



Published in final edited form as:

*Jt Comm J Qual Patient Saf.* 2020 November ; 46(11): 640–649. doi:10.1016/j.jcjq.2020.08.005.

## An interprofessional simulation-based orientation program for transitioning novice nurses to critical care roles in the emergency department: pilot implementation and evaluation

Hannah R. Roncallo, RN, MSN<sup>1</sup>, Jessica M. Ray, PhD<sup>2</sup>, Regina C. Kulacz, RN, MSN<sup>1</sup>, Thomas J. Yang, MD<sup>1,2</sup>, Chris Chmura, RN, MSN<sup>1</sup>, Leigh V. Evans, MD<sup>1,2</sup>, Ambrose H. Wong, MD, MEd<sup>1,2</sup>

<sup>1</sup>Yale New-Haven Health, New Haven, CT

<sup>2</sup>Yale School of Medicine, New Haven, CT

### Abstract

**INTRODUCTION:** The emergency department (ED) relies on high-functioning teams to deliver consistent and safe patient care. Experts recommend that both emergency physicians and ED nurses participate in team training. However, there are currently no nationally accepted curricula for either profession to embed this training in their professional development, especially for health workers who are novice or transitioning into critical care roles.

**METHODS:** Our interprofessional educator team designed and embedded a series of simulation scenarios within a novel orientation program for novice nurses transitioning to critical care roles in the ED to teach clinical and teamwork skills for conjoint groups of resident physician and novice nurse learners. We created four interprofessional simulations to represent the acuity and breadth of patient populations in the ED critical care bays.

**INTERVENTION/REFINEMENT:** To date, we have conducted 24 two-week orientation sessions for 48 nurses and 51 resident physicians. Overall mean scores for the Debriefing Assessment for Simulation in Healthcare (DASH) instrument from nursing participants in the first 18 sessions were high. Qualitative evaluation data from both nurses and physicians demonstrated a positive impact of the simulations and provided insight into respective roles, identities, and priorities across professions. Participant feedback led to iterative steps in refinement of the simulations, including adjustments in debriefings and logistics of the orientation program.

**IMPLICATIONS FOR PRACTICE:** We found that a team-based interprofessional simulation program was feasible and acceptable for practicing novice physicians and nurses as part of a nursing critical care orientation program in the ED. Future work will assess the program's longterm impact on teamwork and safety in the actual clinical environment.

---

Corresponding author: Ambrose H. Wong, MD, MEd, Department of Emergency Medicine, Yale School of Medicine, 464 Congress Ave, Suite 260, New Haven, CT 06519, (203) 737-2489, wongambrose@gmail.com.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Keywords

Patient simulation; interprofessional education; transition program; emergency department

---

Health care workers in the emergency department (ED) report increasing clinical burden due to staff shortages, budgetary cuts, and increased patient volume and acuity.<sup>1,2</sup> This particularly affects novice nurses and physicians starting to work in ED critical care areas as they develop their professional identities and learn new skills to function effectively in a complex and dynamic clinical environment.<sup>3,4</sup> Orientation and training of new staff have significant financial and safety implications in emergency care, especially given increasing challenges of patient boarding and staff turnover.<sup>5,6</sup>

The nursing shortage is recognized and well documented in the literature.<sup>7</sup> Nursing retention is one significant factor of this shortage. An estimated 30% of new graduate nurse hires leave their jobs within the first year of practice.<sup>8</sup> Inconsistency in staffing and leadership, insufficient support for new hires, and a lack of training opportunities contribute to nursing attrition.<sup>7</sup> Specialty areas, including emergency medicine (EM), are particularly affected by this turnover, as competency requires advanced knowledge and proficiency in treating a diverse and acutely ill patient population.<sup>7</sup> While some influences on nursing retention are less modifiable than others, transition programs aimed at providing new nurses with additional support and training have led to success in both recruiting and retaining emergency nursing staff.<sup>7</sup>

Transition and orientation programs can be costly and resource-intensive for their sponsor institutions.<sup>7</sup> Therefore, program development requires mindful consideration targeting high-yield needs. New graduate nurses consistently identify challenges in teamwork and collaboration as a cause of low job satisfaction, especially when managing critically ill patients.<sup>9</sup> Nurse-physician relationships represent a crucial factor in job fulfillment.<sup>8</sup> Improving this aspect of workplace culture could significantly affect nursing retention by promoting a healthy work environment focused on teamwork, communication, and strengthened interprofessional relationships.<sup>8</sup>

Team training, as seen in high-risk industrial sectors such as aviation and military, reduces adverse events by optimizing performance of workers in highly dynamic and complex environments.<sup>10</sup> The ED, due to its high-risk nature, unpredictable acuity, and fluctuating workload needs, was one of the pioneer fields that sought to improve teamwork in health care.<sup>11</sup> Simulation offers a unique environment for this interprofessional development.<sup>12</sup> It creates the fidelity necessary to generate an appropriately controlled practice setting that can illustrate the potential for mistakes and their sequelae, while also fostering the self-reflection needed to learn from those mistakes and change subsequent clinical practice. Simulation is now accepted as a common modality for health care team training.<sup>13</sup> Although the current recommendation is for EM physicians and nurses to participate in team training, there is currently no nationally accepted curricula for either profession detailing how this training process should be embedded in their professional development. Through the creation and pilot implementation of a novel simulation-based program, we aimed to demonstrate feasibility and measure initial reactions, engagement in, and responses to interprofessional

simulation learning and debriefing experiences. We also aimed to explore early stages of interprofessional team dynamics and critical care resuscitation skill development in novice practicing nurses and training physicians while fostering individual skill development and teamwork across professions.

