

Identifying Nontechnical Skill Deficits in Trainees Through Interdisciplinary Trauma Simulation

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OBJECTIVE: The goal of this study was to investigate nontechnical skills in a simulated trauma setting both before and after a debriefing session in order to better understand areas to target for the development of educational interventions.

DESIGN: Wilcoxon signed rank tests were used to compare scores on the 5 domains of the T-NOTECHS pre- and postdebriefings. A qualitative analysis using the PEARLS debriefing framework was performed to provide a rich description of the strategies used by the debriefing facilitators.

SETTING: The Joint Trauma Simulation Program is an interdisciplinary project designed to improve the quality of trauma care through simulation exercises emphasizing nontechnical skills development.

PARTICIPANTS: Thirteen teams of 5 trauma trainees participated in trauma resuscitation simulations: a surgical chief resident, a surgical junior resident, an emergency medicine resident, and 2 emergency medicine nurses.

RESULTS: Teams significantly improved on communication and interaction skills in the simulation scenarios from pre- to postdebriefing. The debrief facilitators spent most of their time engaged in Directive Performance Feedback (56.13%).

CONCLUSIONS: Interprofessional team simulation in trauma resuscitation scenarios followed by debriefing differently affected individual nontechnical skills domains. Additional facilitation strategies, such as focused facilitation and encouraging learner self-assessment, may target other

nontechnical skills in different ways. (J Surg Ed ■■■■-■■■. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: trauma, simulation training, resident education, debriefing

COMPETENCIES: Patient Care, Professionalism, Interpersonal and Communication Skills, Systems Based Practice

INTRODUCTION

Most errors in trauma resuscitation occur during the initial assessment.^{1,2} Trauma is the leading cause of death in patients younger than 44, and prior work has estimated approximately a tenth of these deaths to be related to preventable errors.¹ Because of the complex, time-critical, and high-risk nature of trauma initial assessment, errors of nontechnical skill predominate over errors of technical skill.² Development of nontechnical skills during trauma education is essential to improve trauma outcomes,³ and previous studies have found evidence that training in nontechnical skills can improve team performance.⁴⁻⁷

One widely accepted instrument used to assess nontechnical skills in trauma settings is the modified nontechnical skills scale for trauma (T-NOTECHS). The T-NOTECHS assesses performance in 5 domains: (1) leadership, (2) cooperation and resource management, (3) communication and interaction, (4) assessment and decision-making, and (5) situational awareness and stress coping, and scores have been found to be correlated with improvements in clinical practice.⁸ However, there is a paucity of research investigating how educational interventions may affect improvement in the individual domains of the T-NOTECHS and the effect on trauma team performance.

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The interdisciplinary nature of trauma resuscitation can present challenges for the implementation of nontechnical skills, especially given that each team member has a specialized role to play in the process. The cognition of the team as a unit, as reflected in their communication and other teamwork skills, is important for mitigating nontechnical errors and providing optimal patient care. In an attempt to address this issue, interprofessional interventions have been found to positively affect nontechnical skills.⁹

Along with interprofessional education, simulation training has also been found to confer benefits for nontechnical skills,¹⁰⁻¹² and even brief interventions can help to facilitate nontechnical skills performance.¹³ Given that there is rarely time for reflection during a trauma resuscitation, timely debriefing following an event supports learners in critically reflecting on their performance and areas for improvement.^{14,15} Simulation-based teamwork training combined with debriefing has been found to improve both teamwork and clinical performance of interdisciplinary trauma teams.¹⁶

As discussed, interprofessional interventions and simulation-based training can improve nontechnical skills. However, although nontechnical skills are often discussed as a single construct, they actually encompass a variety of abilities related to such things as communication, decision-making, and interpersonal relationships. As such, debriefing may facilitate these skills in different ways. Consequently, the goal of this study was to investigate nontechnical skills in a simulated trauma setting both before and after a debriefing session in order to better understand areas to target for the development of educational interventions. Specifically, the questions we sought to address were as follows:

1. On which nontechnical skills do teams perform the strongest (e.g., decision-making, communication, leadership, cooperation, or stress management) during a trauma resuscitation simulation?
2. Are improvements in nontechnical skills observed immediately following a debriefing session? Does the debriefing appear to improve some skills more than others?

MATERIAL AND METHODS

The Institutional Review Board at the University of Wisconsin-Madison determined this study to be an exempt program evaluation initiative. The University of Wisconsin Joint Trauma Simulation Program is an interdisciplinary project designed to improve the quality of trauma care through simulation exercises emphasizing nontechnical skills development. The monthly simulations take place in a trauma resuscitation mock-up room, equipped with a high-fidelity manikin (Laerdal, SimMan 3G), advanced audio-visual streaming, capture and playback systems, and

direct observation one-way mirrors. Thirteen teams of 5 trauma trainees participated in the simulations: a surgical chief resident (PGY 4), a surgical junior resident (PGY 2), emergency medicine resident, and 2 emergency medicine nurses. Eight standardized trauma scenarios have been developed ([Appendix](#)). Some residents and nurses participate in more than one scenario, but the scenarios used are changed so that no team member performs the same scenario twice. The sessions are audio and video recorded. Three faculty facilitators from trauma surgery, emergency medicine, and emergency medicine nursing conduct the scenarios, the prebrief and debriefings, and evaluate the teams' performance using the T-NOTECHS.⁸

A formal prebrief is conducted with the whole team of trauma trainees prior to the simulation in order to orient them to the simulation environment and the goals of the simulation. Two standardized trauma simulations are performed at each hour long session, with a debriefing between scenarios. This debriefing session is held within a separate, private room to allow learners a chance to decompress and remove themselves from the scenario. Trainees leave the debriefings with areas to focus on for improvement of their team nontechnical skills, established in conversation between the trainees and debrief facilitators during the debriefing session. After the debriefing, the team has a chance to practice the areas they identified as needing improvement in a second simulated scenario. Following the second scenario, a subsequent short debriefing is facilitated to reflect on any changes in performance.

After completion of each scenario, a T-NOTECHS score was used to evaluate overall simulation performance of the trainee team. Each of the 5 domains is graded on a 5-point Likert scale, with 1 indicating that the team did not demonstrate the behavior and 5 indicating faultless performance on this dimension of teamwork. Anchoring example behaviors are provided.

Analyses

Quantitative analyses were performed in order to better understand the teams' performances on nontechnical skills. T-NOTECHS ratings for 13 sessions were analyzed, for a total of 26 simulated scenarios, including both pre- and postdebriefing simulations. Descriptive statistics of the data were examined, and due to the nonnormal distribution of the data, nonparametric tests were employed to examine the data for statistically significant differences. Wilcoxon signed ranks tests were used to compare scores on the 5 domains of the T-NOTECHS pre- and postdebriefings.

A qualitative analysis was performed to provide a rich description of the strategies used by the debriefing facilitators. Videos of 7 debriefings were available for this analysis and were transcribed verbatim. The PEARLS framework was used as a framework to better understand and describe

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