

I Remember That! Gamification in Malignant Hyperthermia

Management Training

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Description of Team

Malignant Hyperthermia (MH) crisis is fatal event that can happen in the perioperative setting. MH is a genetic condition where the skeletal muscles affect myoplasmic calcium homeostasis. According to the Malignant Hyperthermia Association of the United States (2024), MH is a biochemical response that can be caused by inhalation anesthetics and succinylcholine. Unfamiliarity to the management of the crisis will result in management delay and can lead to patient death. The purpose of this quality improvement project is to increase knowledge and confidence of perioperative team at an urban, tertiary, academic teaching medical center.



Figure 1-2: Simulation Exercise Overview and Simulation Observations



Photo 1-4: Operating Room Team during game-based education and MH Simulation.

| Simulation Exercise | |
|---------------------|---|
| Exercise Name | Malignant Hyperthermia – Adult in the Operating Room |
| Exercise Location | Operating Room |
| Exercise Date | 9/20/2024 |
| Event Scope | The simulation is planned for 60 minutes in the Operating Room at Jesse Brown VA Medical Center. The drill intends to elicit authentic response during an emergency crisis (Malignant Hyperthermia) |
| Learner Scope | Anesthesiologist (1) ESP, Surgeon (1) ESP, Surgical Technologist, Registered Nurse |
| Objectives | 1. Demonstrate appropriate management of Malignant Hyperthermia 2. Identify signs and symptoms of Malignant Hyperthermia |
| Scenario | 50-year-old male, Veteran in the operating room for a right inguinal hernia repair, no known history of adverse effects from anesthesia. Patient draped, prepped for procedure on the OR table. Time out has been completed. Incision made. 15 minutes after incision, MH symptoms observed. |

| Observations, Timeline and LSTs | Time | Observation | LST Category | LST Descriptor | LST Rationale |
|---------------------------------|------|---|--|--|--|
| | 0712 | Availability of Cold Saline for Irrigation/Infusion | Medications | Missing/malfunctioning supplies or no process | No available Cold NS for Irrigation and Infusion |
| | 0712 | No clear assigned roles for additional RNs helping | Team and Communication | Ineffective Communication | No clear assignment on who gets MH kit, ice, etc. |
| | 0712 | Minor delay in calling charge RN | Team and Communication | Ineffective Communication | Circulating RN is not clear on the mode of communication to call Charge RN (red button vs. calling Charge) |
| | 0716 | Minor delay in locating emergency carts | Knowledge or unformed skill/habit | Unfamiliarity with supplies/equipment | Unfamiliar with location of MH Kit |
| | 0716 | Additional Cooling Measure | Environment/Supplies/Equipment | Resources/Other Guidelines | Using patient warming device and turning to ambient temperature to help cool the patient |
| | 0716 | Missing Visual Guide for RNs | Environment/Supplies/Equipment/ Knowledge and unformed skill/habit | Cognitive aid missing, ineffective or not used | No cognitive aid on management of MH in the room |

Staff confidence scored at 92.3% in managing an MH crisis in the operating room. 100% recommends the simulation exercise as an annual activity for the perioperative team. The team identified six latent safety threats and created action plans for each threat.

Implications for Nursing Practice

Simulation based training is recommended for high-risk, low-volume events in the perioperative setting. The exercise provides a realistic and safe environment for nurses, surgical technologists, and allied partners to apply and enhance their knowledge and skills in MH management.

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Preparation and Planning

An interdisciplinary team consisting of perioperative leadership, OR nurses, anesthesia partners and simulation specialists plan a process test. A simulation scenario for an adult MH crisis was created for the perioperative setting. The NPDS added gamification to create an engaging learning environment. In a 2021 study by Van Gaalen, et al, it showed that gamification is a promising tool to improve learning outcomes by strengthening learning behaviors and attitudes towards learning

Assessment

The quality improvement project seeks to assess the level of engagement of the team in a MH simulation exercise. A 11-item post simulation questionnaire was created to measure effectiveness of the simulation exercise.