## METHODS

### Setting and Background

The current project was a collaboration between the primary teaching hospital of one of the largest health systems in the Northeastern United States and its affiliated academic institution. The primary workplace of the participants is a 1,541-bed, level one trauma facility and educational research university with an annual adult ED census of over 100,000 visits. Similar to other sizable health care facilities, our hospital faces unprecedented levels of nursing turnover, specifically in the ED. Additionally, as a teaching institution, EM resident physicians cycle through the ED in four- to eight-week blocks and then may work in other non-ED clinical units for months at a time as part of their training schedule. Upon return from these off-service rotations, resident physicians must adjust to changes in nursing culture and scope of practice that reflect high personnel turnover. These constant shifts and adjustments in interprofessional relationships result in a lack of comradery among nursing and physician professions, as individual working relationships have yet to form. Though not intentional, this lack of familiarity results in diminished communication and less effective teamwork in a critical care environment that depends on both for safe outcomes.<sup>14</sup>

The trauma nurse role is a designated critical care assignment at our ED that manages not only traumatized patients but all patients that arrive with critical illnesses. The role is traditionally reserved for senior nurses in our department with at least two to three years of clinical experience and consistent demonstration of advanced skillset in emergency nursing and critical care. Patients determined to require immediate lifesaving intervention are triaged and immediately cared for in one of the critical care resuscitation bays. Patients may display varying symptoms concerning for a spectrum of life-threatening diseases, including acute stroke, respiratory distress, sepsis, and cardiac arrest, as well as trauma. As a result, the trauma nurse role is a demanding one, requiring proficiency in assessment skills, critical thinking, multitasking, communication, and advocacy. Though this role is likely not specific to this institution, there is no formal recognition of critical care roles by formal accrediting bodies or national organizations such as the Emergency Nurses Association. Instead, the association acknowledges that emergency nursing is a specialty as defined by the American Nurses Association, and nurses working within it must be knowledgeable regarding the varied care provided for the different populations and disease processes seen in the ED.<sup>15</sup>

Due to the high acuity that often presents to our tertiary referral center and an increasingly novice nursing workforce required to fill this senior trauma role, our hospital administrative leadership determined that a standardized nursing trauma orientation was needed. This would prepare new nurses for the trauma role and allow them to gain the required skills needed to manage significantly sicker and more complex patient populations. To promote nursing satisfaction and retention within the department, educators and leadership were

motivated to implement a program that both appropriately trained nurses and provided them with structure and support to transition into their new role.

### Needs Assessment and Program Development

Our interprofessional team, consisting of two nursing educators (H.R. and R.K.), a physician educator (A.H.W.), and a human factors expert with experience in simulation-based health care education (J.M.R.), spearheaded the effort to create this nursing orientation program. Through a series of meetings with administrative leadership and informal interviews with staff members, we identified main gaps in knowledge, skills, and attitudes of care provision in the resuscitation bays. Deficits in teamwork and communication across professions during critical care and resuscitations became the focus of our efforts. Simulation technology offered a modality that provided both fidelity and consistency for participants addressing specific deficits in teamwork and communication.

Successful development of this program required alignment of strategic goals for the academic institution (fulfillment of academic and training requirements for the physicians) and the hospital (knowledge and skills training for the nursing staff). To accomplish this alignment, our team worked conjointly to develop, refine, and pilot this trauma orientation program within the infrastructure of the university-based simulation center. The simulation center was the ideal location to co-locate participants, as it hosted an existing simulation education program for EM resident physicians with a focus on acute care. However, no formal nursing education role or program existed yet. This offered an opportunity to integrate nurses into the existing simulation program while providing improvement for the residents' experience within the scenarios.

Over the course of two months, the nursing educators participated in interprofessional simulations and debriefings, working closely with the physician educators to develop expertise in simulation technology, debriefing methodology, and scenario development. Concurrently, the simulation center team received critical feedback from the nursing educators, modifying the simulation experience to improve the fidelity and realism for nursing participants. We updated the code cart to mirror the exact distribution and contents of those carts used in the emergency department to offer realistic tasks for nurses during medication administration. Nursing educators also requested additional medication administration supplies and simulation equipment, including task trainers for intravenous catheter placement, saline bags, and tubing to increase fidelity during situations in which critically ill patients may require multiple simultaneous drips and potential limitations due to medication compatibility may arise.

During the development process, we paid close attention to ensure a welcoming and positive environment for nursing participants to co-locate their educational experience with physician trainees. Historically, simulation has been met with mixed reception by nursing.<sup>16</sup> Senior nurses may have had limited exposure to this teaching modality during their education due to limited adoption of simulation technology by earlier generations of nursing faculty.<sup>17</sup> Newer nurses may have been exposed to simulation during their undergraduate training, but only as a form of assessment in nursing school. Nursing students have identified simulation as provoking anxiety due to feeling unfamiliar with the simulation environment and

unprepared to demonstrate required skills.<sup>18</sup> Within the design process, we ensured that our interprofessional simulations would integrate nurses and physicians in both participant and faculty roles to mitigate hierarchical imbalance between professions and nurture a team-based learning environment.<sup>19</sup>

To achieve these objectives, we designed a trauma orientation program (Table 1) for nurses new to the role in our department, which consisted of four interprofessional simulations with resident physician and nurse participants. We specifically created the simulation cases (Table 2) to encompass the breadth and acuity of the patient population within the ED resuscitation bays. Physician and nursing educators identified separate objectives specific for physician trainees and nursing orientees as well as teamwork objectives that were applicable to both professions to be embedded within the cases.

