PROGRAM PROFILE

Nightmare on CIL Street: A Simulation Series to Increase Confidence and Skill in Responding to Clinical Emergencies

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Background: The Central Texas Veterans Health Care System (CTVHCS) in Temple, a 189-bed teaching hospital, recently opened its Center for Innovation and Learning for simulation-based learning. CTVHCS built a rapid response simulation curriculum to improve preparedness for internal medicine residents, medical students, and physician assistant students that exploits newly developed medical education technology.
Observations: The Center for Innovation and Learning curriculum was created based on the most common rapid response calls received over the previous 3 years. Cardiac, respiratory, and neurological simulations were implemented. Learners approach each scenario as if they were on night service alone without specialist help. Learners must identify tachyarrhythmia, impending respiratory failure, and a patient with encephalopathy requiring transfer.
Conclusions: Sixteen learners were surveyed before the simulation and after addressing each educational objective was completed and showed improvement. Educating trainees on rapid response scenarios by using a simulation curriculum provides many benefits. Trainees reported improvement in addressing cardiac, respiratory, and neurological rapid response scenarios after experiencing the simulation.

The Central Texas Veteran's Health Care System (CTVHCS) in Temple, Texas, is a 189-bed teaching hospital. CTVHCS opened the Center for Innovation and Learning (CIL) in 2022. The CIL has about 279 m^2 of simulation space that includes high- and low-fidelity simulation equipment and multiple laboratories, which can be used to simulate inpatient and outpatient settings. The CIL high-fidelity manikins and environment allow learners to be immersed in the simulation for maximum realism. Computer and video systems provide clear viewing of training, which allows for more in-depth debriefing and learning. CIL simulation training is used by CTVHCS staff, medical residents, and medical and physician assistant students.

The utility of technology in medical education is rapidly evolving. As noted in many studies, simulation creates an environment that can imitate real patients in the format of a lifelike manikin, anatomic regions stations, clinical tasks, and many real-life circumstances.[1] Task trainers for procedure simulation have been widely used and studied. A 2020 study noted that simulation training is effective for developing procedural skills in surgery and prevents the decay of surgical skills.[2]

In reviewing health care education curriculums, we noted that most of the rapid response situations are learned through active patient experiences. Rapid responses are managed by the intensive care unit and primary care teams during the day but at night are run primarily by the postgraduate year 2 (PGY2) night resident and intern. Knowing these logistics and current studies, we decided to build a rapid response simulation curriculum to improve preparedness for PGY1 residents, medical students, and physician assistant students.

CURRICULUM PLANNING

Planning the simulation curriculum began with the CTVHCS internal medicine chief resident and registered nurse (RN) educator. CTVHCS data were reviewed to identify the 3 most common rapid response calls from the past 3 years; research on the most common systems affected by rapid responses also was evaluated.

A 2019 study by Lyons and colleagues evaluated 402,023 rapid response activations across 360 hospitals and found that respiratory scenarios made up 38% and cardiac scenarios made up 37%.[3] In addition, the CTVHCS has limited support in stroke neurology. Therefore, the internal medicine chief resident and RN educator decided to run 3 evolving rapid

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TABLE Simulation Learning Goals

Cardiac	Respiratory	Neurologic
Recognize and diagnose a tachydysrhythmia secondary to Wolff-Parkinson-White syndrome	Recognize acute changes in patients' vital signs and identify respiratory failure	Review initial approach and assessment to unstable floor patient
Recognize stable vs unstable patients	Develop differential diagnosis for acute respiratory failure while concurrently managing the patient's airway, breathing and circulation	Work through and locate underlying etiology and cause of confusion
Appropriately determine medication treatments based on tachydysrhythmias	Identify anaphylaxis, potential offending agents, and treatments	Recognize and initiate management of hypertensive emergency
Appropriately provide cardioversion	Recognize pending airway obstruction and develop airway management plan	Recognize and treat seizure activity
		Coordinate stroke transfer

response scenarios per session that included cardiac, respiratory, and neurological scenarios. Capabilities and limitations of different high-fidelity manikins were discussed to identify and use the most appropriate simulator for each situation. Objectives that met both general medicine and site-specific education were discussed, and the program was formulated.

