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Implementation of Crisis Checklists in the Operating Room

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Executive Summary

Introduction to the Problem

Emergencies in the operating room, such as cardiac arrest and malignant hyperthermia (MH), are rare but serious occurrences that require timely interventions from the anesthesia provider. Though the typical individual practitioner will rarely experience an operating room (OR) crisis, for a hospital with 10,000 surgical procedures each year, an estimated 145 operating room crises will take place (Arriaga et al., 2013). Regardless of the intense training anesthesia providers undergo, their attention is divided among multiple information sources, including the patient, monitors, fellow staff members, equipment, and tasks. The culminant stress of emergency situations results in decreased recall ability, and distractions interrupt planned actions from being carried out (Stanford Anesthesia Cognitive Aid Group, 2016).

The use of a cognitive aid, such as a crisis checklist, can ensure anesthesia providers do not miss crucial steps in the delivery of care in emergency situations. Simulation training can lead to increased adherence to use of the emergency checklists, decreased time to use, and decreased time to performing the appropriate interventions.

Because OR crises are relatively infrequent, the director of anesthesia and the nurse anesthesia clinical coordinator of Anesthesia Associates of Belleville approached DNP students at Southern Illinois University Edwardsville about implementing checklists for the treatment of several OR emergencies. Components of the *Emergency Manual: Cognitive Aids for Perioperative Critical Events* by the Stanford Anesthesia Cognitive Aid Group, commonly known as the *Stanford Emergency Manual*, were chosen by the facility for use in their ORs because of its integration of both Advanced Cardiac Life Support (ACLS) principles and

anesthesia-related components to the treatment of OR crises. Based on a review of implementation techniques, simulation training was planned to educate anesthesia staff, the main stakeholders of this project, on the use of the new checklists. Simulations would be carried out in the ORs where they work daily to allow for more realistic instruction.

Literature Review

Checklists have been used as performance aids in other industries for many years, such as aviation and nuclear energy. Checklists used as cognitive aids and emergency manuals have been proven to aid the healthcare worker under stress perform more comprehensive care. The use of cognitive aids can assist operating room teams to work together more effectively with appropriate responses, especially under situations with elevated stress levels (Dagey, 2017). The use of cognitive aids can help the provider take a systematic approach to crisis interventions and guide appropriate care that will not only benefit the patient but will also benefit the provider to act promptly and efficiently.

Due to the relative infrequency of some critical events in healthcare, the use of simulation in training the proper responses to these events has played an increasing role in the education of staff and trainees (Kennedy, Cannon, Warner, & Cook, 2014). A meta-analysis by Kennedy et al. (2014) concluded that learner satisfaction was greater with simulation training than when no simulation interventions were employed. Advantages of simulation activities include improved diagnostic capabilities and better team coordination (Nicksa et al., 2015). Also of great importance, Arriaga et al. (2013) demonstrated the ability of simulation training to detect previous knowledge deficits.

In reviewing the literature, increased provider confidence and improved performance were shown as a result of simulation and checklist use in multiple studies (Arriaga et al., 2013; Dagey, 2017; Goldhaber-Fiebert et al., 2015; Harrison et al., 2006; Huser et al., 2014; Nicksa et al., 2015; Park et al., 2010). Additionally, studies demonstrated the use of cognitive aids during a crisis simulation led to increased adherence to recommended life-saving processes (Arriaga et al., 2013; Harrison et al., 2006). Survey responses from study participants that utilized crisis checklists during simulated emergencies indicate a strong likelihood that they will reach for such resources in the future should they experience crises while caring for patients (Arriaga et al., 2013; Goldhaber-Fiebert et al., 2015; Watkins et al., 2016). The overwhelming evidence that simulation has a positive impact on healthcare provider education and implementation of cognitive aids can be seen in the literature.

Methodology

The purpose of this quality improvement project was to implement cognitive aids for timely diagnosis and treatment of cardiac emergencies and MH using simulation-based education for the anesthesia staff at a tertiary care center in southwestern Illinois. The project had a non-experimental study design. An exempt Institutional Review Board (IRB) application was submitted to Southern Illinois University Edwardsville (SIUE) and was approved on May 3, 2018. Additionally, application to proceed with this project was submitted to the Belleville Community IRB and was approved on May 3, 2018.

The anesthesia staff and student registered nurse anesthetists (SRNAs) that were present on the implementation day received a 15-minute educational session on the use of cognitive aids and the benefits of simulation training. A total of 18 staff certified registered nurse anesthetists (CRNAs), anesthesiologists, and SRNAs took part in the high-fidelity simulation training,

complete with mannequins, code carts, the MH cart, and defibrillators. While one OR carried out cardiac arrest simulation with the checklists, another OR carried out MH simulation. After the 15-minute simulation time, the groups switched and took part in the other simulation. Following education and simulation, the participating staff completed a follow-up survey containing 11 items. The survey consisted of ten trichotomous questions, one multiple choice question, and one question for open-ended comments.

Evaluation

Following education regarding the cognitive aids and simulation exercises in which they were referenced, the survey results demonstrated a positive response. All participants responded "Yes" when asked if they felt more prepared to manage or assist a patient having a perioperative Cardiac Crisis or Malignant Hyperthermia crisis after participating in a simulation with the Cardiac Arrest Checklists and Malignant Hyperthermia Checklist respectively (N=16). All hospital employees that participated in the simulation training and completed a survey had a positive response when asked if they would suggest incorporating the surgical crisis simulations into annual training at a tertiary care center in southwestern Illinois (N=10). All SRNAs but one also felt annual simulation training would be beneficial (N=3). The one SRNA that did not respond "Yes" marked with a response of "Unsure."

The most significant limitation of this project was the sample size and inability to compare data between CRNA and anesthesiologist survey data. The results were limited by the fact that neither of the two anesthesiologists in attendance returned a survey. Of the total 39 anesthesia staff members, only 12 attended the training session due to scheduling across multiple facilities. The resulting sample size (N=16) was slightly smaller than projected. Additionally, the simulations themselves could have been expanded to improve the suspension of disbelief in

participants. Future incorporation of surgical drapes, a working IV with fluids infusing, and syringes labeled with drug names for administration could make the simulation more realistic.

Impact to Practice

Data from this project suggests that after simulated emergencies with the Stanford Emergency Manual checklists, the anesthesia providers at this facility plan to use the checklists when future patient issues arise. Because of heightened awareness of the presence, location, and format of the checklists, the providers are more likely to reach for the crisis checklists during an emergency. Adherence to the interventions on the checklists can lead to improvements in patient care and outcomes in future operating room crises.

The potential for sustainability of this project is high. The initial cost of printing the hard copies of the checklists is complete; new costs would not be incurred unless new checklists are needed due to breakdown, loss, or expansion of the operating room. Annual simulation of cardiac arrest and MH using the crisis checklists for reference can be completed during the instructional time determined by the employer to minimize costs.

Conclusion

The focus of this project was to implement crisis checklists in the operating room with high-fidelity simulation-based education. Findings suggest that the use of simulation with the checklists increased the participants' overall knowledge of the treatment of MH and cardiac arrest, as well as made them more prepared to manage and assist in the care of the patient experiencing cardiac arrest or MH. One hundred percent of the participants reported they felt that simulation of operating room crises with the checklists should be carried out annually. This finding demonstrated that the project was warranted and impactful. Support in the literature of

cognitive aids and simulation-based education across many disciplines led to the development of this project. Positive findings elicited from participants warrant the implementation of additional crisis checklists utilizing simulation-based education.