### Outcome Measures

We chose the Debriefing Assessment for Simulation in Healthcare (DASH) instrument to elicit feedback from the nurses regarding their experience. This instrument assesses instructor behaviors during debriefing and facilitation that research and theory have shown to enable learning and change in experiential settings.<sup>20</sup> The tool addresses six elements of debriefing and asks respondents to measure them with a 7-point effectiveness scale. We collected and presented descriptive data for responses to the DASH instrument from nursing participants at the completion of their simulations.

We prioritized using simulation strictly as a teaching modality and skill improvement process rather as an assessment tool, and administrative leadership understood this. As a result, finding an appropriate method to evaluate the success of our program became vital. Our participants' feedback and level of engagement within the program indicated their willingness to take what was presented to them and apply it in clinical practice. Thus, we also collected qualitative feedback regarding participants' interprofessional experience.<sup>21,22</sup> We added an open comment field in the evaluation form for nursing participants to write free text responses regarding the program. In addition, two members of our team (H.R.R. and J.M.R.) collected informal written field notes and verbatim responses during the debriefings to compile verbal feedback from both physicians and nurses. We used a systematic, inductive approach with initial open coding of our notes and responses in a Microsoft Word document, followed by biweekly group consensus on major themes through an iterative analytic process using the constant comparative method as more information was added at the end of each session with a group of interprofessional learners. We used this qualitative data to make iterative improvements to the simulations and the overall orientation program throughout the pilot period (Table 1). We stopped field observations and text responses when we reach data saturation for this first phase of our study regarding program feasibility and acceptability, an accepted technique for ensuring richness of data in qualitative research.<sup>23</sup> We obtained institutional review board approval from our university Human Investigation Committee as an exempt study.

## INTERVENTION AND REFINEMENT

### Pilot Intervention

The initial iteration of the trauma orientation program for nursing staff included two twelve-hour shifts over the course of two consecutive weeks (Table 1). The shift started with a two-hour review of high acuity procedural skillsets necessary for working in the resuscitation bays, including nursing management of the massive transfusion protocol and use of level one rapid infuser, chest tubes, and arterial lines. Next, the interprofessional simulations took place over a three-hour period at the simulation center. The nurses then moved back into the ED and received didactics to reinforce knowledge and skill components for clinical topics applied in simulation and debriefing.<sup>24</sup> These didactics included presentations on administration of critical medications, electrocardiogram interpretation, and transcutaneous and transvenous pacing. Finally, we allotted time for a mentored clinical practicum at the end of each shift lasting approximately four hours, where orientees worked in the ED in the trauma nurse role under direct supervision of one of the nursing educators.

On the first shift of the trauma orientation program, upon arrival to the simulation center, we provided the nursing staff with a brief orientation to the immersive simulated resuscitation bay and mannequin capabilities. Nursing participants had the opportunity to listen to the mannequin's lung sounds and heart sounds, palpate pulses, and familiarize themselves with the emergency equipment available, including the cardiac defibrillator, code cart, and airway cart. We then provided nursing orientees and resident physicians a detailed interprofessional orientation to the day's session. This consisted of introductions of resident physician participants, nurse participants, and physician and nursing educators as well as a brief explanation of the context for bringing nurses and physicians together in a team-based simulation. We also described the clinical setting and resources available for use during the simulation, including blood products, specialists, and ancillary staff (e.g., pharmacy, respiratory technicians).

At a minimum, two resident physicians and two nurses participated in each simulation. We consistently situated one of the nursing educators physically within the simulation environment as a confederate, equipped with an earpiece and microphone and playing the role of a patient care technician. The confederate role was particularly important, facilitating communication between the participants and the control room and enhancing the situational fidelity of the case. In addition, the nursing educator was able to provide just-in-time training and assistance to the nurses regarding simulation logistics, especially with individuals who were not as comfortable or familiar with participating in a simulated clinical scenario. A structured debriefing followed each simulation; it was important for nursing and physician educators to be equally represented in the debrief.<sup>19</sup> Main topics of discussion often emphasized teamwork, communication, and collaboration across the professions rather than details of clinical management.

### Summary of Key Findings and Iterative Refinement

To date, we have conducted 24 orientation sessions for 48 nursing and 51 resident physician participants in the program. We collected quantitative data using the DASH instrument from

18 nursing participants for the first nine sessions. Survey results revealed high levels of satisfaction with the debriefing process and those leading debriefings, specifically as it refers to promotion of learning and reflection (Table 3). Overall mean DASH scores were high ( $6.97 \pm 0.16$  out of 7). Qualitative results from physician and nursing participants revealed four key themes: individual clinical skill development; teamwork/communication skills; insight into respective roles, identities, and priorities; and reflections on simulation experience and orientation program system improvements. Table 4 summarizes our qualitative findings regarding the orientation program and interprofessional experiences as well as our steps for iterative refinement based on participant feedback. In the following section, we highlight important results and main efforts to improve our program.

