly equipped high-fidelity simulation rooms. Each room was outfitted with cameras and microphones for video and audio recording. Each simulation was run by a dedicated simulation technician, and evaluated by an interprofessional team of two physician debriefers from the Emergency Medicine and Surgery Departments. “Confederate Nurses”, who were trained and provided with a standardized script for their role, provided the situation, background, assessment, recommendations (SBAR) to the participants once they entered the room. This confederate aided in the resuscitations only at the requests of the team members.

The study occurred over a single 8-hour orientation day. Participants were randomly divided into one of two team conditions: joining a team whose members stayed constant over the course of the three scenarios (stable teams) or joining a team whose team members changed with each scenario, such that each case the team was made up of a new set of individuals (dynamic teams). Regardless of team assignment, teams were composed of 3–4 R1s, each containing a similar mix of General Surgery and Emergency Medicine residents. The sequence of scenarios was the same for all trainees. Participants were instructed to care for the patients as if they are the only physicians available, with other specialties available only if consulted. All participants received orientation to the mannequins prior to the orientation day via online video. After each scenario, teams participated in a 20-min debriefing which was led by trained faculty members. Each team of debriefers had one member from the Department of Surgery and one from the Department of Emergency Medicine, and had a formal training in simulation and debriefing. Debriefing utilized the advocacy and inquiry approach[21] and participants were encouraged to reflect on clinical management decisions as well as teamwork principles.

Situation awareness among teams was objectively assessed in real time using the SAGAT technique.[22,23] Specifically, each scenario had three pre-identified points which were identified as key decision points relevant to the overall goals for that case. When teams reached this point of the scenario, the case was “frozen” (i.e., simulator and vitals screen turned off). During these freeze points, a set of 3 written questions was presented to each participant to determine their situation awareness at that moment. The questions had been structured to assess 3 levels of situation awareness by addressing the following concepts specific to the case: What just happened? (level 1); What does it mean? (level 2); What will happen/needs to happen next? (level 3).[22] For example, Scenario 2 was frozen immediately after a head CT resulted showing epidural hematoma and midline shift and the following questions were posed: “What does the head CT show?” (level 1); “What is this causing to the patient?” (level 2); “What needs to happen next?” (level 3). During freeze points, participants were instructed to turn away from the monitors and had 60 seconds to provide written responses to these questions. Participants were not aware of their team members' responses. Participants were informed beforehand that there would be structured freezes with questions interspersed through each case.

Situation awareness scores was determined by evaluating correct responses to the written questions during the “freeze points” in the case. Acceptable answers were determined beforehand by a group of practicing physicians in Surgery and Emergency Medicine, with 1 point for a fully correct answer, ½ point for a somewhat correct answer, and 0 points for incorrect answers.

A pre-determined case-specific rubric created by practicing clinicians was used to evaluate clinical effectiveness based on those used in previous studies (Appendix A).[24–26] The tool was developed for each scenario to assess if critical interventions were done appropriately and included both quality and timed indicators. Critical actions were listed, and a score between 0 and 2 was given for each action. Generally, 0 indicated the task was not done at all, 2 indicated the task was done perfectly, and 1 was given for performance in-between. Specific guidelines for grading were included in the tool, and cases were each graded independently by three practicing Emergency Medicine physicians. Scenarios had a total possible point value of 42, 47, and 56 for Scenarios 1, 2, and 3, respectively.

Teamwork was assessed by evaluating the videos using the Communication and Teamwork Skills tool (CATS).[27] The CATS evaluates coordination, situation awareness, cooperation and communication on a scale of “observed and good” (given 2 points), “variation in quality” (given 1 point), and “expected but not observed” (given 0 points). The CATS tool was standard across all cases, and allowed for a total of 34 points. Teamwork was graded by the same Emergency Medicine physicians who graded clinical effectiveness. Consensus was achieved through discussion of discrepancies until agreement was confirmed.

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