Program Description

Nightmare on CIL Street is a simulation-based program designed for new internal medicine residents and students to encounter difficult situations (late at night, on call, or when resources are limited; ie, weekends/holidays) in a controlled simulation environment. During the simulation, learners will be unable to transfer the patient and no additional help is available. Each learner must determine a differential diagnosis and make appropriate medical interventions with only the assistance of a nurse. Scenarios are derived from common rapid response team calls and low-volume/high-impact situations where clinical decisions must be made quickly to ensure the best patient outcomes. High-fidelity manikins that have abilities to respond to questions, simulate breathing, reproduce pathological heart and breath sounds and more are used to create a realistic patient environment.

This program aligns with 2 national Veterans Health Administration priorities: (1) connect veterans to the soonest and best care; and (2) accelerate the Veterans Health Administration journey to be a high-reliability organization (sensitivity to operations, preoccupation with failure, commitment to resilience, and deference to expertise). Nightmare on CIL Street has 3 clinical episodes: 2 cardiac (A Tell-Tale Heart), respiratory (Don't Breathe), and neurologic (Brain Scan). Additional clinical episodes will be added based on learner feedback and assessed need.

Each simulation event encompassed all 3 episodes that an individual or a team of 2 learners rotate through in a round-robin fashion. The overarching theme for each episode was a rapid response team call with minimal resources that the learner would have to provide care and stabilization. A literature search for rapid response team training programs found few results, but the literature assisted with providing a foundation for Nightmare on CIL Street.[4,5] The goal was to completely envelop the learners in a nightmare scenario that required a solution.

After the safety brief and predata collection, learners received a phone call with minimal information about a patient in need of care. The learners responded to the requested area and provided treatment to the emergency over 25 minutes with the bedside nurse (who is an embedded participant). At the conclusion of the scenario, a physician subject matter expert who has been observing, provided a personalized 10-minute debriefing to the learner, which presented specific learning points and opportunities for the learner's educational development. After the debriefing, learners returned to a conference room and awaited the next call. After all learners completed the 3 episodes, a group debriefing was

conducted using the gather, analyze, summarize debriefing framework. The debriefing begins with an open-ended forum for learners to express their thoughts. Then, each scenario is discussed and broken down by key learning objectives. Starting with cardiac and ending with neurology, the logistics of the cases are discussed based on the trajectory of the learners during the scenarios. Each objective is discussed, and learners are allowed to ask questions before moving to the next scenario. After the debriefing, postevent data were gathered.

Objectives

The program objective was to educate residents and students on common rapid response scenarios. We devised each scenario as an evolving simulation where various interventions would improve or worsen vital signs and symptoms. Each scenario had an end goal: cardioversion (cardiac), intubation (respiratory), and transfer (neurologic). Objectives were tailored to the trainees present during the specific simulation (Table).

IMPLEMENTATION

The initial run of the simulation curriculum was implemented on February 22, 2023, and ended on May 17, 2023, with 5 events. Participants included internal medicine PGY1 residents, third-year medical students, and fourth-year physician assistant students. Internal medicine residents ran each scenario with a subject matter expert monitoring; the undergraduate medical trainees partnered with another student. Students were pulled from their ward rotations to attend the simulation, and residents were pulled from electives and wards. Each trainee was able to experience each planned scenario. They were then briefed, participated in each scenario, and ended with a debriefing, discussing each case in detail. Two subject matter experts were always available, and occasionally 4 were present to provide additional knowledge transfer to learners. These included board-certified physicians in internal medicine and pulmonary critical care. Most scenarios were conducted on Wednesday afternoon or Thursday.

The CIL provided 6 staff minimum for every event. The staff controlled the manikins and acted as embedded players for the learners to interact and work with at the bedside. Every embedded RN was provided the same script: They were a new nurse just off orientation and did not know what to do. In addition, they were instructed that no matter who the learner wanted to call/page, that person or service was not answering or unavailable. This forced learners to respond and treat the simulated patient on their own.

Survey Responses

To evaluate the effect of this program on medical education, we administered surveys to the trainees before and after the simulation (Appendix). All questions were evaluated on a 10-point Likert scale (1, minimal comfort; 10, maximum comfort). The postsurvey added an additional Likert scale question and an open-ended question.

Sixteen trainees underwent the simulation curriculum during the 2022 to 2023 academic year, 9 internal medicine PGY1 residents, 4 medical students, and 3 physician assistant students. Postsimulation surveys indicated a mean 2.2 point increase in comfort compared with the presimulation surveys across all questions and participants.

DISCUSSION

The simulation curriculum proved to be successful for all parties, including trainees, medical educators, and simulation staff. Trainees expressed gratitude for the teaching ability of the simulation and the challenge of confronting an evolving scenario. Students also stated that the simulation allowed them to identify knowledge weaknesses.

Medical technology is rapidly advancing. A study evaluating high-fidelity medical simulations between 1969 and 2003 found that they are educationally effective and complement other medical education modalities.[6] It is also noted that care provided by junior physicians with a lack of prior exposure to emergencies and unusual clinical syndromes can lead to more adverse effects.[7] Simulation curriculums can be used to educate junior physicians as well as trainees on a multitude of medical emergencies, teach systematic

approaches to medical scenarios, and increase exposure to unfamiliar experiences.

The goals of this article are to share program details and encourage other training programs with similar capabilities to incorporate simulation into medical education. Using pre- and postsimulation surveys, there was a concrete improvement in the value obtained by participating in this simulation. The Nightmare on CIL Street learners experienced a mean 2.2 point improvement from presimulation survey to postsimulation survey. Some notable improvements were the feelings of preparedness for rapid response situations and developing a systematic approach. As the students who participated in our Nightmare on CIL Street simulation were early in training, we believe the improvement in preparation and developing a systematic approach can be key to their success in their practical environments.

From a site-specific standpoint, improvement in confidence working through cardiac, respiratory, and neurological emergencies will be very useful. The anesthesiology service intubates during respiratory failures and there is no stroke neurologist available at the CTVHCS hospital. Giving trainees experience in these conditions may allow them to better understand their role in coordination during these times and potentially improve patient outcomes. A follow-up questionnaire administered a year after this simulation may be useful in ascertaining the usefulness of the simulation and what items may have been approached differently. We encourage other institutions to build in aspects of their site-specific challenges to improve trainee awareness in approaches to critical scenarios.

Challenges

The greatest challenge for Nightmare on CIL Street was the ability to pull internal medicine residents from their clinical duties to participate in the simulation. As there are many moving parts to their clinical scheduling, residents do not always have sufficient coverage to participate in training. There were also instances where residents needed to cover for another resident preventing them from attending the simulation. In the future, this program will schedule residents months in advance and will have the simulation training built into their rotations.

Medical and physician assistant students were pulled from their ward rotations as well. They rotate on a 2-to-4-week basis and often had already experienced the simulation the week prior, leaving out students for the following week. With more longitudinal planning, students can be pulled on a rotating monthly basis to maximize their participation. Another challenge was deciding whether residents should partner or experience the simulation on their own. After some feedback, it was noted that residents preferred to experience the simulation on their own as this improves their learning value. With the limited resources available, only rotating 3 residents on a scenario limits the number of trainees who can be reached with the program. Running this program throughout an academic year can help to reach more trainees.

CONCLUSIONS

Educating trainees on rapid response scenarios by using a simulation curriculum provides many benefits. Our trainees reported improvement in addressing cardiac, respiratory, and neurological rapid response scenarios after experiencing the simulation. They felt better prepared and had developed a better systematic approach for the future.

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Ethics and consent

Not applicable

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APPENDIX Survey Questions

Survey	Question
Pre and post	How comfortable do you feel under rapid response situations?
Pre and post	Do you feel adequately prepared for rapid response situations?
Pre and post	Do you have a systematic approach to rapid responses?
Pre and post	How confident are you in working through cardiac rapid responses?
Pre and post	How confident are you in working through respiratory rapid responses?
Post and post	How confident are you in working through neurology critical situations?
Post	How comfortable are you with cardioversion?
Post	Is there anything you would like to see done differently?

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