**Perceptions of Impact on Individual Skills and Teamwork/Communication.—**

The first few weeks of the pilot revealed participant feedback that highlighted particularly valuable elements of the program and areas that could be improved to promote skill development and team building. Residents “leveled up” into more senior roles while nurses became oriented into the trauma nurse role. Having all professions practicing above their current level allowed for advancement of learning while giving participants a sense of unfamiliarity in their role, which flattened the hierarchy between professions and built a sense of cohesion and team-based learning. We used the pre-briefing orientation as an opportunity to discuss this universal role promotion after participants relayed that the explanation was helpful at understanding the context of the learning environment. To ensure psychological safety, we addressed the importance of respect, confidentiality, and buy-in to the experience prior to each day in accordance with best practices.<sup>25</sup> Numerous participants reported an increased perception in the impact of the simulations compared to prior simulation experiences due to the presence of interprofessional team members with whom they actually work in the clinical environment. Residents felt similar; one shared, “The interprofessional piece is very important because we had actual nurses I know personally performing the nursing tasks. It made me realize how much work was involved when we give complicated orders and medications in a complex or ill patient.” Promoting a setting that welcomed unique perspectives from each profession was significant in fostering learning.

**Perceptions of Simulation Experience and Orientation Program.—**

Interprofessional simulations on Thursdays became the well-received “simulation with a nursing presence” component to the residents’ two-week simulation rotation. Simultaneously, “Trauma Thursdays” emerged as the popular new orientation program amongst nursing staff in the ED. An area of concern for nursing participants as well as nursing educators was the relatively short amount of clinical time in the two-day orientation. Feedback from nursing participants reinforced the perception that the skills and didactic portions were a critical component of the orientation, providing training that they could not receive in another forum. Through negotiations with hospital administration, we were able to add 12 additional hours of clinical time to the orientation program.

## IMPLICATIONS FOR PRACTICE

In addition to our primary goals of program feasibility, acceptability, and engagement with participants, the simulation-based trauma orientation program has enabled the educator team to identify opportunities for continuous quality improvement relevant to the clinical environment of the ED resuscitation bays. One primary example was the consistent request for the physician team leader to perform standardized case summaries prior to high-risk interventions such as rapid sequence intubation. This prevented potential medication errors and ensured backup and adjunct equipment were available. We provided just-in-time interventions for key knowledge deficits in clinical knowledge, such as dosages for rapid sequence intubation medications, thrombolytics, and vasoactive drips, through brief didactics and open discussion during debriefings. In addition, nursing educators responded by creating and distributing medication cards with relevant dosage and titration information to both nurses and resident physicians involved in the simulation program so that both professions could cross-check doses of high-risk medications using consistent cognitive aids when working in the resuscitation bays in the future.

Unexpected concerns within the simulation program have arisen since its onset, including the potential for our educator team to identify participants as significantly deficient or lacking in skillsets as a result of their performance during the simulation scenarios. This created a conflict between our goal of maintaining a safe space for making errors and the potential need for more definitive corrective action to prevent unsafe practices in the clinical environment. Ultimately, we felt that our responsibility to protect simulation as a learning environment was a stronger mission and decided that recognized deficits would be corrected during debriefing but not reported to administrative leadership. However, we felt that notable performance deficits in the simulation environment would alert educators to assess those individuals while on shift. This would allow us to discuss concerns identified in the clinical environment with administrative leadership and recommend remediation or additional education as necessary.

## CONCLUSION

Overall, our initial results for this innovation demonstrate that an interprofessional simulation-based critical care orientation program is feasible and acceptable for resident physicians and novice nurses in the ED. Although the DASH scores may be limited by a ceiling effect, we found that nursing learners felt high levels of satisfaction with the interprofessional debriefing process. In addition, our qualitative results from both physicians and nurses revealed positive impact on individual clinical skill development, teamwork and communication, insights across professions, and actionable changes to the orientation program itself. The interprofessional simulation program is ongoing and evolving to meet the needs of the department, with improvements incorporated into the program as necessary. Planned next steps include a mixed methods study using a combination of quantitative evaluation tools with semi-structured interviews with our participants to capture robust data regarding the long-term impact of interprofessional simulation on clinical practice. We have obtained approval from our institutional review board, and data collection is ongoing. Other potential areas of future interest include evaluation of interprofessional simulation program



impact on cost effectiveness through measures including staff retention and prevention of serious safety events.

## Acknowledgments

Ambrose H Wong is supported by the Robert E. Leet and Clara Guthrie Patterson Trust Mentored Research Award and the KL2 TR001862 from the National Center for Advancing Translational Science (NCATS), components of the National Institutes of Health and the National Institutes of Health Roadmap for Medical Research. The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