Implementation

A game-based education with knowledge checks was conducted to establish baseline education amongst operating room staff. An in-situ simulation exercise followed to provide a high-fidelity environment. A pre-briefing was completed to set the stage of the simulation. Key competencies were included in the exercise. These include time of signs and symptoms recognition, delivery of MH medication and alerting the charge nurse of the emergency. An After-Action report was completed to identify opportunities for improvement.

Outcomes

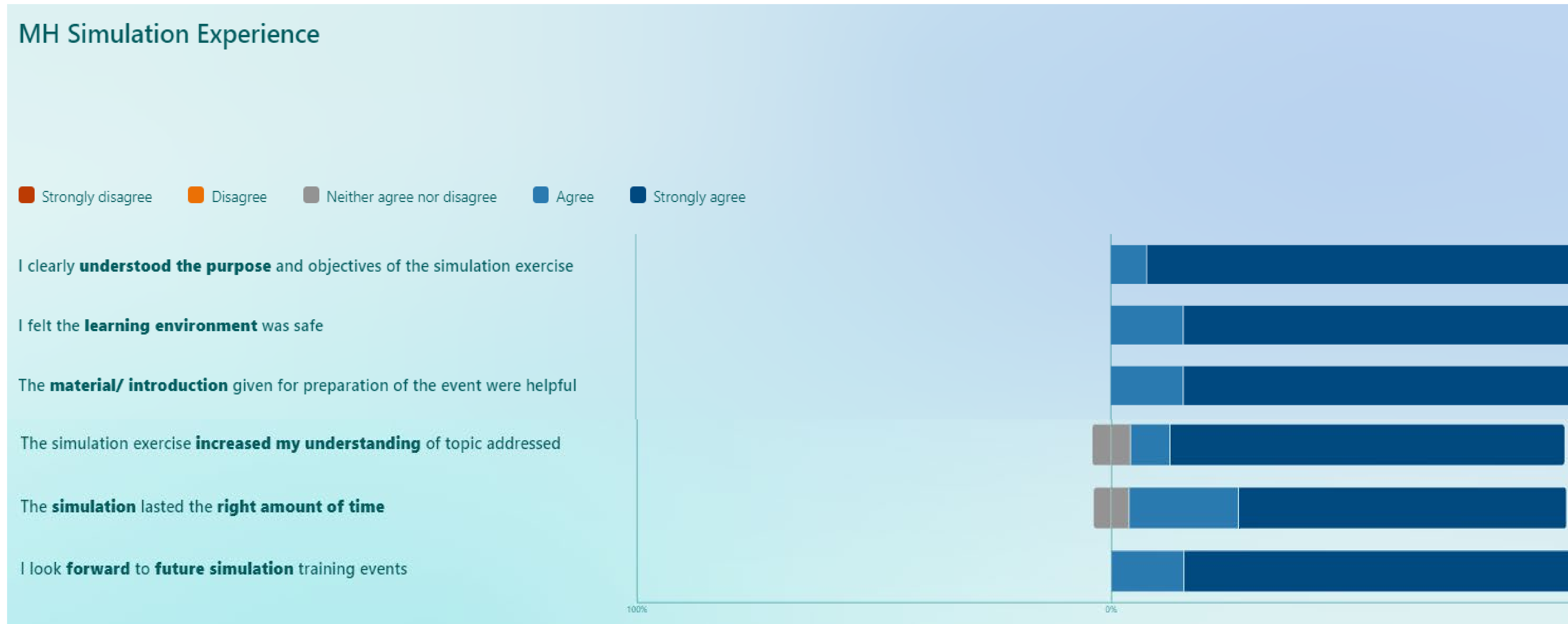


Figure 3: Simulation Experience Results

Recommendation for MH Simulation Annually: 100%

Staff Confidence in Managing a MH Crisis: 92.3%

Latent Safety Threats Identified: 7

Simulation Time: 60 Minutes

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