## REFERENCES

1. Johnston A, Abraham L, Greenslade J, et al. Review article: Staff perception of the emergency department working environment: Integrative review of the literature. *Emerg Med Australas* 2016;28:7–26. [PubMed: 26784282]
2. Wolf LA, Perhats C, Delao AM, Clark PR, Moon MD. On the Threshold of Safety: A Qualitative Exploration of Nurses' Perceptions of Factors Involved in Safe Staffing Levels in Emergency Departments. *J Emerg Nurs* 2017;43:150–7. [PubMed: 27836139]
3. Patterson B, Bayley EW, Burnell K, Rhoads J. Orientation to emergency nursing: perceptions of new graduate nurses. *J Emerg Nurs* 2010;36:203–11. [PubMed: 20457314]
4. Schubert CC, Denmark TK, Crandall B, Grome A, Pappas J. Characterizing novice-expert differences in macrocognition: an exploratory study of cognitive work in the emergency department. *Ann Emerg Med* 2013;61:96–109. [PubMed: 23036439]
5. Rabin E, Kocher K, McClelland M, et al. Solutions to emergency department 'boarding' and crowding are underused and may need to be legislated. *Health Aff (Millwood)* 2012;31:1757–66. [PubMed: 22869654]
6. Carter EJ, Pouch SM, Larson EL. The relationship between emergency department crowding and patient outcomes: a systematic review. *J Nurs Scholarsh* 2014;46:106–15. [PubMed: 24354886]
7. Morphet J, Considine J, McKenna L. Transition to specialty practice programs in emergency nursing-A review of the literature. *Australasian Emergency Nursing Journal* 2011;14:45–9.
8. Twibell R, St Pierre J, Johnson D, et al. Tripping over the welcome mat: Why new nurses don't stay and what the evidence says we can do about it. *American Nurse Today* 2012;7:357–65.
9. Hayes B, Bonner A, Pryor J. Factors contributing to nurse job satisfaction in the acute hospital setting: a review of recent literature. *Journal of Nursing Management* 2010;18:804–14. [PubMed: 20946216]
10. Shapiro MJ, Morey JC, Small SD, et al. Simulation based teamwork training for emergency department staff: does it improve clinical team performance when added to an existing didactic teamwork curriculum? *Quality and Safety in Health Care* 2004;13:417–21. [PubMed: 15576702]
11. Small SD, Wuerz RC, Simon R, Shapiro N, Conn A, Setnik G. Demonstration of high-fidelity simulation team training for emergency medicine. *Acad Emerg Med* 1999;6:312–23. [PubMed: 10230983]
12. Rosenman ED, Fernandez R, Wong AH, et al. Changing Systems Through Effective Teams: A Role for Simulation. *Acad Emerg Med* 2018;25:128–43. [PubMed: 28727258]
13. Eppich W, Howard V, Vozenilek J, Curran I. Simulation-based team training in healthcare. *Simul Healthc* 2011;6 Suppl:S14–9. [PubMed: 21817858]
14. Ballangrud R, Hall-Lord ML, Persenius M, Hedelin B. Intensive care nurses' perceptions of simulation-based team training for building patient safety in intensive care: a descriptive qualitative study. *Intensive Crit Care Nurs* 2014;30:179–87. [PubMed: 24731413]
15. Winters N Seeking Status: The Process of Becoming and Remaining an Emergency Nurse. *J Emerg Nurs* 2016;42:412–9. [PubMed: 27160607]
16. Cantrell ML, Meyer SL, Mosack V. Effects of Simulation on Nursing Student Stress: An Integrative Review. *J Nurs Educ* 2017;56:139–44. [PubMed: 28263351]

17. Kardong-Edgren SE, Starkweather AR, Ward LD. The integration of simulation into a clinical foundations of nursing course: student and faculty perspectives. *Int J Nurs Educ Scholarsh* 2008;5:Article26.
18. Shearer JN. Anxiety, Nursing Students, and Simulation: State of the Science. *J Nurs Educ* 2016;55:551–4. [PubMed: 27668733]
19. Palaganas JC, Epps C, Raemer DB. A history of simulation-enhanced interprofessional education. *J Interprof Care* 2014;28:110–5. [PubMed: 24372044]
20. Brett-Fleegler M, Rudolph J, Eppich W, et al. Debriefing assessment for simulation in healthcare: development and psychometric properties. *Simul Healthc* 2012;7:288–94. [PubMed: 22902606]
21. Wong G, Greenhalgh T, Westhorp G, Pawson R. Realist methods in medical education research: what are they and what can they contribute? *Medical education* 2012;46:89–96. [PubMed: 22150200]
22. Anderson E, Smith R, Hammick M. Evaluating an interprofessional education curriculum: a theory-informed approach. *Medical teacher* 2016;38:385–94. [PubMed: 26079669]
23. Ranney ML, Meisel ZF, Choo EK, Garro AC, Sasson C, Morrow Guthrie K. Interview-based Qualitative Research in Emergency Care Part II: Data Collection, Analysis and Results Reporting. *Acad Emerg Med* 2015;22:1103–12. [PubMed: 26284572]
24. Su WM, Osisek PJ. The revised Bloom’s Taxonomy: Implications for educating nurses. *The Journal of Continuing Education in Nursing* 2011;42:321–7. [PubMed: 21707023]
25. Rudolph JW, Raemer DB, Simon R. Establishing a safe container for learning in simulation: the role of the presimulation briefing. *Simul Healthc* 2014;9:339–49. [PubMed: 25188485]

**Table 1:**

## Trauma Orientation Training Schedule and Iterative Refinements

A.M. shift	P.M. shift (after refinement)	Day 1	Day 2	Day 3 (after refinement)
7:00–7:30 A.M.	11:00–11:30 A.M.	Orientation to two-day program and expectations, discussion of past simulation experience, parking passes, medication titration cards	Reactions from previous week, any critical care experience on nonorientation shifts since last orientation date	12-hour 1:1 supervised clinical shift with nursing educator
7:30–8:45 A.M.	11:30 A.M.–12:45 P.M.	<ul style="list-style-type: none"> <li>Resuscitation room tour: supplies, trauma cart, airway cart, intravenous (IV) cart, code cart</li> <li>Intraosseous catheter (EZIO) demonstration</li> <li>Zoll defibrillator demonstration with arrhythmia education box (defibrillation, cardioversion, acing)</li> <li>Transvenous pacing demonstration</li> <li>Resuscitation room medication Pyxis™ MedStation™ review</li> <li>Rewarming protocol, chill protocol</li> </ul>	Hands-on skills with accompanying trauma PowerPoint: <ul style="list-style-type: none"> <li>Emergency blood fridge location and procedure</li> <li>Mass transfusion protocol</li> <li>Level 1® Rapid Infuser: set up, troubleshooting, contraindications</li> <li>Chest tubes: set up, maintenance, documentation, complications</li> <li>Arterial-lines: set up, monitor, blood draws</li> </ul>	
8:45 – 9:00 A.M.	12:45–1:00 P.M.	Simulation center tour and orientation to room	15-minute break	
9:00A.M. – 12:00 P.M.	1:00—4:00 P.M.	Two interdisciplinary simulations and debriefings	Two interdisciplinary simulations and debriefings	
12:00– 1:00 P.M.	4:00–5:00 P.M.	Review of documentation in electronic health record for trauma, stroke, cardiac arrest, conscious sedation	Didactic post-simulation: Hyperkalemia management, rapid sequence intubation, pacing PowerPoint slides	
1:00–1:45 P.M.	5:00–5:45 P.M.	Lunch break	Lunch break	
1:45–3:00 P.M.	5:45–7:00 P.M.	Didactic post-simulation: left ventricular assist devices (LVADs) and ST-elevation myocardial infarction (STEMI) management PowerPoint slides	Didactic post-simulation: Comprehensive stroke management PowerPoint slides: assessment, diagnostic imaging, NIH Stroke Scale, thrombolytic administration, thrombectomy, intracranial hemorrhage	
3:00–7:00 P.M.	7:00–11:00 P.M.	Four-hour clinical rotation in trauma assignment with nursing educator	Four-hour clinical rotation in trauma assignment with nursing educator	

**Table 2:**

Summary of Simulation Cases and Learning Objectives

Case Name	Case Description	RN objectives	MD objectives	Team Objectives
<i>"Brash Crash"</i>	81-year-old female transferred from skilled nursing facility by emergency medical services to ED for evaluation of altered mental status and diarrhea for one week. Patient is lethargic, hypotensive, and bradycardic. Patient has poor peripheral venous access, delaying lab work and identification of hyperkalemia. Transcutaneous pacing and atropine should be initiated, but there is frequent loss of capture until recognition and reversal of hyperkalemia. Identification of hyperkalemia and bradycardia due to acute renal failure.	<ul style="list-style-type: none"> <li>Initiate cardiac monitor with recognition of unstable vital signs, obtain an electrocardiogram</li> <li>Obtain intraosseous access after informed of difficult peripheral intravenous access</li> <li>Identify, prioritize, and appropriately administer medications for bradycardia, rapid sequence intubation, and hyperkalemia</li> <li>Initiate transcutaneous pacing and recognize loss of capture</li> <li>Continue to assess and inform provider of vital signs changes and assessment findings</li> </ul>	<ul style="list-style-type: none"> <li>Identify differential diagnoses and deliver appropriate treatment for unstable bradycardia, including transcutaneous pacing and vasopressors</li> <li>Identify differential diagnoses and deliver appropriate treatment for acute hyperkalemia</li> <li>Recognize beta blocker overdose toxidrome and administer empiric treatment in emergency setting</li> <li>Prepare for and treat loss of airway protection in a critically ill patient with metabolic derangements</li> </ul>	<ul style="list-style-type: none"> <li>Troubleshoot transcutaneous pacing loss of capture</li> <li>Prioritize and coordinate multiple tasks and critical illnesses simultaneously in a medically complex case</li> <li>Use teamwork and communication principles of closed loop communication, summarizing, task assistance, and situation awareness during resuscitation of acutely ill patient</li> </ul>
<i>Snowstorm ST Elevation Myocardial Infarction (STEMI)</i>	55-year-old male presenting with chest pain, shortness of breath, and diaphoresis. Quickly diagnosed with anterolateral STEMI, delayed transport from the community hospital setting to a facility with a catheterization lab related to snow conditions. Patient decompensates due to cardiogenic shock, becoming hypotensive and needing to be intubated. Vasopressors should be initiated to treat hypotension.	<ul style="list-style-type: none"> <li>Place patient on cardiac monitor, obtain electrocardiogram, and obtain at least two points of large bore intravenous access</li> <li>Utilize and prepare emergent equipment, including cardiac monitor</li> <li>Administer appropriate medications for STEMI, including aspirin, intravenous fluids, opioids, heparin, brilinta, alteplase if used, vasopressors: levophed and/or dobutamine, and paralytics/sedatives for rapid sequence intubation</li> </ul>	<ul style="list-style-type: none"> <li>Recognize and treat STEMI, including administration of appropriate medical therapy and consultation with cardiology</li> <li>Anticipate hemodynamic decompensation and treat appropriately for patients at risk for cardiogenic shock including vasopressor support, non-invasive airway adjuncts</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate non-standard management of STEMI (when catheterization lab is not immediately available, or patient is unstable)</li> <li>Demonstrate effective team dynamics in a stressful peri-code situation when definitive care is delayed</li> <li>Recognize and appropriately manage cardiogenic shock</li> <li>Counsel family members regarding critical illnesses and involves them in</li> </ul>

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Case Name	Case Description	RN objectives	MD objectives	Team Objectives
		<ul style="list-style-type: none"> <li>Continue to assess and inform provider of vital sign changes and assessment findings (lung sounds)</li> </ul>		<ul style="list-style-type: none"> <li>decision-making process</li> </ul>
<i>Moped Trauma</i>	22-year-old male brought in by a friend as a trauma patient after he lost control of his moped and fell into a ditch on the side of the road. Patient quickly decompensates, with altered mental status, shock, pneumothorax. Patient requires emergent transfusion with level one rapid infuser and emergent chest tube placement followed by prompt transfer once stable for trauma surgery consult.	<ul style="list-style-type: none"> <li>Place patient on cardiac monitor and obtain at least two points of large bore intravenous access</li> <li>Recognize change in vital signs (hypotension, tachycardia, hypoxia) and assist in assessment findings of primary and secondary survey (decreased lung sounds on affected side)</li> <li>Assist in preparation and placement of chest tube</li> <li>Proper administration of emergent blood products using level one rapid infuser</li> </ul>	<ul style="list-style-type: none"> <li>Perform appropriate primary and secondary survey to identify traumatic injuries</li> <li>Follow guidelines as dictated by Advanced Trauma Life Support (ATLS)</li> <li>Demonstrate procedural competency in tube thoracostomy</li> <li>Recognize hemorrhagic shock in a trauma patient and prioritize administration of blood products</li> <li>Prepare for and treat loss of airway protection in a traumatized patient with potential difficult anatomy</li> </ul>	<ul style="list-style-type: none"> <li>Use teamwork and communication principles of closed loop communication, summarizing, task assistance, and situation awareness during trauma resuscitation</li> <li>Demonstrate a coordinated approach to the management of hemorrhagic shock in the trauma patient given lack of definitive trauma services and need to transfer to a level I trauma center</li> </ul>
<i>Acute Stroke in the Emergency Department</i>	77-year-old male brought in by emergency medical services for acute onset of right-sided weakness, last known normal 2.5 hours prior to arrival. Exam and imaging notable for middle cerebral artery occlusion and ischemic infarct with large deficit, indicated for thrombolysis with alteplase. Patient suffers hemorrhagic conversion post-thrombolytic therapy.	<ul style="list-style-type: none"> <li>Place patient on cardiac monitor, obtain vital signs, and identify abnormal findings on NIH Stroke Scale</li> <li>Obtain large bore intravenous access and all other necessary access (Foley catheter or additional points of access) prior to thrombolytic administration</li> <li>Appropriately administer medication with understanding of contraindications and what to assess for associated with thrombolytics</li> <li>Recognize and notify provider of patient change in mental status after thrombolysis</li> </ul>	<ul style="list-style-type: none"> <li>Perform appropriate neurologic assessment for recognition of potential stroke, including NIH Stroke Scale (may use cognitive aids if needed)</li> <li>Recognize ischemic stroke based on clinical exam and interpretation of imaging while considering alternative diagnoses</li> <li>Administer thrombolytic therapy for acute ischemic stroke in a timely fashion while considering indications and contraindications of thrombolysis</li> </ul>	<ul style="list-style-type: none"> <li>Use teamwork and communication principles of closed loop communication, summarizing, task assistance, and situation awareness during resuscitation of a patient experiencing an acute ischemic stroke and subsequent hemorrhagic conversion</li> <li>Perform timely and appropriate management of a patient with ischemic stroke, including critical actions of diagnosis, medication administration, and re-assessment</li> </ul>

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Case Name	Case Description	RN objectives	MD objectives	Team Objectives
		<ul style="list-style-type: none"> <li>• Administer anticoagulation reversal agents properly</li> </ul>	<ul style="list-style-type: none"> <li>• Anticipate, recognize and appropriately treat hemorrhagic conversion in a stroke patient</li> <li>• Prepare for and treat loss of airway protection in a patient with increased intracranial pressure and signs of impending herniation</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate patient-centered discussion with family regarding diagnosis and management of stroke and updates regarding prognosis after hemorrhagic conversion</li> </ul>
<p>ED, emergency department; NIH, National Institutes of Health.</p>				

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 3:**

Quantitative Feedback from Debriefing Assessment for Simulation in Healthcare (DASH) Evaluation Tool from Nursing Participants

DASH Element	End of Session	
	Mean scores	Standard deviation
One: The instructor set the stage for an engaging learning environment.	6.91	±0.12
Two: The instructor maintained an engaging context for learning.	6.94	±0.09
Three: The instructor structured the debriefing in an organized way.	6.94	±0.05
Four: The instructor provoked in-depth discussions that led me to reflect on my performance.	6.89	±0.25
Five: The instructor identified what I did well or poorly and why	7.0	±0
Six: The instructor helped me see how to improve or how to sustain good performance.	6.94	±0.08
Overall	6.97	±0.16

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 4:**

Qualitative Feedback from Nursing and Resident Physician Participants and Program Iterative Refinement

Themes	Definition/Concept	RN Participant Feedback	MD Participant Feedback	Steps to Program Refinement
Individual Clinical Skill Development	Interprofessional simulation is seen as an educational resource to promote continuous quality improvement, specifically as it applies to individual safety in clinical practice. Understanding the “why” behind clinical practices is beneficial.	<p>“Thank you for going into detail about hyperkalemia orders. The extra learning is refreshing. I wish we could do simulation learning more often.”</p> <p>“This orientation has been a really great help and a good place for me to ask clinical questions in a non-judgmental area.”</p> <p>“More simulations and trauma training classes should be taught as they are informative and a less stressful environment to learn critical skills.”</p>	<p>“I thought the simulation was very effective and helpful for both us [doctors] and nurses. Working through diagnoses and interventions in front of the whole team was really useful. The scenarios felt like real traumas or codes and it put realistic pressure on me to quickly performing tasks while critically thinking or breaking down what we need to do next.”</p> <p>“I love the debrief as they break down why we do what we do. It makes me really think deeply about how we make decisions while trying to diagnose what's going on with the patient.”</p>	Continued support from educator team and administrative leadership to support the interprofessional simulation-based trauma orientation program
Teamwork/Communication Skills	Having a greater understanding of the thought processes of other professions is beneficial. Interprofessional simulation is an educational modality that promotes teamwork and builds recognition for why teamwork is necessary in the management of critically ill patients.	<p>“I enjoyed debriefing because it gave us the opportunity to voice our opinion, think out loud, and reflect on our strengths and weaknesses to other members of the team.”</p> <p>“I think simulation is both helpful for team building and for enhancing the development as well as proficiency of the interprofessional team! We really came together as a functioning unit.”</p>	<p>“I enjoyed working as a collaborative team. It promoted my own skills in teamwork and communication. I will work on summarizing my thought process and make sure everyone on the team is on the same page so we can anticipate each other's next steps in the future.”</p> <p>“I really felt like we bonded as a team after running all these simulation cases together. We get each other now. I can't wait for us to actually work together!”</p>	Teamwork and communication targeted as a greater focus within debriefing during interprofessional simulations. Participants are informed of this in the pre-brief and it is an encouraged theme in the debrief.
Insight into Respective Roles, Identities, and Priorities	This experience fostered understanding of the different roles and responsibilities across professions in a constructive and appreciated fashion. The unique perspectives offered from each profession are identified by the participants as important to learning.	<p>“Enjoyed doing simulations with residents, gives me a better idea of their thought process during code situations.”</p> <p>“I think all trauma nurses, seasoned or not, should attend the simulations. They assist with good communication and respect with the residents. It also shows how incredibly smart these attendings and residents are- which is exciting for us nurses to see!”</p>	<p>“Everyone should go through team simulations because it shows [the residents] what nurses go through and thought processes and vice versa. I feel more empowered in resuscitation rooms to speak directly to the nurse because of these. I also will make a better effort to learn all my nursing colleague's names.”</p> <p>“Debriefs provide a valuable way for me to understand how nurses think and what they anticipate with their actions when I discuss my plan and differential diagnoses.”</p>	A structured pre-brief highlights the importance of mutual respect across professions as well as confidentiality during the simulation and debriefing in an effort to promote open dialog for learning purposes. The debriefing also facilitates advocacy/inquiry to reveal thought processes behind critical actions observed in the simulation.
Reflections on Simulation Experience and Orientation Program System Improvements	Interprofessional simulation provides a unique learning environment for participants that is both educational and gratifying. The continued success of the program is reliant on feedback related to the participant's experience and continued improvement of the	<p>“Sim was helpful with learning where strengths and weaknesses are. Sim and debriefing helped with recognizing what could have been done better and what went well. Interprofessional simulations could be beneficial to all, not just trauma orientation.”</p> <p>“Trauma orientation and sim has been beneficial, but I think more time and education needs to be spent in the resuscitation rooms for</p>	<p>“Simulation was extremely helpful in helping manage multiple medical problems within the critical patient. I liked the debriefing because it allowed everyone to talk about their process behind their medical decisions. I also liked sim because it allowed me to take time and think about my actions/patient care.”</p> <p>“I wish I had more learning opportunities like these last two days earlier in my training.”</p> <p>“I believe it would be helpful to</p>	There is continued support from faculty and administrative leadership to support the interprofessional simulation-based trauma orientation program. We added 12 hours of clinical orientation time to the original two-day program in response to orientee requests. There are current discussions with administrative leadership

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript



Themes	Definition/Concept	RN Participant Feedback	MD Participant Feedback	Steps to Program Refinement
	<p>program to meet the learning objectives of those involved.</p>	<p>newer nurses. I don't think 8 hours is enough for practical experience."                      "I felt a lot of the debrief went to the resident performance."                      "It would be beneficial to have class offerings weekly/monthly to review trauma material because there is an enormous amount of information."</p>	<p>make more use of interdisciplinary sim for the residents and increase the frequency of such exercises."                      "I went from dreading simulation to really enjoying my experience. I learned a lot and used the things I needed to work on from the first case to better myself and my role in the second case. I really enjoyed working with the nurses—gave us a more realistic feel."</p>	<p>regarding more opportunities for senior staff nursing to be involved in simulation. Recognition of the nursing perspective and adjustment as needed to debriefing structure to be more inclusive of nursing was facilitated in response to evaluation data.                      The education team promotes the continuous collection of evaluation data to assess the efficiency of the program at obtaining educational objectives.</p>

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript