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Emergency Nurse Perceptions of Disaster Preparedness After the Implementation of a Department Emergency Operations Plan

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EMERGENCY NURSE PERCEPTIONS OF DISASTER PREPAREDNESS AFTER THE IMPLEMENTATION OF A DEPARTMENT EMERGENCY OPERATIONS PLAN

By

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Abstract

Emergency departments (ED) are the entryway into the healthcare system during a disaster event and patients often arrive in the first thirty minutes after an event has occurred. This creates unique challenges for ED nurses. The purpose of the Quality Improvement (QI) project was to measure the impact of a Department Emergency Operations Plan (DEOP) on the ED nurse's perception of disaster preparedness. This study included a convenience sample of 126 full time and part time registered nurses working in the ED at a Level 1 Trauma hospital. Institutional Review Board (IRB) approval was obtained by both Arkansas Tech University and the participating hospital. Informed consent was obtained prior to taking the pre- and post-education questionnaires. The questionnaires were created by the primary investigator with expert validation by the Emergency Nurses Association's (ENA) 2018 Emergency Management and Preparedness Committee (EMPC). Measures included knowledge level questions based on the identified priority needs of the leadership team. Education of the DEOP was provided over thirty minutes during the January, 2019 staff meetings. Data was collected via REDCap for analysis. Thirty participants completed both questionnaires. Results indicate that the DEOP QI project significantly increased the perception of the ED's nurse's knowledge level regarding disaster response for each of the questions utilized from the pre-education questionnaire as compared to the post-education questionnaire. Additionally, 85% of participants noted that the education increased their comfort level with the DEOP.

Keywords: disasters, hospital preparedness, mass casualty incidents, department emergency operations plan, emergency department, emergency department nurse

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Chapter I: Introduction

Focus of Inquiry

Disasters are inevitable. A disaster event can be caused by a natural phenomenon, such as a hurricane or tornado, or a man-made event, such as a bombing, active shooter, or technology failure. The emphasis of emergency preparedness for communities and individual hospitals in regards to mass casualty disaster incidents has become significant as the prevalence and intensity of these events have increased in recent years (Nadworny et al., 2014). Over the past 22 years (1990-2018), there were 87 recorded mass shootings, 57% of which occurred in the last 10 years (2018 National Crime Victims' Rights Week Resource Guide: Crime and Victimization Fact Sheet, 2018). Additionally, the scope and severity of natural disasters have increased over the past 20 years according to the Centre for Research on the Epidemiology of Disease (CRED). From 1994-2013, 218 million people worldwide were affected by natural disasters with 529 of those disasters occurring solely in 2013 (CRED, 2015). The need for emergency preparedness is particularly important for acute care hospitals that provide emergency department, operating rooms, and inpatient care capabilities in communities. Whatever the cause, disaster events generally occur with little to no warning and often have devastating impacts to the affected area and surrounding communities.

Acute care hospitals play a crucial role in disaster response, especially when the response includes a mass casualty incident. Regulatory agencies such as The Joint Commission (TJC) and Centers for Medicaid and Medicare Services (CMS) have developed specific guidance to ensure that emergency preparedness activities occur at the hospital level. In fact, TJC and CMS have mandated that hospitals develop and exercise

plans for various disaster situations (Veenema, Deruggiero, Losinski, & Barnett, 2017). The hospital emergency operations plan (HEOP) provides an overview of the command structure, role and responsibilities, as well as response needs of the hospital system (Nielson, 2017). The HEOP is evaluated yearly, as required by TJC, through the hospital's emergency management committee comprises of hospital leadership from all departments. According to Neilson (2017), "It is pivotal to know the plan, the command structure (who's in charge), and the key components of disaster preparedness" (p. 55). Professional nurses, despite work location, are integral to the overall response of the healthcare facility during disaster events, and thus should have knowledge of the HEOP.

Disasters can quickly overwhelm hospital resources, including staff, supplies, and bed availability. A disaster event can interrupt normal hospital operations in the first 15-30 minutes of the event's occurrence (Neilson, 2017). The activation of the HEOP initiates the assembly of supporting infrastructure necessary for a timely and appropriate hospital level response and must occur quickly after the identification of an incident in order for the hospital to respond efficiently (Whetzel, Walker-Cilo, Chan, & Trivett, 2013). Disaster events include no notice events occurring at the hospital, such as an active shooter, as well as external events occurring in or around the community. The HEOP is a lengthy document often evaluated at a leadership level. This document covers information from activation through recovery and is nonspecific to a particular department's disaster response needs. Veenema et al. (2017) states, "An effective institutional disaster response requires seamless integration of all functioning units if staff and patients are to be kept safe from harm and ensure that quality of care is not compromised" (p. 152).

Emergency departments (ED) are the primary entry point into the hospital setting for victims of a disaster, and as such, play a crucial role in disaster response. However, EDs are often at maximum capacity or overcrowded. Overcrowding in EDs is a global concern and has been identified as a national crisis in some countries (Yarmohammadian, Rezaei, Haghshenas, & Tavakoli, 2017). Yarmohammadian, Rezaei, Haghshenas, and Tavakoli (2017) define overcrowding as the circumstances in which the services of the ED are impacted due to the excessive number of patients waiting to be seen, currently undergoing assessment and treatment, or awaiting disposition as compared to the bed or staffing capacity of the ED. Disaster events typically create a surge of patients requiring care into the ED. In times of surge, the healthcare needs of patients surpass accessible resources, creating a disruption in hospital operations that cause them to falter (Jenkins et al., 2015). Without an adequate department specific plan, this surge of patients greatly affects the ability of the ED to provide coordinated, effective care. Literature indicates that hospital operations are often impacted soon after a disaster strikes as the first patients involved in a mass casualty disaster situation frequently arrive to the ED within 5-30 minutes of the event and may arrive without prior notification (Jenkins et al., 2015; Neilson, 2017; Whetzel et al., 2013). Due to this occurrence, emergency nurses must have knowledge of the HEOP and know the activation/escalation process in order for the hospital to respond swiftly and effectively. However, ED nurses cannot wait for the hospital to assemble the incident command structure in order to provide initial mass casualty or disaster response guidance. Effective planning and preparedness activities specific to the ED is essential to the initial phase of disaster response.

Statement of the Problem

While the HEOP is the official plan for the healthcare facility, it is a lengthy document that guides the entire hospital response efforts from activation of the event through recovery efforts. Because this plan is lengthy and encompasses the facility-wide response efforts, it is not easy to navigate for department specific needs in the midst of a disaster response. ED staff need an easy to navigate guide for disaster response to ensure the congruency of the healthcare delivery system during high stress, high impact, ever changing events. EDs should have a department emergency operations plan (DEOP) that encompasses the needs of the department as well as the overarching facility response.

Need and Background for the Study

The HEOP is a document managed by the hospital's emergency management committee with oversight from senior leadership. The HEOP guides disaster response of the entire facility to include staff and resource management, and thus should be activated immediately upon notification of an event. In reality, HEOPs are often lengthy documents and non-specific to department level guidance or needs in regards to a disaster response. When assessing knowledge of the HEOP, a high percentage of frontline ED nurses were unaware of the hospital disaster plan. Those that were aware had not read the plan, and many lacked the knowledge of how to locate the plan in the event of a disaster (Whetzel et al., 2013). In the midst of a disaster response, the ED nurse must make prompt and complicated decisions regarding communication, command and control, and surge planning quickly.

Purpose of the Research

The purpose of this QI Project is to measure the impact of the implementation of a DEOP on the ED nurse's perception of disaster preparedness.

Assumptions

It is assumed not all of the nurses participating in either the pre- or post-education questionnaire have the same, or any, experience with disaster response. It is also assumed the participants answered the questions honestly, in accordance with their perceived knowledge. If a nurse did not attend one of the four DEOP education sessions during the January 2019 staff meetings, it is assumed the nurse would not have taken the post-education survey that contributed to the comparison survey. Further assumptions speculate if a nurse answered the pre-education questionnaire, they attended one of the four education sessions. Additionally, it is assumed that if a nurse answered the pre-education questionnaire and attended one of the education sessions, they answered the post-education questionnaire. It is also assumed all eligible RNs participating in the QI project had computer access to the questionnaire, time during the work day to complete this QI project's pre- and post-education questionnaires, and checked their email to access the questionnaires.

Research Question

What impact does the implementation of a department emergency operation plan (DEOP) have on the ED nurse's perception of disaster preparedness in a 51 bed, Level 1 trauma, adult emergency department?

Limitations

Limitations were noted within the QI project. This QI project was inclusive of full-time and part-time registered nurses employed in the ED of a single Level One Trauma facility, therefore, the QI project itself is not generalizable to ED nurses working in other facilities. Additionally, the DEOP education for this QI project was limited to the four January 2019 monthly staff meetings. Although department leadership recommended these staff meetings to be mandatory in person meetings, not all RN's were able to participate in person and a call-in option webinar was offered for each staff meeting from their personal computer. Not all RNs participated in the meetings. Not all call-in participants logged in to view the DEOP document during the live education sessions.

In addition to the time of day constraints, the educational sessions were limited to 30 minutes for each meeting. The introduction to the DEOP was planned for 30 minutes per educational session. As a first introduction to the DEOP, 30 minutes only allowed enough time for a quick overview of department needs regarding a true disaster event and did not allow time for in depth discussion of actual needs during a real event.

Another limitation of this QI project was the pre-and post-education questionnaire tool. This tool was created by the primary investigator to specifically cover the areas of the DEOP and preparedness perceptions and had not previously been utilized in a QI

project; therefore, validity of the questionnaire was not previously established. The questionnaire content was sent to members of the ENA 2018 EMPC for expert validation. Comments and suggestions from the committee members were incorporated into the pre- and post-education questionnaire.

Definition of Terms

Department Emergency Operations Plan (DEOP): A department specific disaster plan that outlines how an individual department responds to a disaster. The plan should utilize an inclusive template to incorporate how a department meets the elements of the HEOP while keeping workload reasonable (Hope, 2016).

Disaster: An event that creates a significant damage to property and life and overwhelms the local communities' resources (Thobaity, Plummer, & Williams, 2017).

Emergency Management: The supervisory department charged with creating the structure to reduce vulnerability to hazards and to deal with disasters. Principles of emergency management include comprehensive, progressive, risk- driven, integrated, collaborative, coordinated, flexible, and professional capabilities. The four phases of emergency management are mitigation, preparedness, response and recovery (FEMA.gov, 2019).

Emergency Nurses Association: The global professional nursing association for emergency nursing, dedicated to the representing the future of emergency nursing (ENA.org, 2019).

Emergency Preparedness: The continuous effort of planning, training, exercising, and evaluation in regards to disaster events to assure efficiency and coordination during the response of a disaster event (DHS.gov, 2019).

Hospital Emergency Operations Plan (HEOP): HEOP are plans that describe how a facility will respond to and recover from all hazards to include the six critical elements within the Joint Commission's Emergency Management Standards to include communications, resources and assets, safety and security, staff responsibilities, utilities, and clinical support activities (California Hospital Association, 2017).

Mass Casualty: Any event that overwhelms the healthcare delivery system, in regards to the number of injured victims that greatly overtaxes the resources and capabilities of an affected healthcare facility within a short period of time (Ben-Ishay, Mitaritonno, Catena, Sartelli, Ansaloni, & Kluger, 2016).

Surge Capacity: A major concern for healthcare facilities. This is defined as the ability to provide medical care during a sudden influx in patient numbers as related to victims of a disaster (Sheikhbardsiri, Nekoei-Moghadam, & Rezaei, 2017).

Triage: According to the ENA's Trauma Nursing Core Course (TNCC), triage is an integral task in a disaster (ENA, 2014). Regarding a disaster event, is defined as the technique of prioritizing patients for care and treatment after a mass casualty event. Triage in disaster situation means treating as many victims as possible with respect to the limited resources available (Clarkson & Williams, 2018).

Summary

Disaster events will continue to affect healthcare facilities. The importance of disaster planning for hospitals has become exceedingly apparent in recent years with the increase in disaster and mass casualty events. The HEOP must be acted upon quickly once a disaster or mass casualty event has occurred in an effort to provide appropriate care to all patients requiring medical care during this crucial time. Due to the unique

challenges EDs encounter following a disaster, ED nurses must have a workable, department specific plan in order to facilitate the continued operations of the hospital. The ED DEOP will guide the response of the ED to ensure the congruency of the healthcare delivery system during high stress, high impact, ever-changing events. Although regulatory agencies have mandated hospitals must devote resources to create practical disaster management plans, when assessing the emergency nurses perceived readiness to respond to a disaster event or disaster training, little is known (Whetzel et al., 2013). This QI project will examine the impact of the implementation of a DEOP on the ED nurse's perception of disaster preparedness.

Chapter II: Literature Review

The purpose of this QI Project is to measure the impact of the implementation of a DEOP on the ED nurse's perception of disaster preparedness. Disasters often occur with little to no warning and may quickly overwhelm a healthcare facility (Nielson, 2017). Timely activation of the HEOP is important to facilitate a comprehensive hospital response. However, ED's encounter unique challenges in the first minutes to hours after a disaster event occurs. Common challenges include role perception in relation to command and control needs of the department, communication difficulties and delays, and needs for triage and surge capabilities. The goal of this chapter is to examine current literature related to the challenges regarding role perception, communication, and triage and surge needs. Search terms included disaster, mass casualty event, mass casualty incident, hospital, healthcare, emergency department, nurse, disaster plan, emergency operations plan, communication, role, surge, and triage. The EBSCOhost interface was used to access the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Ovid MEDLINE databases to review the literature. Additionally, the IOWA Model for Evidence-based practice (EBP), was utilized as the framework for this QI project.

Conceptual Framework

EBP improves patient safety and quality of care, reducing morbidity and mortality, and decreasing hospital costs. Incorporating an EBP model would be beneficial in the implementation of the DEOP. The conceptual framework chosen for this QI study was the IOWA Model of Evidence-Based Practice to improve quality of care (Buckwalter, Cullen, Hanrahan, Kleiber, McCarthy, Rakel, & Tucker, 2017) in the

midst of a disaster response. As defined by Polit and Beck (2012), the Iowa Model is a framework commonly utilized to manage project evolvement and initiation for an EBP strategy. Based on Roger's (1983) Diffusion of Innovations theory, this heuristic model was developed by nurses integrating successful methods learned when working through projects utilizing research (Buckwalter et al., 2017). The IOWA model was selected for this study because nurses find it seemingly logical and beneficial when using this guide to transform research findings into clinical practice that improve patient outcomes (Brown, 2014).

Research on practice changes regarding hospital disaster response is minimal. While the Iowa Model of EBP has not been utilized in a published disaster-specific practice change, it provides a multistep guide utilizing decision points that proved beneficial for this project.

The first step identified in the IOWA model is to identify an issue, either problem focused or knowledge focused where an EBP change might be justified (Brown, 2014). For this QI project, a lack of knowledge regarding disaster response needs was identified as a concern for the ED's. This was identified through after-action reviews conducted of real events and exercises that took place in the ED.

According to the IOWA model, the second step for the team is to decide if the identified problem is a priority for the organization, department, or unit (Brown, 2014). For the hospital participating in this project, this problem was identified as a priority not only by senior leadership, but also by department physician and nursing leadership. Over the past decade, the community and this facility has experienced multiple disaster events. These events include explosions, active shooters, and bus wrecks. The after-action

reviews of these events as well as the yearly exercises conclude knowledge of department level needs remains low. The facility's emergency management committee introduced a DEOP template to be adapted to the needs of each department and unit in the hospital and set an expectation that staff were to complete education on this plan. This hospital-wide effort was fully supported by senior leaders.

After project priority was determined, the third step is to form a team consisting of nurses and non-nursing staff to develop, evaluate, and implement the EBP change (Brown, 2014). Disaster response requires a team approach; therefore, all levels of staff should be represented during this step. For this project, the team included physicians and nurses, with collaboration with non-licensed staff regarding their response activities.

The next step in the IOWA model is to gather and critique relevant research associated with the proposed practice change (Brown, 2014). For this team, the information utilized came from previous hospital after action reviews as well as needs identified in conference presentations from events such as the 2016 Pulse Nightclub shooting, the 2017 Las Vegas concert shooting, and personal experiences gained during the 2017 Hurricane Harvey response and evacuation efforts. In addition, needs identified in published case studies from the Aurora, Colorado shooting in 2012 and the 2013 Boston Marathon Bombings as well as other research related to disaster response were reviewed prior to developing the ED specific DEOP.

The next step for this project was the implementation of the intervention into a pilot practice and evaluation of the practice change (Brown, 2014). The education for the ED specific DEOP is complete and the plan has been implemented. Because disaster events do not occur on a regular basis, this DEOP will be tested during a planned mass

casualty exercise scheduled in one month, or the next real event, which ever happens next. The DEOP will be evaluated in the after-action review for lessons learned every time it is utilized. For this study, the IOWA model of EBP provided a multi-step guide based on interventions to solve a clinical problem and make a departmental change using a framework that nursing and other health care providers can easily understand.

Review of Literature

Department specific DEOP's are not commonly utilized and research is limited as to their effectiveness during a disaster event. After reviewing case studies from previous hospital disaster response efforts, the need for a DEOP was apparent. As Nadworny et al. (2014) detail, the intensity and frequency of both natural and man-made disasters has increased in recent years. The importance of hospital preparedness must evolve with this increase. For emergency departments, planning and preparedness is crucial to the success of the overall hospital response. Three common themes important to hospital and ED preparedness and planning efforts, were identified in the research: inaccurate or delayed communication, role perception and preparedness needs, and the importance of disaster triage and implications of surge.

Communication Issues: Inaccurate or Delayed Communication

Efficient and timely communication is important during any disaster response and is a core value that guides response efforts. However, communication that crosses jurisdictional boundaries are oftentimes ineffective (Paturas, Smith, Albanese, & Waite, 2015). Public health departments, law enforcement agencies, fire departments, emergency medical services (EMS), and hospitals are an example of entities that encounter inaccurate or delayed communication during disaster response efforts (Paturas

et al., 2015). Communication issues may create delays in regards to staffing, resource management and the overall response to an influx of patients to a hospital.

A case study published by Nadworny et al. (2014) discussed lessons learned from a receiving hospital in the Boston Marathon Bombing of 2013. The case study identified that communication from the scene was not accurate in the number of patients that would be presenting shortly to the hospital. It rapidly became obvious that initial reports of casualties of over 100 patients was vastly inaccurate. In fact, 275 injured patients from the bombing would seek treatment at local hospitals (Nadworny et al., 2014). An additional case review from the Aurora, Colorado mass shootings also portrayed confusion regarding the number of victims injured at the scene. Within the first 10 minutes of the hospital response, the ED received 10 victims from the shooting. The following 11 minutes (from 1:11 am-1:22 am), the ED received eight more patients from the disaster event with at least four critical patients (Koehler, Scott, & Davis, 2014). In fact, the total number of patients from scene that would require treatment was not communicated to the hospital (Koehler, Scott, & Davis, 2014). Inaccurate communication can delay activation of the HEOP thus delaying critical resources such as supplies and staff.

Furthermore, lessons learned outlined in the case study of Aurora, Colorado mass shooting also discussed communication delays. Koehler, Scott, and Davis (2014) describe a two-hour delay in communication regarding six adult patients the Children's Hospital Colorado, located on the same campus, had received. Delays in communication regarding patient counts and needs makes it difficult to plan for the amount of staff and resources necessary to adequately respond.

Communication delays were also identified in the lessons learned as outlined in the case study of Aurora, Colorado mass shooting. Koehler, Scott, and Davis (2014) acknowledged that the hospital's mass notification system designed to notify staff in the event of a disaster situation was not utilized on the night of this event. When unit staff were attempting to utilized the paper call back notification lists, they found the call back lists were difficult to locate or were old and contained incorrect information. This created a challenge in the initial two hours of the disaster response (Koehler, Scott, & Davis, 2014). The delay in communication regarding staffing needs of a disaster event can negatively impact the response efforts for the hospital by delaying additional physician and nurse support staff as well as the ability to open more operating rooms if needed.

Role Responsibility: Perception and Preparedness

Knowledge of assigned roles is essential to the overall response of any disaster event. Often, the education regarding role knowledge and the responsibility of said role is targeted to senior leadership that will manage the hospital incident command center during a disaster response. However, the healthcare facility is impacted initially within the first 15-30 minutes of an unplanned disaster (Nielson, 2017). Because many disasters occur outside of normal business operations, relying on the hospital incident command center for instruction and expertise can cause delays in the immediate response efforts by the hospital. Therefore, is important for the ED staff to be well educated on their roles and responsibilities within their department during this chaotic time.

A descriptive study conducted by Whetzel et al. (2014) reviewed perceptions of the ED nurse in relation to roles and preparation. A 56-question survey was distributed to

nurses at the New Jersey ENA Emergency Care Conference in March 2007. Of the approximately 700 RN's in attendance, 177 RN's completed the survey questionnaire, attributing to a 25% return rate (Whetzel et al., 2014). In regard to role perception, the majority of participants reported they had knowledge of how to activate the HEOP while 9% of participants were unsure of who had the authority to activate it (Whetzel et al., 2014). In respect to role preparedness, 97.7% of participants were aware their hospital had a disaster plan; however, 21.5% (1 out of 5) participants admittedly had not read the plan and 9.1% of participants did not know where to locate the HEOP. Additionally, the study found that fewer than half of the survey participants had completed incident command training, although most survey participants recognized that incident command training was relevant to more than nurses solely in leadership roles (Whetzel et al., 2014).

Limitations were noted for this study. According to Whetzel et al. (2014), the study included a small sample size with a potential bias due to geographical location. Despite representation of over a dozen states within the study participants, the majority were from New Jersey, New York, and Pennsylvania. Because of the impact of the 9/11 attacks, participants from these areas may have inconsistent perspectives related to disaster response than those from other areas in the United States that have not had these extreme experiences (Whetzel et al., 2014). Another identified limitation was the lack of a validated survey tool and the need for additional studies to assess the validity of the survey instrument used in this particular study (Whetzel et al., (2014).

Implications for future research and education needs were identified. Whetzel et al. (2014) affirms clarification and clear communication regarding the role of the ED nurse in disaster response is crucial for department managers and educators. Further, the

study reiterates that an element of performance for TJC is that hospitals educate staff for their emergency response roles. Encouragement of incident command training is necessary to understand the dynamics and needs of a disaster or mass casualty response effort (Whetzel et al., 2014). Emergency nurses will likely be on the frontline for a hospital disaster response and should be well versed in their roles before an event occurs.

Importance of Disaster Triage and Implications of Surge

Triage in a disaster response event is vastly different from triage during normal operations. The goal of disaster triage is to care for as many patients as possible with consideration to the limited resources available to treat the surge of victims that will require medical care after a disaster occurs (Ajimi, Sasaki, Uchida, Kaneko, Nakahara, & Sakamoto, 2015). High priority patients, those that need immediate care in order to save life or limb, must be identified quickly. A study conducted by Ajimi et al. (2016), utilized a simulation using Shannon's entropy to review the increased risk of confusion of information during a mass casualty primary triage exercise. As stated by Ajimi et al. (2016), "Shannon's entropy is an indicator of uncertainty of information arising from an information source" (p. 499). This study utilized The Simple Triage and Rapid Assessment (START) triage method, commonly utilized during mass casualty events. Eight scenarios within an identified triage area, involving a total of 32 patients, were created to study the effect of the triage process. Some of the victims were reintroduced at random in a surge type fashion to explore the effect of the triage system (Ajimi et al., 2016).

Discussion regarding the study included the finding the risk of informational confusion due to the mixing of information from pre- and post-triage patients when

utilizing a low visibility tag. Ajimi et al. (2016) identified that the priority assigned to a patient during triage is directly linked to a patient's prognosis. Though the prioritization of the patient is important, information sharing among caregivers to help treat patients as quickly as possible is essential to the response effort. Additional corroboration of the study is needed in regards to the degree of entropy in relation to the amount of informational confusion at a triage location (Ajimi et al., 2016).

Jenkins et al., (2015), published a retrospective cohort study of trauma patients discharged from hospitals participating in the Trauma Quality Improvement Program (TQIP) of the American College of Surgeons (ACS). Previous studies indicated that surges in trauma patients, identified by accelerated increases in patient volume and acuity of trauma patients, contribute to poor clinical outcomes (Jenkins et al., 2015). During times of surge, the healthcare needs of patients often surpass the available resources at the hospital causing an interruption of hospital services (Jenkins et al., 2015). At the time of this study, individual needs of hospitals were not well understood in relation to the specific needs of the overall trauma system. Trauma surge had been previously identified as 10 trauma patient admissions in a 24-hour period (Jenkins et al., 2015).

The sample population for this study included trauma patients discharged from a participating TQIP facility between January 2010 and December 2011 (Jenkins et al., 2015). Patients excluded from the study include patients that lacked records that indicated date and time of entry into the ED (Jenkins et al., 2015). Patients that arrived to the ED without signs of life, identified as having an initial systolic blood pressure of 0 mmHg, heartrate of 0 beats per minute and a Glasgow Coma Motor Score of 1 were also excluded from the study (Jenkins et al., 2015).

According to Jenkins et al. (2015), a total of 230,621 patient were entered into the final cohort study out of the possible 233,632 patients admitted to the participating hospital during the study timeframe. From the potential 233,632 patients admitted, 375 patients were excluded due to insufficient data in date and time of ED arrival and 2,627 patients were excluded from the study due to lack of vital signs upon entry into the ED (Jenkins et al., 2015). The study found patients admitted during non-surge conditions had a predicted mortality of 6.3% when compared to patients admitted during high surge conditions who had a predicted mortality of 9.9% (Jenkins et al., 2015). Additional findings indicated high surge conditions on mortality increased in the patient population that suffered from gunshot wounds (Jenkins et al., 2015). Patient probability of mortality rose from 15.5% during low surge timeframes to 42.0% during high surge times, likely because of the intensive resource needs during a time when resources may be limited. Coincidentally, non-firearm injured patients had a mortality rate of 5.8% during low surge times, but increased to 8.5% during high surge intervals (Jenkins et al., 2015).

Several limitations were noted with the study. The trauma surge index (TSI) created for this study needs validation utilizing additional datasets pulled from TQIP. Also, this study measured capacity strain inclusive only of trauma patients. Additional studies should include strain caused by non-trauma surge capacity strain as well as the effect of trauma surges on non-trauma patients in relation to mortality. Finally, Jenkins et al. (2015) recommends additional research regarding the relevance of the TSI and other measures of hospital surge, the National Emergency Department Overcrowding Survey (NEDOCS) in relation to nursing shortages and bed availability. Although additional research and validation is needed, the survey findings were consistent with an increased

risk of mortality to both trauma and non-trauma patients during a surge from a disaster event. ED surge is directly impacted by hospital bed availability. Disasters create a surge of traumatically injured patients and hospital surge can have catastrophic effects on a trauma patient's morbidity and mortality throughout their hospitalization, not just within the initial ED visit.

Summary

Disaster events are typically unplanned incidents that create chaos and confusion making research difficult to conduct. According to Nadworny et al. (2014), sharing experiences and lessons learned identified in the formal after-action reports allows for a different aspect of learning about disaster response needs. Through case studies and retrospective research studies, there is sufficient evidence to support the need for ED specific disaster preparedness in relation to communication issues and delays, role perception and preparedness, as well as disaster triage and the implications of surge. As noted by Kohler, Scott, and Davis (2014), accurate, timely communication during an event is essential for the initial disaster response needs of the hospital as well as for ongoing planning for resource management and staffing for the entire response. Communication breakdowns can delay the right teams being in place quickly to care for the sudden influx of patients. Koehler, Scott, and Davis (2014) reiterate it is critical to the response efforts that clear communication and knowledge regarding role delineation starts from the initial notification of a disaster event. Finally, preparation for surge and identified triage protocols in regards to surge is important. A surge of trauma patients has a direct impact on the mortality of said trauma patients (Jenkins et al., 2015). A DEOP can provide meaningful, guidance to the ED staff by including activation information,

communication needs, role delineation, and triage and surge protocols to ensure a well-coordinated disaster response. The IOWA Model of EBP was useful and efficient for this QI project, assisting with the identified concerns related to disaster preparedness and response knowledge levels in the ED. The findings in the literature review support the need for the QI project. This is evidenced by the need for more specific disaster preparedness education as well as the need for a workable department specific disaster plan. An efficient, well-organized approach to disaster response is the key to a successful response effort to include patient and staff safety, quality care, and timeliness of resources and additional staff to decrease patient mortality and nurse burnout.

Chapter III: Methodology

Study Design

A disaster preparedness QI project was conducted from December, 2018 to January, 2019 at Baylor Scott and White Medical Center-Temple's (BWSMC-Temple) ED. This project aimed to assess the impact that the implementation of a DEOP had on the ED nurse's perception of disaster preparedness. Details of this QI project are provided in this chapter and findings and a subsequent information is summarized in the following chapters. The QI project followed a structured methodology and included the following components: (a) creation the ED DEOP, (b) assessing the ED nurse's perception of disaster preparedness utilizing a pre-education questionnaire, (c) providing a 30-minute education of the DEOP during the January 2019 staff meetings, and (d) assessing the ED nurse's perception of disaster preparedness after the DEOP education utilizing a post-education questionnaire. The project was planned and implemented by a multidisciplinary team including an ED physician and nursing leadership and the primary investigator that met initially and as needed during the course of the project. The team communicated via email as necessary for planning and evaluation of the project.

Setting

The QI project was conducted in the ED at a Level One Trauma hospital in the southern United States. The participating hospital, which is an academic facility, is licensed for 498 beds. It is located in an urban community, but also services patients from nearby rural and frontier communities as well. The ED is a 51-bed department which employs between 110-130 full-time and part-time registered nurses.

Sample

A convenience sample of full-time and part-time RN's working in the ED as of December 1, 2018 were recruited for the study. The participants were recruited on a voluntary basis. The inclusion criteria consisted of being employed in the ED as of December 1, 2018 as a registered nurse (RN) in either a full-time or part-time position. Additional inclusion criteria were that the nurse was a bedside staff nurse, charge nurse, or nursing supervisor with direct patient care duties. Administrative staff without patient care responsibilities were excluded from the study leaving a convenience sample of 126 nurses working in the ED as of December 1, 2018. Participants were recruited verbally, through department shift change huddles via a script read by the ED nursing director, ED nurse manager, or ED supervisor. Participants also received an email via their work email that contained information about the project and a link to the informed consent and questionnaire. Enrollment into the study occurred when the participant checked the "I consent" box after reading the informed consent information on each questionnaire.

Of the 126 RN's that were sent the pre-education questionnaire, five of the emails were returned indicating that the nurses were no longer employed in the ED. This left a total of 121 RN's that were able to complete the questionnaire. Out of those 121 RN's, a total of 49 completed the questionnaire for a completion rate of 40%.

The post-education questionnaire was sent to the same 126 RN's email for congruency. Of the same 126 RN's that received the email, the five emails were again returned, indicating they were not working in the department any longer. This left a total of 121 RN's that were able to respond to the post-education questionnaire. Forty-four RN's completed the questionnaire; a completion rate of 36%.

A comparison report of participants that completed both the pre- and post-education questionnaires was utilized as well. This report indicates 32 of the 121 applicable RN's answered both questionnaires, but not every participant answered all questions. Thus, the completion rate for RN's that answered both the pre- and post-education questionnaires is 26%.

Human Subjects

The application for review of human participants' research was completed by the primary investigator and sent to the Arkansas Tech University Institutional Review Board (IRB) as well as the participating healthcare facility's IRB. In addition to the IRB application, the summary of purpose and objectives, informed consent document (Appendix A), the DEOP education plan, the pre-education questionnaire (Appendix B) and post-education questionnaire (Appendix C) was included. Both IRB applications detailed the purpose and objectives, risk of participation, cost of participation, benefits of the QI Project participation, the process of informed consent, data collection tool description, and recording of findings. The application was approved by ATU on December 13, 2018 and by the participating healthcare facility on December 21, 2018. Informed consent was obtained prior to the pre- and post-education questionnaire. Participation was on a voluntary basis and the participants had the right to leave the study at any time.

Instrumentation

Both the pre-education and post-education questionnaires were created by the primary investigator and are identical, with the addition of one additional question on the post-education questionnaire. The additional question reads, "My comfort level with the

DEOP has increased since receiving education." The choices for this question are based on a 5-point Likert scale as Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree.

The questionnaires developed by the primary investigator was based on multiple identified needs. First, an ED specific DEOP was completed. The healthcare system utilizes a DEOP plan template, approved by the system, facilitated through the emergency management department, and utilized by all departments in each of the healthcare system's hospitals. The primary investigator used the healthcare systems approved DEOP template and added to the format to meet the needs of this level one trauma ED. The contents and additional sections of the DEOP were created by the primary investigator, in conjunction with an ED physician as well as ED nursing leadership. In addition, the ED physician has experience in disaster and mass casualty response efforts as does the primary investigator and both have leadership roles in the facility, regional, and state disaster and emergency management committees, councils, and teams.

When creating the ED DEOP, this group utilized literature from previous disaster response efforts that noted best practices and needs, as well as needs found in the participating hospitals after action reviews from disaster and mass casualty events since 2009. Knowledge gained from the participating ED physician and primary investigators' roles when responding to regional and state disaster and mass casualty exercises and real events were also considered in the development of this DEOP. The first five sections of the ED's DEOP included guidance for the ED in relation to preparation of immediate needs for a mass casualty or disaster event such as the initial ED notification process,

initial ED response needs, confirmed event pre-patient arrival needs, awareness and vigilance of persons that may enter the ED without cause, and external partner needs and processes. External partners include local, regional, state, and national entities that may be necessary during the response of a mass casualty or disaster event. For example, public health officials, emergency managers, and liaison from nearby military installations or state or national disaster teams may present to the hospital for assistance in the response.

The remainder of the DEOP incorporated the format of the Emergency Response Guides (ERG) following the tabs of the ERG in order for ease of response efforts. The ERGs are found in a red trifold book, developed by the healthcare systems emergency management department and located in every department of each hospital in the healthcare system. The ERGs provide a basic explanation of the systems guidelines and policies for all critical codes and needs, non-specific to any hospital or department. Every department's DEOP plan is expected to be located in the ERG as a supplemental guide for the specific department. Once the ED DEOP document was completed by the primary investigator with input from the ED physician and nursing leadership, it was sent for final approval to the participating ED physician and nursing leadership.

After final approval of the ED DEOP, a single questionnaire was created. The initial questionnaire utilized questions to assess the ED nurse's perception of knowledge related to each section of the DEOP. Some of the more in-depth sections generated multiple questions related to the ED nurse's knowledge perception while many of the shorter sections necessitated a single question. Each question allowed the RN to assess their perception of knowledge related to the specific section. The primary investigator

utilized the knowledge and experience of the biostatistician in regards to addressing the level of knowledge as a perception of the ED nurse. It was determined utilizing a Likert scale would make it difficult to capture perceptions. The knowledge-based levels were recommended at this time.

The final ED DEOP and initial questionnaire were sent to the ENA's EMPC for expert validation with an explanation of the QI project needs. To serve on this national committee, interested persons complete an application process and are selected by a selection committee and approved by the ENA Board of Directors committee liaison for a two-year term. The EMPC committee comprises five subject matter experts from across the United States, an ENA Board of Directors Liaison, and an administrative ENA employee. At the time of this QI project, the primary investigator was an active member of this committee and the current committee chairperson. Upon feedback from two of the four applicable EMPC committee members in review of the questionnaire, updates to the format and questions were made. Updates included the addition of the final question on the post-education questionnaire as well as an agreement with the biostatistician's recommendation of removing the Likert scale for responses with exception of the last question. Additionally, from their specific experiences with prior surveys, the committee recommended that the knowledge scale should not include the "neutral" selection. From their recommendations, the single questionnaire was changed to include a pre- and post-education questionnaire to incorporate the additional question and the scale was changed to a four-selection knowledge-based format versus the Likert scale.

Data Collection

The REDCap system was utilized for data collection in the QI project. The REDCap system is a secure web application for building and managing online surveys and databases. Data from a specific survey is only available to the users assigned to that survey. In this instance, the projects biostatistician was the only user with access to the survey data. When building the project into the REDCap system, two separate questionnaires were loaded, to include the informed consent for each. The identified RN's work emails were then loaded into the database in preparation for the autogenerated emails. The autogenerated emails were sent through the REDCap system and the sender information was the primary investigator. The REDCap system for this project was set to also send reminder emails with the questionnaire link every two days for a period of two weeks at 6:45 am.

Pre-education questionnaires via REDCap were sent to the identified staff beginning on 12/25/2018 and ending on 01/07/2019. Education regarding the DEOP took place at the four January staff meetings, held on January 8 and 9, 2019. The education sessions lasted 30 minutes each. The post-education questionnaires via REDCap were sent to the identified staff starting on 01/10/2018 and closed on 01/24/2019. Upon opening the survey link, the informed consent appears. The questionnaire participant must click on either "I consent" or I do not consent". From there, the participant will either be taken to the demographic questions of the questionnaire if they selected "I consent", or the website will automatically close if they selected "I do not consent." After the demographic questions, participants will proceed to the next page with the knowledge-based questions. The QI project participants answer

32 questions based on No Knowledge, Basic/ Novice Knowledge, Intermediate Knowledge, and Expert Knowledge in both the pre- and post-education questionnaire with an additional question on the post-education questionnaire only, based on a Likert scale. These questions were dependent on the perceptions of knowledge level of the survey participant.

Data Analysis

Once the post-education questionnaire closed, the biostatistician accessed the REDCap system to run the data analysis report. This report was generated based on the Excel files PreDATAlabels.csv and PostDATAlabels.csv exported from REDCap on 2/16/2019. All statistical analysis were performed in SAS 9.4.

Demographic and questionnaire data were described using descriptive statistics. Demographic data contained information such as gender, age, part-time or full-time employment status at the time of the study, length of time in healthcare, length of time in the emergency department, current job role (staff nurse, team leader, charge nurse, supervisor, manager, or not in current practice), and disaster experience. Questionnaire data included knowledge-based questions regarding areas pertaining to the DEOP. The final question on the post-education survey utilized a Likert scale to assess the perception of knowledge with respect to the DEOP after the education was provided. Frequencies and percentages are used to describe categorical variables related to the knowledge areas identified in the DEOP. Means and standard deviations (or medians and ranges where appropriate) are used to describe continuous variables. A Wilcoxon signed ranks test, also known as a paired difference test, compares two measurements of a single question or sample in order to assess the difference between the paired scores and ranking the

absolute difference (Polit and Beck, 2012). For this study, a Wilcoxon signed-rank test was used to assess the change in responses from the pre-education questionnaire to the post-education questionnaire. The significance level is set to 0.05. A p-value less than 0.05 implies that the participants answers significantly changed between the pre-education questionnaire to the post-education questionnaire.

Summary

Disaster preparedness education and training are necessary in order to provide victims of disaster well-coordinated, timely care. For this QI project, an ED DEOP was created to provide guidance in the midst of chaos. The participants of this study were sent a pre-education questionnaire to assess their personal perception of disaster preparedness related to the contents of the DEOP. Education was provided in four 30-minute sessions during a staff meeting. After the education concluded, a post-education questionnaire was sent to the participants to assess their personal perception regarding disaster preparedness that included the same questions with the addition of a final question. The REDCap system was utilized in the data collection of their responses for both questionnaires. This system provided an analysis of each question for both questionnaires. The Wilcoxon signed-rank test compares the responses of each question from the pre- and post-education questionnaires.

Chapter IV: Findings

A 32-item questionnaire tool was utilized for data collection to determine the perception of disaster preparedness before and after education of the ED DEOP was implemented as well as an additional question on the post-education questionnaire related to the success of the educational sessions. The participants included only registered nurses working both full and part time at a level one trauma hospital in Central Texas. For this QI project, demographic information to include gender, age, range, highest level of education, employment status, and current job role were identified. Additionally, only 10 questions were utilized from the pre- and post-education questionnaires. The results of the questionnaires are divided into three categories, pre-education participants, post-education participants, and a comparison of those participants that completed both the pre- and post-education questionnaires.

Demographic information is summarized in Table 1. The results for the pre-education questionnaire items (see Tables 2-11) are presented in the frequency of responses according to a 4-item knowledge scale ranking as having no knowledge, basic/ novice knowledge, intermediate knowledge, and expert knowledge prior to the implementation of the DEOP educational sessions. The individual results for the post-education questionnaire items (see Tables 12-21) were assessed to show the frequency of responses according to a 4-item knowledge scale ranking as having no knowledge, basic/ novice knowledge, intermediate knowledge, and expert knowledge after the educational sessions were provided. Inclusive of only the post-education questionnaire, an additional question was added (Table 22), based on a 5-item Likert scale ranking of 1=Strongly Agree, 2= Agree, 3=Neutral, 4=Disagree, and 5=Strongly Disagree. For each question

addressed in the pre- and post-education findings sections, a comparison of the answers is found in Tables 23-32. Finally, Table 33 utilizes the Wilcoxon signed-rank test to determine the significance of any change in responses.

The results were calculated according to the rating of each participant regarding each question separately per pre- and post-education questionnaire to include a pre- and post-education comparison of the participants that completed both questionnaires. According to the tool, the higher the score indicates the increased perception of disaster readiness by the ED nurses that responded to both questionnaires. In regards to the comparison scores, a Wilcoxon signed rank test was used to assess the change in participants' ratings to each question. A significant p-value less than 0.05 implies that participants reported a significant change in knowledge level from the pre-education questionnaire to the post-education questionnaire.

Demographic Information

Table 1

Demographic Information

Table: Demographics

	N = 30	% / Range
Gender – Female (%)	56	91.8%
Age* (range)	30	22 – 64
Highest Level of Education (%)		
Associate's	7	11.5%
Bachelor's	51	83.6%
Master's	3	4.9%
Employment – Full time (%)	57	93.4%
Years working in healthcare (%)		
0-2	15	24.59%
3-5	16	26.23%
6-8	10	16.39%
9-11	6	9.84%
12+	14	22.95%
Years working in the Emergency Department (%)		
0-2	28	45.90%
3-5	16	26.23%
6-8	12	19.67%
9-11	2	3.28%
12+	3	4.92%
Current Job Role		
Charge Nurse	6	9.8%
Staff Nurse	45	73.8%
Supervisor	4	6.6%
Team Leader	6	9.8%
Ever participated in an actual disaster activation or event	29	47.5%

* Continuous variables reported as median and range

Table 1 summarizes the demographic information collected in both the pre- and post-education questionnaires. Fifty-six (92%) of the participants were female and five (8.2%) were male. Thirty of the participants reported an age range of 22-64 years. Regarding education level, seven participants (11.5%) held an associate's degree, 51 participants (83.6%) held a bachelor's degree, and three (4.9%) held a master's degree. Fifty-seven (93.4%) of participants reported they were full-time employees in the ED at the time of the study while four (6.6%) reported they held part time positions. In relation

to years working in healthcare: 15 (24.6%) participants reported they had worked in healthcare for two years or less, 16 (26.2%) participants reported they had worked in healthcare for three to five years, 10 (16.4%) participants reported they had worked in healthcare for six to eight years, six (9.8%) participants reported they had worked in healthcare for nine to 11 years, and 14 (23%) participants reported they had worked in healthcare for 12 years or more. As for years working in the emergency department, 28 (45.9%) participants reported they had worked in an ED for two years or less, 16 (26.2%) participants reported they had worked in an ED three to five years, 12 (19.7%) participants reported they had worked in an ED for six to eight years, two (3.3%) participants reported they had worked in an ED for nine to 11 years, and three (4.9%) participants reported they had worked in an ED for 12 years or more. In regards to the participants current job role, 45 (73.8%) participants responded they were at a staff nurse level, six (9.8%) responded they held a team leader position, six (9.8 %) responded they held a charge nurse position, and four (6.6%) reported they held a supervisor position in the ED. Twenty-nine participants (47.5%) reported they had previously participated in an actual disaster activation or event.

Pre-education Questionnaire Results

Table 2

Q1. Rated knowledge level of – Contents of the Hospital Emergency Operations Plan (HEOP), N=47

Knowledge of Contents Hospital EOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	15	31.91	15	31.91
Basic/Novice Knowledge	21	44.68	36	76.60
Intermediate Knowledge	11	23.40	47	100.00
Frequency Missing = 2				

Table 2 indicates the perception of knowledge nurses had regarding the content of the HEOP in the pre-education questionnaire. Of the 47 participants, 31.91% perceived they had no knowledge, 44.68% perceived they had a basic or novice knowledge, and 23.4% perceived they had intermediate knowledge of the HEOP. None of the nurses perceived they had expert knowledge of the HEOP. Two participants that took the pre-education questionnaire did not answer the question.

Table 3

Q2. Rated knowledge level of – Location of the hospital EOP (HEOP), N=47

Location of hospital EOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	17	36.17	17	36.17
Basic/Novice Knowledge	19	40.43	36	76.60
Intermediate Knowledge	8	17.02	44	93.62
Expert Knowledge	3	6.38	47	100.00
Frequency Missing = 2				

Table 3 identified the perception of knowledge nurses had regarding the location of the HEOP in the pre-education questionnaire. Of the 47 participants, 36.17% perceived they had no knowledge, 40.43% perceived they had a basic or novice knowledge, 17.02% perceived they had intermediate knowledge, and 6.38% perceived they had expert knowledge of the location of the HEOP. Two participants that took the questionnaire did not answer this question.

Table 4

Q3. Rated knowledge level of – Activation of the hospital EOP (HEOP) and command center, N=47

Activation of hospital EOP and command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	17	36.17	17	36.17
Basic/Novice Knowledge	17	36.17	34	72.34
Intermediate Knowledge	11	23.40	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

Table 4 reports the perception of knowledge nurses had regarding the process to activate the HEOP and command center from the pre-education questionnaire. Of the 47 participants, 36.17% perceived they had no knowledge, 36.17% perceived they had a basic or novice knowledge, and 23.40% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding the process to activate the HEOP and command center. Two participants that took the pre-education questionnaire did not answer this question.

Table 5

Q4. Rated knowledge level of – Who can activate the hospital EOP (HEOP) and command center, N=47

Who can activate the hospital EOP and command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	15	31.91	15	31.91
Basic/Novice Knowledge	18	38.30	33	70.21
Intermediate Knowledge	12	25.53	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

Table 5 indicates the perception of knowledge nurses had regarding who can activate the HEOP and command center in the pre-education questionnaire. Of the 47 participants, 31.91% perceived they had no knowledge, 38.30% perceived they had a basic or novice knowledge, 25.53% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding who can activate the HEOP and command center. Two participants that took the pre-education questionnaire did not answer the question.

Table 6

Q5. Rated knowledge level of – Contents of the Department EOP (DEOP), N=47

Contents of the Department EOP (DEOP)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	22	46.81	22	46.81
Basic/Novice Knowledge	16	34.04	38	80.85
Intermediate Knowledge	7	14.89	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

Table 6 identified the perception of knowledge nurses had regarding the content of the ED DEOP in the pre-education questionnaire. Of the 47 participants, 46.81% perceived they had no knowledge, 34.04% perceived they had a basic or novice knowledge, 14.89% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding the content of the ED DEOP. Two participants that took the questionnaire did not answer this question.

Table 7

Q6. Rated knowledge level of – Location of the ED DEOP, N=47

Location of the ED DEOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	23	48.94	23	48.94
Basic/Novice Knowledge	14	29.79	37	78.72
Intermediate Knowledge	7	14.89	44	93.62
Expert Knowledge	3	6.38	47	100.00
Frequency Missing = 2				

Table 7 determined the perception of knowledge nurses had regarding the location of the DEOP from the pre-education questionnaire. Of the 47 participants, 48.94% perceived they had no knowledge, 29.79% perceived they had a basic or novice knowledge, 14.89% perceived they had intermediate knowledge, and 6.38% perceived they had expert knowledge regarding the location of the ED DEOP. Two participants that took the pre-education questionnaire did not answer this question.

Table 8

Q7. Rated knowledge level of – When to report a potential event, N=47

When to report a potential event	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	15	31.91	15	31.91
Basic/Novice Knowledge	15	31.91	30	63.83
Intermediate Knowledge	15	31.91	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

Table 8 indicates the perception of knowledge nurses regarding when to report a potential event in the pre-education questionnaire. Of the 47 participants, 31.91% perceived they had no knowledge, 31.91% perceived they had a basic or novice knowledge, 31.91% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding when to report a potential event. Two participants that took the pre-education questionnaire did not answer the question.

Table 9

Q8. Rated knowledge level of – To whom a potential event is reported, N=47

To whom a potential event is reported	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	15	31.91	15	31.91
Basic/Novice Knowledge	20	42.55	35	74.47
Intermediate Knowledge	10	21.28	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

Table 9 identified the perception of knowledge nurses had regarding to whom a potential event is reported to in the pre-education questionnaire. Of the 47 participants, 31.91% perceived they had no knowledge, 42.55% perceived they had a basic or novice knowledge, 21.28% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding to whom a potential event is reported to. Two participants that took the questionnaire did not answer this question.

Table 10

Q9. Rated knowledge level of – Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc.), N=47

Initial preparation steps for the ED	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	12	25.53	12	25.53
Basic/Novice Knowledge	23	48.94	35	74.47
Intermediate Knowledge	10	21.28	45	95.74
Expert Knowledge	2	4.26	47	100.00
Frequency Missing = 2				

The data in table 10 determined the perception of knowledge nurses had regarding the initial preparation steps for the ED with consideration to staffing, triage needs, communication needs, etc. when an event occurs from the pre-education questionnaire. Of the 47 participants, 25.53% perceived they had no knowledge, 48.94% perceived they had a basic or novice knowledge, 21.28% perceived they had intermediate knowledge, and 4.26% perceived they had expert knowledge regarding the initial preparation steps for the ED. Two participants that took the pre-education questionnaire did not answer this question.

Table 11

Q12. Rated knowledge level of – Initial communication with the hospital command center, N=47

Initial communication with the hospital command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	20	43.48	20	43.48
Basic/Novice Knowledge	19	41.30	39	84.78
Intermediate Knowledge	5	10.87	44	95.65
Expert Knowledge	2	4.35	46	100.00
Frequency Missing = 3				

Table 11 identified the perception of knowledge nurses had regarding the initial communication needs with the hospital command center from the pre-education questionnaire. Of the 46 participants, 43.78% perceived they had no knowledge, 41.30% perceived they had a basic or novice knowledge, 10.87% perceived they had intermediate knowledge, and 4.35% perceived they had expert knowledge regarding the initial communication needs with the hospital command center. Three participants that took the questionnaire did not answer this question.

Post-education Questionnaire Results

Table 12

Q1. Rated knowledge level of – Contents of the Hospital Emergency Operations Plan (HEOP), N=41

Knowledge of Contents Hospital EOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	4	9.76	4	9.76
Basic/Novice Knowledge	19	46.34	23	56.10
Intermediate Knowledge	18	43.90	41	100.00
Frequency Missing = 3				

Table 12 indicates the perception of knowledge nurses regarding the content of the HEOP in the post-education questionnaire. Of the 41 participants to this post-education question, 9.76% perceived they had no knowledge, 46.34% perceived they had a basic or novice knowledge, 43.90% perceived they had intermediate knowledge of the HEOP. No nurses perceived they had expert knowledge of the HEOP. Three participants that took the post-education questionnaire did not answer the question.

Table 13

Q2. Rated knowledge level of – Location of the hospital EOP (HEOP), N=41

Knowledge of location of the hospital EOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	5	12.20	5	12.20
Basic/Novice Knowledge	11	26.83	16	39.02
Intermediate Knowledge	17	41.46	33	80.49
Expert Knowledge	8	19.51	41	100.00
Frequency Missing = 3				

Table 13 identified the perception of knowledge nurses had regarding the location of the HEOP in the post-education questionnaire. Of the 41 participants to this post-education question, 12.20% perceived they had no knowledge, 26.83% perceived they had a basic or novice knowledge, 41.46% perceived they had intermediate knowledge, 19.51% perceived they had expert knowledge of the location of the HEOP. Three participants that took the questionnaire did not answer this question.

Table 14

Q3. Rated knowledge level of – Activation of the hospital EOP (HEOP) and command center, N=40

Activation of the hospital EOP and command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	5	12.50	5	12.50
Basic/Novice Knowledge	15	37.50	20	50.00
Intermediate Knowledge	12	30.00	32	80.00
Expert Knowledge	8	20.00	40	100.00
Frequency Missing = 4				

Table 14 determined the perception of knowledge nurses had regarding the activation of the HEOP and command center from the post-education questionnaire. Of the 40 participants to this post-education question, 12.50% perceived they had no knowledge, 37.50% perceived they had a basic or novice knowledge, 30% perceived they had intermediate knowledge, 20% perceived they had expert knowledge regarding the process to activate the HEOP and command center. Four participants that took the post-education questionnaire did not answer this question.

Table 15

Q4. Rated knowledge level of – Who can activate the hospital EOP (HEOP) and command center, N=41

Who can activate the hospital EOP and command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	4	9.76	4	9.76
Basic/Novice Knowledge	16	39.02	20	48.78
Intermediate Knowledge	13	31.71	33	80.49
Expert Knowledge	8	19.51	41	100.00
Frequency Missing = 3				

Table 15 indicates the perception of knowledge nurses regarding who can activate the HEOP and command center in the post-education questionnaire. Of the 41 participants to this post-education question, 9.76% perceived they had no knowledge, 39.02% perceived they had a basic or novice knowledge, 31.71% perceived they had intermediate knowledge, and 19.51% perceived they had expert knowledge regarding who can activate the HEOP and command center. Three participants that took the post-education questionnaire did not answer the question.

Table 16

Q5. Rated knowledge level of – Contents of the Department EOP (DEOP), N=40

Contents of the Department EOP (DEOP)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	3	7.50	3	7.50
Basic/Novice Knowledge	16	40.00	19	47.50
Intermediate Knowledge	15	37.50	34	85.00
Expert Knowledge	6	15.00	40	100.00
Frequency Missing = 4				

Table 16 identified the perception of knowledge nurses had regarding the contents of the ED DEOP in the post-education questionnaire. Of the 40 participants to this post-education question, 7.5% perceived they had no knowledge, 40% perceived they had a basic or novice knowledge, 37.5% perceived they had intermediate knowledge, and 15% perceived they had expert knowledge regarding the content of the ED DEOP. Four participants that took the questionnaire did not answer this question.

Table 17

Q6. Rated knowledge level of – Location of the DEOP, N=41

Location of the DEOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	6	14.63	6	14.63
Basic/Novice Knowledge	7	17.07	13	31.71
Intermediate Knowledge	17	41.46	30	73.17
Expert Knowledge	11	26.83	41	100.00
Frequency Missing = 3				

Table 17 determined the perception of knowledge nurses had regarding the location for the DEOP from the post-education questionnaire. Of the 41 participants to this post-education question, 14.63% perceived they had no knowledge, 17.07% perceived they had a basic or novice knowledge, 41.46% perceived they had intermediate knowledge, and 26.83% perceived they had expert knowledge regarding the location of the ED DEOP. Three participants that completed the post-education questionnaire did not answer this question.

Table 18

Q7. Rated knowledge level of – When to report a potential event, N=41

When to report a potential event	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	4	9.76	4	9.76
Basic/Novice Knowledge	12	29.27	16	39.02
Intermediate Knowledge	17	41.46	33	80.49
Expert Knowledge	8	19.51	41	100.00
Frequency Missing = 3				

Table 18 indicates the perception of knowledge nurses regarding when to report a potential event in the post-education questionnaire. Of the 41 participants who answered this question, 9.76% perceived they had no knowledge, 29.27% perceived they had a basic or novice knowledge, 41.46% perceived they had intermediate knowledge, and 19.51% perceived they had expert knowledge regarding when to report a potential event. Three participants did not answer this question.

Table 19

Q8. Rated knowledge level of – To whom a potential event is reported, N=41

To whom a potential event is reported	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	4	9.76	4	9.76
Basic/Novice Knowledge	11	26.83	15	36.59
Intermediate Knowledge	18	43.90	33	80.49
Expert Knowledge	8	19.51	41	100.00
Frequency Missing = 3				

Table 19 identified the perception of knowledge nurses had regarding whom to report a potential event to in the post-education questionnaire. Of the 41 participants to this post-education question, 9.76% perceived they had no knowledge, 26.83% perceived they had a basic or novice knowledge, 43.90% perceived they had intermediate knowledge, and 19.51% perceived they had expert knowledge regarding to whom a potential event is reported to. Three participants did not answer this question.

Table 20

Q9. Rated knowledge level of – Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc.), N=41

Initial preparation steps for the ED	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	3	7.32	3	7.32
Basic/Novice Knowledge	17	41.46	20	48.78
Intermediate Knowledge	12	29.27	32	78.05
Expert Knowledge	9	21.95	41	100.00
Frequency Missing = 3				

Table 20 determined the perception of knowledge nurses had regarding the initial preparation steps for the ED with consideration to staffing, triage needs, communication needs, etc. when an event occurs from the post-education questionnaire. Of the 41 participants, 7.32% perceived they had no knowledge, 41.46% perceived they had a basic or novice knowledge, 29.27% perceived they had intermediate knowledge, and 21.95% perceived they had expert knowledge regarding the initial preparation steps for the ED. Three participants did not answer this question.

Table 21

Q12. Rated knowledge level of – Initial communication with the hospital command center, N=41

Initial communication with the hospital command center	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No Knowledge	5	12.20	5	12.20
Basic/Novice Knowledge	16	39.02	21	51.22
Intermediate Knowledge	13	31.71	34	82.93
Expert Knowledge	7	17.07	41	100.00
Frequency Missing = 3				

Table 21 identified the perception of knowledge nurses had regarding the initial communication needs with the hospital command center from the post-education questionnaire. Of the 41 participants who answered this question, 12.2% perceived they had no knowledge, 39.02% perceived they had a basic or novice knowledge, 31.71% perceived they had intermediate knowledge, and 17.07% perceived they had expert knowledge regarding the initial communication needs with the hospital command center. Three participants did not answer question.

Table 22

Q34. My comfort level with the DEOP has increased since receiving education, N=41

Increased comfort level post-education of DEOP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Agree	21	51.22	21	51.22
Disagree	2	4.88	23	56.10
Neutral	3	7.32	26	63.41
Strongly Agree	14	34.15	40	97.56
Strongly Disagree	1	2.44	41	100.00
Frequency Missing = 20				

Table 22 indicates the perception of knowledge nurses had regarding the increased comfort level after education of the ED DEOP utilizing a 5-point Likert scale. Of the 41 participants, 14 (34.15%) strongly agreed, 21 (51.22%) agreed, three (7.32%) were neutral, two (4.88%) disagreed, and one (2.44%) strongly disagreed with the question. Eighty-five percent of all the nurses who completed the educational program indicated their comfort level with the DEOP had increased. Twenty participants that took either the pre- or post-education questionnaire did not take both questionnaires. For these 20 participants, this question was not applicable.

Pre- and Post-education Questionnaire Comparisons

The following tables demonstrate participant feedback from both the pre-education and post-education questionnaires. To decipher these tables, compare left to right for the pre-education questionnaire knowledge levels and top to bottom for the post-education questionnaire knowledge levels to determine the knowledge level rating comparison.

Table 23

Q1. Rated knowledge level of – Contents of the Hospital Emergency Operations Plan (HEOP) compared between the pre-questionnaire and post- questionnaire, N=30

Contents of the Hospital Emergency Operations Plan (EOP) compared between the pre- questionnaire and post- questionnaire				
	Post-education			
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Total**
No Knowledge	2	8	1	**11**
Basic/Novice Knowledge	0	4	7	**11**
Intermediate Knowledge	0	1	7	**8**
Total	**2**	**13**	**15**	**30**
Frequency Missing = 2				

Table 23 compared only those that responded to the question regarding the knowledge of the contents of the HEOP in both the pre- and post-education questionnaires (Tables 2 & 12). There were 30 participants to this question for each questionnaire and two participants that took both the pre- and post-education questionnaire that did not answer this question.

For the participants that answered “no knowledge” on the pre-education questionnaire, two participants again rated “no knowledge” on the post-education questionnaire. Eight RN’s increased their perceived level of knowledge to “basic or novice knowledge”. One RN increased their perception of knowledge to “intermediate knowledge” regarding the contents of the HEOP. For the participants that answered the pre-education questionnaire regarding their perceived knowledge level of the contents of the HEOP as “basic or novice knowledge”, four answered the post-education questionnaire as again having “basic or novice knowledge”, and seven participants cited their knowledge level increased to “intermediate knowledge”. Of the participants that answered this question as having “intermediate knowledge” in the pre-education questionnaire, one cited they had “basic or novice knowledge” and seven felt their knowledge level had not increased from “intermediate knowledge”. Overall, for this question, 16 participants had a perceived increase in knowledge level, 13 participants indicated they had no increase in knowledge and one RN believed their perceived knowledge level decreased by one level. The education for this project did not cover the content of the HEOP in detail.

Table 24

Q2. Rated knowledge level of – Location of the hospital EOP (HEOP) compared between the pre- questionnaire and post- questionnaire, N=30

Location of the hospital EOP compared between the pre- questionnaire and post-questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	5	3	2	**12**
Basic/Novice Knowledge	0	2	7	2	**11**
Intermediate Knowledge	0	0	3	2	**5**
Expert Knowledge	0	0	0	2	**2**
Total	**2**	**7**	**13**	**8**	**30**
Frequency Missing = 2					

Table 24 compares only those that responded to the question regarding the knowledge of the location of the HEOP in both the pre- and post-education questionnaires (Tables 3 & 13). Thirty participants answered this question for each questionnaire. Two participants that took both questionnaires did not answer this question on either questionnaire.

For the participants that answered "no knowledge" on the pre-education questionnaire, two participants again rated "no knowledge" on the post-education questionnaire. Five RN's increased their perceived level of knowledge to "basic or novice knowledge". Three RN's increased their perception of knowledge to "intermediate knowledge" regarding the location of the HEOP and two participants felt

they had “expert knowledge” on the post-education questionnaire. For the participants that answered the pre-education questionnaire regarding their perceived knowledge level of the location of the HEOP as “basic or novice knowledge”, two RN’s answered the post-education questionnaire as again having “basic or novice knowledge”, seven participants cited their knowledge level increased to “intermediate knowledge”, and two RN’s felt they had “expert knowledge” in the post-education questionnaire. Of the participants that answered this question as having “intermediate knowledge” in the pre-education questionnaire, seven felt their knowledge level had not increased from “intermediate knowledge” and two RN’s rated their knowledge level as having “expert knowledge”. The two participants that ranked their knowledge level in the pre-education questionnaire as “expert knowledge”, their answers did not change. Overall, for this question, 21 out of 30 (70%) participants had a perceived increase in knowledge level and the remaining nine (30%) participants indicated they had no increase in knowledge.

Table 25

Q3. Rated knowledge level of – Activation of the hospital EOP (HEOP) and command center compared between the pre- questionnaire and post- questionnaire, N=30

Activation of the hospital EOP and command center compared between the pre- questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	6	3	1	**12**
Basic/Novice Knowledge	0	3	4	2	**9**
Intermediate Knowledge	0	1	4	3	**8**
Expert Knowledge	0	0	0	1	**1**
Total	**2**	**10**	**11**	**7**	**30**
Frequency Missing = 2					

Table 25 compares only those that responded to the question regarding the knowledge of activation of the HEOP and command center in both the pre- and post-education questionnaires (Tables 4 & 14). Out of 30 participants who answered this question for each questionnaire, 19 (63.3%) participants rated their knowledge level higher in the post-education questionnaire for this specific item. Two participants that took both questionnaires did not answer this question on either questionnaire.

For the participants that answered "no knowledge" on the pre-education questionnaire, two participants again rated "no knowledge" on the post-education questionnaire. Five RN's increased their perceived level of knowledge to "basic or novice knowledge". Three RN's increased their perception of knowledge to "intermediate knowledge" regarding the process to activate the HEOP and command

center and two participants felt they had “expert knowledge” on the post-education questionnaire. For the participants that answered the pre-education questionnaire regarding their perceived knowledge level of the process to activate the HEOP and command center as “basic or novice knowledge”, three RN’s answered the post-education questionnaire as again having “basic or novice knowledge”, five participants cited their knowledge level increased to “intermediate knowledge”, and one RN felt they had “expert knowledge” in the post-education questionnaire. Of the participants that answered this question as having “intermediate knowledge” in the pre-education questionnaire, one RN perceived their knowledge level post-education was that of a “basic or novice knowledge”, four felt that their knowledge level had not increased from “intermediate knowledge”, and three RN’s rated their knowledge level as having “expert knowledge”. The participant that ranked their knowledge level in the pre-education questionnaire as “expert knowledge” did not change their knowledge level. Overall, for this question, 19 (63.3%) participants had a perceived increase in knowledge level, nine (30%) participants indicated they had no increase in knowledge and one person (3.3%) felt their knowledge level decreased by one after the education.

Table 26

Q4. Rated knowledge level of – Who can activate the hospital EOP (HEOP) and command center compared between the pre- questionnaire and post- questionnaire, N=30

Who can activate the hospital EOP and command center compared between the pre- questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	5	3	2	**12**
Basic/Novice Knowledge	0	3	5	1	**9**
Intermediate Knowledge	0	1	4	3	**8**
Expert Knowledge	0	0	0	1	**1**
Total	**2**	**9**	**12**	**7**	**30**
Frequency Missing = 2					

Table 26 compares only those that responded to the question regarding the knowledge of who can activate the HEOP and command center in both the pre- and post-education questionnaires (Tables 5 & 15). Thirty participants' answers are compared in this table. Two participants that took both the pre- and post-education questionnaires did not answer the question.

Of the RN's that rated their pre-education questionnaire as having "no knowledge", two again felt they had "no knowledge" after the education, five increased their level of knowledge to "basic or novice knowledge", three RN's perceived their knowledge level as "intermediate knowledge", and two perceived they had "expert knowledge" in the post-education questionnaire. From the pre-education questionnaire,

of those that perceived their knowledge level to be “basic or novice knowledge”, three felt they did not have an increase in knowledge after the education, five RN’s ranked their knowledge level as “intermediate knowledge”, and one participant believed they had “expert knowledge” on the post-education questionnaire. Of the participants that rated their knowledge level on the pre-education questionnaire as “intermediate knowledge”, one RN perceived their knowledge level dropped to “basic or novice knowledge”, four participants did not feel that their knowledge level increased, and three participants rated their knowledge level as increased to “expert knowledge.” The RN that ranked their level of knowledge as “expert knowledge” for this question maintained that level in the post-education questionnaire. To summarize, 19 (63.3%) RN’s rated their knowledge level as increased in the post-education questionnaire, ten (33.3%) participants had no increase, and one (3.3%) RN rated their knowledge level as decreased on the post-education questionnaire.

Table 27

Q5. Rated knowledge level of – Contents of the Department EOP (DEOP) compared between the pre- questionnaire and post- questionnaire, N=29

Contents of the Department EOP (DEOP) compared between the pre-questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	8	3	2	**15**
Basic/Novice Knowledge	0	0	6	2	**8**
Intermediate Knowledge	0	0	3	1	**4**
Expert Knowledge	0	0	1	1	**2**
Total	**2**	**8**	**13**	**6**	**29**
Frequency Missing = 3					

Table 27 compares only those that responded to the question regarding the knowledge of contents of the DEOP on both the pre- and post-education questionnaires (Tables 6 & 16). There are 29 participants on this comparison table. Three participants that took both questionnaires did not answer this question on either questionnaire.

Of the RN's that answered they had "no knowledge" on the pre-education questionnaire, two maintained that knowledge level after the education, eight reported they had increased their level to "basic or novice knowledge, three perceived their knowledge level increased to "intermediate level" and two felt their knowledge level was "expert knowledge" on the post-education questionnaire. One RN that had a perceived knowledge rating of "basic or novice knowledge" maintained that level on the post-education questionnaire while six had an increased level of knowledge to that of

"intermediate knowledge." Two RN's changed their knowledge level to having "expert knowledge." Of the four RN's that indicated they held "intermediate knowledge" before the education, three maintained this level and one RN had a reported increase to "expert knowledge" in the post-education questionnaire. In the pre-education questionnaire, two participants reported they had "expert knowledge". After the education, one RN decreased their knowledge level to "intermediate knowledge and one maintained they had "expert knowledge" after the education. Overall, 22 (76%) participants reported an increased level of knowledge in the post-education questionnaire, while six (21%) maintained their knowledge level and one (3.4%) RN reported a decreased level of knowledge.

Table 28

Q6. Rated knowledge level of – Location of the DEOP compared between the pre-questionnaire and post- questionnaire, N=30

Location of the DEOP compared between the pre- questionnaire and post-questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	4	5	5	**16**
Basic/Novice Knowledge	0	1	6	2	**9**
Intermediate Knowledge	0	0	1	2	**3**
Expert Knowledge	0	0	0	2	**2**
Total	**2**	**5**	**12**	**11**	**30**
Frequency Missing = 2					

Table 28 compares only those that responded to the question regarding the knowledge of location of the DEOP in both the pre- and post-education questionnaires (Tables 7 &17). There were 30 participants compared in this table. Two participants that took both questionnaires did not answer this question on either questionnaire.

Of the RN's that answered they had "no knowledge" before the education, two participants felt they did not have an increased knowledge level on the post-education questionnaire, while four RN's perceived they had increased their knowledge level to "basic or novice knowledge", five noted they now held an "intermediate knowledge" level, and five RN's rated their knowledge level as "expert knowledge." Of the participants that rated their knowledge level at "basic or novice" on the pre-education

questionnaire, one RN felt they had no increase knowledge gained, six reported an increase to “intermediate knowledge”, and two felt they held “expert knowledge” after the education. Three participates rated their pre-education knowledge level as “intermediate knowledge.” After the education, one RN maintained this level while two RN’s reported a perceived increase to “expert knowledge.” Both of the participants that ranked their knowledge level as “expert knowledge” on the pre-education questionnaire maintained that level after the education. Overall, 24 (80%) RN’s felt their knowledge level had increased by at least one level after the education, while six (20%) did not indicate an increase in their knowledge level. No one reported a decrease in knowledge level on the post-education questionnaire.

Table 29

Q7. Rated knowledge level of – When to report a potential event compared between the pre- questionnaire and post- questionnaire, N=30

When to report a potential event compared between the pre- questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	5	2	1	**10**
Basic/Novice Knowledge	0	2	6	2	**10**
Intermediate Knowledge	0	0	6	2	**8**
Expert Knowledge	0	0	0	2	**2**
Total	**2**	**7**	**14**	**7**	**30**
Frequency Missing = 2					

Table 29 compares only those that responded to the question regarding the knowledge of when to report a potential event in both the pre- and post-education questionnaires (Tables 8 & 18). There were 30 participants who responded to this question for each questionnaire. Two participants that took both the pre- and post-education questionnaire did not answer the question.

To explain this table further, of the participants that perceived their knowledge level to be "no knowledge" before the education, two RN's maintained this knowledge level after the education, five reported an increased knowledge level to "basic or novice", two responded they had "intermediate knowledge" and one RN felt they had "expert knowledge" on the post-education questionnaire. Comparing the participants that

initially felt they held “basic or novice knowledge” on the pre-education questionnaire, two participants felt they had no increase in knowledge after the education, while six reported an increase in their knowledge level to “intermediate knowledge”, and two RN’s perceived their knowledge level to be “expert knowledge” in the post-education questionnaire. Regarding the eight participants that indicated their level of knowledge for this question was “intermediates knowledge” before the education sessions, six maintained this level and two rated their knowledge level as “expert knowledge” after the education was provided. Two participants ranked their knowledge as “expert knowledge” on both questionnaires. In summary, 17 (57%) RN’s indicated their knowledge level increased after the education was provided while 12 (40%) stayed the same. No one reported a decrease in knowledge in the post-education questionnaire.

Table 30

Q8. Rated knowledge level of – To whom a potential event is reported compared between the pre- questionnaire and post- questionnaire, N=30

To whom a potential event is reported compared between the pre- questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	4	3	2	11
Basic/Novice Knowledge	0	2	10	1	13
Intermediate Knowledge	0	0	2	2	4
Expert Knowledge	0	0	0	2	2
Total	2	6	15	7	30
Frequency Missing = 2					

Table 30 compares only those that responded to the question regarding the knowledge of whom a potential event is reported in both the pre- and post-education questionnaires (Tables 9 & 19). Thirty participants answered this question on each questionnaire. Two participants that took the questionnaires did not answer this question on either questionnaire.

To explain this table, two RN's felt they had "no knowledge" before or after the education, while four participants perceived they had increased their knowledge from "no knowledge" to "basic or novice knowledge", three nurses felt they had "intermediate knowledge" and two believed they held "expert knowledge" after the education was completed. Of the participants that answered they held "basic or novice knowledge" on the pre-education questionnaire, two maintained this level, 10 felt they had increased

knowledge to “intermediate knowledge”, and one perceived they had “expert knowledge” after the education. Of the RN’s that initially rated their knowledge level as “intermediate knowledge”, two had no increased knowledge and two ranked their knowledge level as “expert knowledge” on the post-education questionnaire. Two RN’s indicated their perceived knowledge level was “expert knowledge” on both questionnaires. In total, 22 (73.3%) RN’s believed their knowledge level increased after the education was provided while eight (26.7%) maintained their knowledge level on both questionnaires. No one perceived a decreased knowledge level after the education was provided.

Table 31

Q9. Rated knowledge level of – Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc.) compared between the pre- questionnaire and post- questionnaire, N=30

Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc.) compared between the pre- questionnaire and post-questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	6	0	1	**9**
Basic/Novice Knowledge	0	3	9	2	**14**
Intermediate Knowledge	0	0	2	3	**5**
Expert Knowledge	0	0	0	2	**2**
Total	**2**	**9**	**11**	**8**	**30**
Frequency Missing = 2					

Table 31 compares only those that responded to the question regarding the knowledge of initial preparation steps for the ED in both the pre- and post-education questionnaires (Tables 10 & 20). Thirty participants replied to this question for each questionnaire. Two participants that took both questionnaires did not answer this question on either questionnaire.

Of those that rated their knowledge level at "no knowledge" on the pre-education questionnaire, two participants felt they did not gain knowledge from the education, while six indicated their level of knowledge increased to "basic or novice knowledge, and one felt their knowledge level had increased to "expert knowledge." Of the participants

that indicated that their knowledge level as “basic or novice” prior to the education, three reported they had maintained that level, nine rated their level as increased to “intermediate knowledge” and two felt their level was “expert knowledge” on the post-education questionnaire. Of the RN’s that perceived they had “intermediate knowledge” before the education was provided, two maintained this level, and three increased their rating of knowledge to “expert knowledge” on the post-education questionnaire. Two participants believed they held “expert knowledge” on both questionnaires. Overall, for this question, 21 (70%) RN’s believed their knowledge level increased after the education and nine (30%) participants believed the education gave them no additional knowledge.

Table 32

Q12. Rated knowledge level of – Initial communication with the hospital command center compared between the pre- questionnaire and post- questionnaire, N=29

Initial communication with the hospital command center compared between the pre- questionnaire and post- questionnaire					
	Post-education				
Pre-education	**No Knowledge**	**Basic/Novice Knowledge**	**Intermediate Knowledge**	**Expert Knowledge**	**Total**
No Knowledge	2	8	2	2	**14**
Basic/Novice Knowledge	0	2	8	2	**12**
Intermediate Knowledge	0	0	0	1	**1**
Expert Knowledge	0	0	1	1	**2**
Total	**2**	**10**	**11**	**6**	**29**
Frequency Missing = 3					

Table 32 compares only those that responded to the question regarding the knowledge of initial communication with the hospital command center in both the pre- and post-education questionnaires (Tables 11 & 21). Twenty-nine participants completed this question on each questionnaire. Three participants that took both the pre- and post-education questionnaire did not answer the question.

For the participants that answered "no knowledge" on the pre-education questionnaire, two participants again rated "no knowledge" on the post-education questionnaire. Eight RN's increased their perceived level of knowledge to "basic or novice knowledge." Two increased their perception of knowledge to "Intermediate knowledge." Two participants noted their perception of knowledge related to the needs surrounding initial communication with the hospital command center to "expert

knowledge." For the participants that answered the pre-education questionnaire regarding their previewed knowledge level surrounding the needs of initial communication with the hospital command center as "basic or novice knowledge", two answered the post-education questionnaire as again having "basic or novice knowledge", eight participants cited their knowledge level increased to "intermediate knowledge" and two felt their knowledge level increased to "expert knowledge." Of the one participant that answered this question as having "intermediate knowledge" in the pre-education questionnaire, the rated knowledge level increased to "expert knowledge" in the post-education questionnaire. Two participants rated their perceived level of knowledge on the pre-education questionnaire as "expert knowledge." On the post-education questionnaire, one of the two rated their perceived level of knowledge as "intermediate level" and one ranked their knowledge level again as "expert level." Overall, for this question, 23 (79%) participants had a perceived increase in knowledge level, five (17%) participants indicated they had no increase in knowledge, and one (3.4%) RN believed their perceived knowledge level decreased by one level.

Table 33

Amount of change in response from pre-education questionnaire to post-education questionnaire.

Question	N	Median Change	Min Change	Max Change	p-value
Q1. Contents of the Hospital Emergency Operations Plan (EOP)	30	1	-1	2	0.0003
Q2. Location of the hospital EOP	30	1	0	3	< 0.0001
Q3. Activation of the hospital EOP and command center	30	1	-1	3	< 0.0001
Q4. Who can activate the hospital EOP and command center	30	1	-1	3	< 0.0001
Q5. Contents of the Department EOP (DEOP)	29	1	-1	3	< 0.0001
Q6. Location of the DEOP	30	1	0	3	< 0.0001
Q7. When to report a potential event	30	1	0	3	< 0.0001
Q8. To whom a potential event is reported	30	1	0	3	< 0.0001
Q9. Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc.)	30	1	0	3	< 0.0001
Q12. Initial communication with the hospital command center	29	1	-1	3	< 0.0001

In Table 33, the questions from the pre- and post-education questionnaires are identified by question number. The total number of participants that answered each individual question in both the pre- and post-education questionnaire is identified as the N value. Twenty-nine participants answered questions five and 12 on both pre- and post-education questionnaires. Thirty participants answered all other questions on both questionnaires. For all questions, the median amount of change from the pre-education questionnaire to the post-education questionnaire was one. This implies that at least half

of the participants reported at least one level higher in knowledge on the post-education questionnaire as compared to the pre-education questionnaire. Since there are four levels of knowledge (no knowledge, basic/ novice knowledge, intermediate knowledge, expert knowledge), the maximum magnitude for change is three and that can be in a negative direction or positive direction. Questions with a minimum of zero imply there were no subjects who reported any less knowledge on the post-education questionnaire as compared to the pre-education questionnaire. In regards to the minimum change column, negative values indicate there was a decrease in knowledge on the post-education questionnaire as compared to the pre-education questionnaire. The value indicates the number of levels the knowledge was reported to decrease. Questions one, three, four, five, and twelve all had a decrease in reported knowledge by one participant on the post-education questionnaire. Respective to the maximum change column, positive numbers indicate that there was an increase in knowledge and the value indicates the number of levels the knowledge was reported to increase. Question one had an increase in two knowledge levels. All other questions utilized for this study had an increase of three knowledge levels. The p-values reported are from a Wilcoxon signed-rank test used to assess the median difference between the pre-education questionnaire and the post-education questionnaire. The significance level is set to 0.05. A p-value less than 0.05 implies that the participants significantly changed their answer from the pre-education questionnaire to the post-education questionnaire. Question one had a p-value of 0.003, indicating a significant change in knowledge level. The remainder of the questions utilized for this study had a p-value of 0.001, demonstrating a significant change in knowledge level. For each of the questions utilized for this study, this information

demonstrates that the knowledge level of increased significantly from the pre-education questionnaire as compared to the post-education questionnaire.

Summary of Findings

The purpose of this QI project was to determine the impact of the implementation of a DEOP has on the ED nurse's perception of disaster readiness. The pre-education questionnaire had a completion rate of approximately 40%. The post-education questionnaire had a completion rate of 36%. In regards to the pre- and post-education questionnaire comparison, dependent on the question, 29-30 participants (approximately 26%) took both the pre- and post-education questionnaires.

Based on the results of comparison tables, there is sufficient evidence to indicate that the implementation of the ED DEOP was successful in increasing the perception of the ED nurse's disaster preparedness for each of the specific knowledge rating items utilized in the participating institution. The p-values reported are from a Wilcoxon signed-rank test used to assess the median difference between the pre-education questionnaire and the post-education questionnaire. For each of the questions utilized for this study, this p-value information demonstrates that the knowledge level of increased significantly from the pre-education questionnaire as compared to the post-education questionnaire.

Chapter V: Conclusions

Summary

The purpose of this study was to assess the impact of a DEOP on the ED nurse's perception of disaster preparedness. ED's are the entry point into the healthcare system during times of disaster and mass casualty events, and as such, ED nurses must be knowledgeable in accessing and utilizing the DEOP during a disaster response. The ability to access a department plan that provides specific guidance consistent with the HEOP during high stress disaster events will ensure congruency for the healthcare delivery system. To ensure ED nursing staff are knowledgeable regarding the activation processes for the hospital as well as preparing for the immediate needs of an ED response, a DEOP is beneficial.

A disaster preparedness QI project was conducted from December, 2018 to January, 2019 in a 51 bed ED at a Level One Trauma hospital in the southern United States. This QI project aimed to assess the impact that the implementation of a DEOP had on the ED nurse's perception of disaster preparedness. The QI project followed the IOWA methodology and included components such as the creation of the ED DEOP, initial assessment of the ED nurse's perception of knowledge related to disaster preparedness utilizing a pre-education questionnaire, a 30-minute education of the DEOP during January 2019 ED staff meetings conducted by the primary investigator, and assessment of the ED nurse's perception of knowledge related to disaster preparedness utilizing a post-education questionnaire. The project was planned and implemented by a multidisciplinary team inclusive of ED nursing and physician leadership as well as the primary investigator.

Discussion

The findings and interpretations of this study revealed that the implementation of a DEOP increased the ED nurse's perception of disaster preparedness in a 51 bed, Level 1, adult ED. The participation rate for this study ranged from 25% to 39%. The participation rate for the pre-education questionnaire was 39% (N=121). The post-questionnaire participation rate was 34% (N=121). The comparison group, which included RN's that took both questionnaires was 25% (N=121). The results for this study were determined by answers from the pre-education questionnaires, the post-education questionnaires, and a comparison of the two. The findings from the Wilcoxon signed-rank test of the comparison groups indicate significant positive change in regards to the knowledge level of disaster preparedness. Additionally, 85% (N=41) of participants indicated their comfort level increased after the education of the DEOP.

The pre- and post-education questionnaires contained four questions related to hospital EOP, specifically the contents included in the hospital EOP, where it is located, the activation process, and who can activate it. Because this QI project was based on the level of knowledge pertaining to the ED DEOP, minimal education of the HEOP was provided. This education was meant to serve as a point of reference to facilitate discussion regarding the importance of early communication and activation processes to ensure a timely hospital wide response to a disaster event. As evidenced in the pre- and post-education comparison results, the question pertaining to the knowledge level of the contents of the HEOP, the knowledge level increased 53% (N=30) after the education. Additionally, in the pre- and post-education comparison results regarding the knowledge level of the location of the HEOP, the knowledge level increased 70% (N=30). The third

question of the pre- and post-education questionnaire comparison results identifying the knowledge level regarding how to activate the HEOP, the reported knowledge level increased 63% (N=30). In regards to who can activate the HEOP, the comparison of the pre- and post-education questionnaire results indicate an increase in the rated knowledge level 63% (N=30). These findings and its importance are supported in the literature. All hospitals are required to have up to date HEOP's and nurses should be aware of the plan and its contents; however, 9% participants did not know who at their hospital had the authority to activate the hospital-wide, 1 in 5 participants (21.5%) had not read their HEOP, and 91.1 % of participants were unsure of where to locate the plan (Whetzel et al., 2013). Because HEOP's are lengthy, broad plans, a DEOP may be a more meaningful guide to an ED nurse attempting to navigate through the initial department and hospital needs during the initial disaster response.

The pre- and post-education questionnaires contained four similar questions related to the DEOP. These questions include contents of the DEOP, location of the DEOP, when to report a potential event, and to whom to report the information. In regards to the rated knowledge level regarding the contents of the DEOP, the comparison results indicate a 52% (N=29) increase in knowledge after the education. The comparison results regarding the rated knowledge level of the location of the DEOP increased by 80% (N=30) post-education. There was a 60% (N=30) increase in rated knowledge level on the comparison findings with respect to when to report a potential event after education. Finally, the comparison results from the pre- and post-education questionnaires indicate a knowledge level increase of 73% (N=30) regarding to whom to report a potential event. These findings are significant in they support communication

needs essential for the early activation of a hospital-wide response. According to a case study from the Aurora, Colorado mass shootings published by Koehler, Scott, and Davis (2014), the HEOP was not activated until ED nursing leadership, facilities leadership and the chief nursing officer (CNO) arrived to the ED, approximately 45 minutes after the initial notification of the disaster event occurred. Delays in notification to appropriate hospital personnel can create delays in staffing, resource management, and overall negatively impact the response efforts for the hospital. Efficient and timely communication during a disaster response is important.

In addition to the activation of the HEOP which facilitates the hospital wide response efforts, inaccurate and delayed communication can also affect the initial ED response to a disaster event. The pre- and post-education questionnaires included two questions related to the initial ED communication needs for an effective disaster response. The rated knowledge level for initial preparation steps for the ED included considerations of the ED communication needs as addressed in the DEOP. The comparison results found an increase in reported knowledge level of 70% (N=30). Additionally, with respect to the communication needs with the hospital command center, the comparison results indicated an increase in rated knowledge level of 79% (N=29) as reported by the participants. The importance of accurate and timely communication is supported in the literature. When addressing lessons learned from the Boston Marathon Bombing event in 2013, Nadworny et al. (2014) identified that communication from the scene of the disaster to the healthcare facility was vastly inaccurate as the initial reports of 100 victims turned into 275 patients that sought treatment at local hospitals. Because communication from the scene of a disaster event is chaotic, it is important for hospitals

to be able to identify potential events and communicate the potential event both with the hospital and ED physician and nursing staff in order to plan appropriately. Koehler, Scott, and Davis (2014) outline the difficulties with communication to staff in the Aurora, Colorado mass shooting in 2012. They discuss the issues of not utilizing the hospital's mass notification system and the challenges of utilizing paper call-back lists in they were outdated, incomplete, or difficult to locate. This issue can create a delay in calling in necessary staff to the ED to assist with the patient surge. Communication delays and inaccuracies create staffing and resource management delays in regards to an initial ED disaster response.

The pre- and post-education questionnaires asked one question related to the initial preparation steps for the ED which addressed command and control in regard to role responsibility as outlined in the DEOP. The comparison results found a 70% (N=30) increase in knowledge level by the participant. This finding is significant to the study considering that with every disaster event, command and control in regards to role perception is essential to the overall ED response. Because a healthcare facility may be impacted in the first 15-30 minutes after an event occurs (Nielson, 2017), it is important that ED nurses understand their role. The study conducted by Whetzel et al., (2014) magnified concerns in that only 21.5% of participants had read the hospital's EOP which contains guidance on role responsibility. Additionally, according to this article, only 45.7% of participants had taken an incident command course, which provides education on command roles for the responder of a disaster event. Several sections of the DEOP discussed specific ED guidance on role responsibility and needs. The DEOP education included guidance on role perception and needs during a mass casualty or disaster event.

The guidance offered by the DEOP was not only ED specific, it was scalable to all sizes of events.

The pre- and post-education questionnaires asked one question directed to the initial preparation steps for the ED that focusing on the importance of disaster triage and implications of surge as discussed in the DEOP. The comparison results found a 70% (N=30) increase of rated knowledge level by the participant. This finding was significant to the study in that the sudden surge of patients from a disaster event can create issues both in the ED and inpatient units. Whetzel et al. (2013) reiterates that the first notification of a disaster event may be patients arriving to the ED that did not wait for EMS. In the Aurora, Colorado mass shootings, Koehler, Scott, and Davis (2014) discussed that in the first ten minutes of the disaster event it was apparent resources would be strained. Knowledge of processes for the surge of patients is important and lack of knowledge can be detrimental to ED and hospital disaster response efforts as well as increase the morbidity and mortality of disaster victims and inpatients. Surges in traumatically injured patients can lead to poor clinical outcomes because the needs of the patient exceed the available resources (Jenkins et al., 2015). The DEOP education included guidance on moving triage to an alternate location dependent on the size of the event to facilitate the influx of patients as well as communication needs regarding expected surge during a disaster event.

Conclusions

This QI project found that ED nurses in the participating hospital had an increased knowledge level of department specific needs after the implementation and education of the ED DEOP. While the DEOP does not take the place of the overarching hospital EOP,

it can offer specific, and perhaps, more meaningful guidance for the bedside ED nurse during a mass casualty or disaster event. It is concluded, based on the findings of this study, that the DEOP is beneficial to the initial response needs of the affected department, which in this case, is the ED. This study sets an example for other ED's to create and implement their own DEOP.

Implications

The findings from this QI project indicates that the DEOP may be beneficial and provide meaningful guidance to the bedside nurse facing a disaster response as it provides guidance in the areas discussed in this study. These areas include the contents and location of the HEOP, activation processes identified in the HEOP as well as who can activate the HEOP and command center, contents and location of the ED DEOP, when and to whom to report a potential event, initial preparation steps necessary for an ED disaster response, and initial communication needs from the ED with the hospital command center. A more detailed examination into the benefits of the DEOP is necessary. The findings of this study identify the importance of an ED DEOP in regards to the perceived knowledge level of disaster preparedness. According to this study, the DEOP positively affects the ED response to a disaster event. Additionally, the guidance can likely be utilized in other departments and non-hospital-based entities to enhance their disaster preparedness knowledge.

Recommendations

Additional research is necessary to determine if the guidance the DEOP provides is truly beneficial in comparison to the overarching HEOP. The current standard by

regulatory agencies is that nurses must read and follow the HEOP. However, the HEOP is not department specific and offers broad guidance for response needs. A more detailed plan may be beneficial, especially to departments that are considered to be first receivers and likely will need to respond before leadership is on site to offer additional expertise and guidance.

Additional research is recommended among hospitals of different size and capabilities as well as like facilities in order to have a better understanding of the benefit of a DEOP. With a larger sample size, inclusive of different types and capabilities of healthcare facilities, findings will be more generalized. Increased and more targeted education of the DEOP time may have an impact on findings. Additionally, specialty care areas such as pediatric, mental health, and labor and delivery ED's may indicate similar or different findings, and should be assessed as well.

Alternate survey distribution mechanisms may also have an impact on completion rates, and subsequently, findings. Bedside nurses often do not check emails for an extended period of time due to workload and numerous days off work. Also, the timing of the questionnaires and education may have been detrimental to the project as it was completed during the Christmas and New Year holiday season.

Research comparing responses to demographic data and professional experience may be helpful in the future as disaster preparedness continues to evolve. Self and family preparations in relation to disaster readiness may also play a key role in the perception of disaster preparedness. This may be worth assessing in subsequent studies to determine the relation of self-preparedness as compared to preparedness levels for the workplace. It is documented in previous studies that self-preparedness is important to the overall

response efforts. The absence or lack of preparation may decrease the nurse's ability to care for others during times of disaster.

References

Ajimi, Y., Sasaki, M., Uchida, Y., Kaneko, I., Nakahara, S., & Sakamoto, T. (2016). Primary triage in a mass-casualty event possesses a risk of increasing informational confusion: A simulation study using Shannon's entropy. *Prehospital and Disaster Medicine, 31*(5), 498-504. doi: 10.1017/S1049023X16000698

Ben-Ishay, O., Mitaritonno, M., Catena, F., Sartelli, M., Ansaloni, L., & Kluger, Y. (2016). Mass casualty incidents - time to engage. *World Journal of Emergency Surgery: WJES*, *11*, 8. doi: 10.1186/s13017-016-0064-7

Brown, C. G., (2014). The Iowa model of evidence-based practice to promote quality care: An illustrated example in oncology nursing. *Clinical Journal of Oncology Nursing, 18*(2), 157-9. doi: 10.1188/14.CJON.157-159

Buckwalter, K., Cullen, L., Hanrahan, K., Kleiber, C., Mccarthy, A., Rakel, B., & Tucker, S. (2017). Iowa Model of Evidence-Based Practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182

California Hospital Association (2017). *Emergency Operations Plan (EOP).* Retrieved from https://www.calhospitalprepare.org/overview/emergency-operations-plan-eop

Centre for Research on the Epidemiology of Disease (CRED). (2015). *The Human Cost of Natural Disasters 2015: A global Perspective.* Retrieved from http://reliefweb.int/sites/reliefweb.int/files/resources/PAND_report.pdf

Clarkson, L. & Williams, M. (2018). *EMS, Triage, & Mass Casualty.* Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK459369/

Department of Health Services, U.S. Department of Homeland Security. (2019, February 2). Plan and Prepare for Disasters. Retrieved from: https://www.dhs.gov/plan-and-prepare-disasters

Emergency Nurses Association. (2019, February 2). *About Emergency Nurses Association.* Retrieved from: https://www.ena.org/about

Emergency Nurses Association. (2014). *Trauma Nursing Core Course: Provider Manual* (7th Ed.). Des Plaines, IL: ENA.

FEMA.gov/training. (2019, February 2). Emergency Management. Retrieved from: https://training.fema.gov/hiedu/docs/emprinciples/0907_176%20em%20principles12x18v2f%20johnson%20(w-o%20draft).pdf

Hope, J. (2016). Participate in a comprehensive effort to create department emergency plans. *Dean and Provost, 17*(9), 1-5. doi: 10.1002/dap.30184

Jenkins, P.C., Richardson, C.R., Norton, E.C., Cooke, C.R., Banerjee, M., Nathans, A.B., Hemmila, M.R. (2015). Trauma surge index: Advancing the measurement of trauma surges and their influence on mortality. *Journal of American College of Surgeons*, *221,* 729-738. Retrieved from: http://dx.doi.org/10.1016/j.jamcollsurg.2015.05.016

Koehler, A., Scott, R. A., & Davis, R. (2014). Surviving the dark night: The Aurora, Colorado, mass shootings. *Journal of Emergency Nursing: JEN: Official Publication of the Emergency Department Nurses Association, 40*(5), 440-445. doi: 10.1016/j.jen.2014.03.001

Mass Casualty Shootings. 2018 National Crime Victim's Rights Week Resource Guide: Crime Victimization Fact Sheets. Retrieved from:

https://ovc.ncjrs.gov/ncvrw2018/info_flyers/fact_sheets/2018NCVRW_MassCasualty_508_QC.pdf

Nadworny, D., Davis, K., Miers, C., Howigan,T., Broderick, E., Boyd, K., & Dunster, G. (2014). Boston strong- One hospitals response to the 2013 Boston Marathon bombings. *Journal of Emergency Nursing, 40*(5), 418-427. doi: 10.1016/j.jen.2014.06.007

Neilson, M. (2017). When disaster strikes, will you be ready? *Nursing2017, 47*(12), 52-56. Retrieved from www.Nursing2017.com

Paturas, J.L., Smith, S.R, Albanese, J., & Waite, G. (2015). Inter-organisational response to disasters. *Journal of Business Continuity & Emergency Planning, 9*(4), 346-358. Retrieved from https://libcatalog.atu.edu:443/login?url=http://search.ebscohost.com/login.aspc?direct=true&db=bth&AN=116748964&site=ehost-live&scope=site

Polit, D. & Beck, C.T. (2012). *Nursing Research: Generating and Assessing Evidence for Nursing Practice (9th ed.).* Wolters Kluwer Health: Lippincott, Williams & Wilkins.

Sheikhbardsiri, H., Raeisi, A.R., Nekoei-Moghadam, M., & Rezaei, F. (2017). Surge capacity of hospitals in emergencies and disasters with a preparedness approach: A systematic review. *Disaster Med. Public Health Prep,11*(5), 612-620. doi: 10.1017/dmp.2016.178.

Thobaity, Plummer, & Williams (2016). What are the most common domains of the core competencies of disaster nursing? A scoping review. *International Emergency Nursing, 31*(2017), 64-71. doi: 10.1016/j.jenj.2016.10.003

Veenema, T., Deruggiero, K., Losinski, S., Barnett, D. (2017). Hospital administration and nursing leadership in disasters: An exploratory QI Project using concept mapping. *Nursing Administration Quarterly, 41*(2), 151-163. doi: 10.1097/NAQ.0000000000000224

Whetzel, E., Walker-Cillo, G., Chan, G., & Trivett, J. (2013). Emergency nurse perceptions of individual and facility emergency preparedness. *Journal of Emergency Nursing: JEN: Official Publication of the Emergency Department Nurses Association, 39*(1), 46-52. doi: 10.1016/j.jen.2011.08.005

Yarmohammadian, M. H., Rezaei, F., Haghshenas, A., & Tavakoli, N. (2017). Overcrowding in emergency departments: A review of strategies to decrease future challenges. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, *22*, 23. doi:10.4103/1735-1995.200277

Appendix A

Informed Consent

Title of Project: Emergency nurse perceptions of disaster preparedness after the implementation of a department emergency operations plan.

Principal Investigator: Angela Gentry, BSN, RN, TCRN

The Introductory Paragraph

We invite you to take part in a research study titled: Emergency nurse perceptions of disaster preparedness after the implementation of a department emergency operations plan at Baylor Scott and White Medical Center, Temple which seeks to increase the knowledge of the emergency department (ED department emergency operations plan to increase the ED nurse perceptions of disaster readiness. Taking part in this study is entirely voluntary. We urge you to discuss any questions about this study with the identified department leaders. If you decide to decline participation, do not click on the survey link.

Section 1. Purpose of the Research

The purpose of this research is to identify the ED nurse's perception of disaster preparedness after the implementation of a department emergency operations plan (DEOP).

Section 2. Procedures

After the recruitment period and initial information has been provide to all applicable staff, there will be an initial survey sent via email to all eligible registered nurses working either part time or full time in the Baylor Scott and White Medical Center, Temple (BSWMC, Temple) to be completed in an identified time frame. Once this time has elapsed, there will be education provided regarding the DEOP during a staff meeting and subsequent department huddles after the staff meeting for identified staff that were unable to attend the mandatory meeting for two weeks. Once this time has elapsed, a post education survey will be sent to all registered nurses working either part time or full time in the BSWMC, Temple Emergency Department.

Section 3. Time Duration of the Procedures and Study

The duration of this study will last 4 weeks: 2 open weeks to complete the informed consent (approximately 5 minutes for each survey), pre-education survey (approximately 5 minutes), 2 open days of education during staff meetings (approximately 30 minutes), followed by 2 weeks open for the post-education survey (approximately 5 minutes).

Section 4. Discomforts and Risks

There are no known risks anticipated with this study.

Section 5. Potential Benefits

Possible benefits to the participant: You will not benefit from taking part in this research study.
Possible benefits to others: The results of this research may guide the future creation and implementation of department emergency operation plans to increase disaster readiness needs of all departments with a hospital entity, to include emergency departments.

Section 6. Statement of Confidentiality

Your research records that are reviewed, stored, and analyzed at BSWMC, Temple will be kept in a secured area in the trauma program managers office.

In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Section 7. Compensation for Participation
You will not receive any compensation for being in this research study.

Section 8. Voluntary Participation
Taking part in this research study is voluntary. You do not have to participate in this research. If you choose to take part, you have the right to stop at any time. If you decide not to participate or if you decide to stop taking part in the research at a later date, there will be no penalty or loss of benefits to which you are otherwise entitled.

Section 9. Contact Information for Questions or Concerns
You have the right to ask any questions you may have about this research. If you have questions, complaints or concerns or believe you may have developed an injury related to this research, contact Angela Gentry, BSN, RN, TCRN, Nurse Manager, Trauma Services at 254-724-9926 or Dr. Shelly Randall, Research Advisor, Graduate Department of Nursing, Arkansas Tech University at srandall@atu.edu.

If you have questions regarding your rights as a research participant or you have concerns or general questions about the research, please visit Arkansas Tech University's IRB web site at https://www.atu.edu/ospui/human_subjects.php.

For more information about participation in a research study and about the Institutional Review Board (IRB), a group of people who review the research to protect your rights, please visit Arkansas Tech University's IRB web site at https://www.atu.edu/ospui/human_subjects.php. Included on this web site, you can access federal regulations and information about the protection of human research participants.

Before making the decision regarding enrollment in this research you should have:
- Discussed this study with an investigator,
- Reviewed the information in this form, and
- Had the opportunity to ask any questions you may have.

Participant: By clicking the check box, you indicate that the research study has been explained to you by the primary investigator and any questions that you have about the research study has been answered. Additionally, by clicking the check box you are voluntarily choosing to take part in this research.

☐ I Consent

☐ I Do Not Consent

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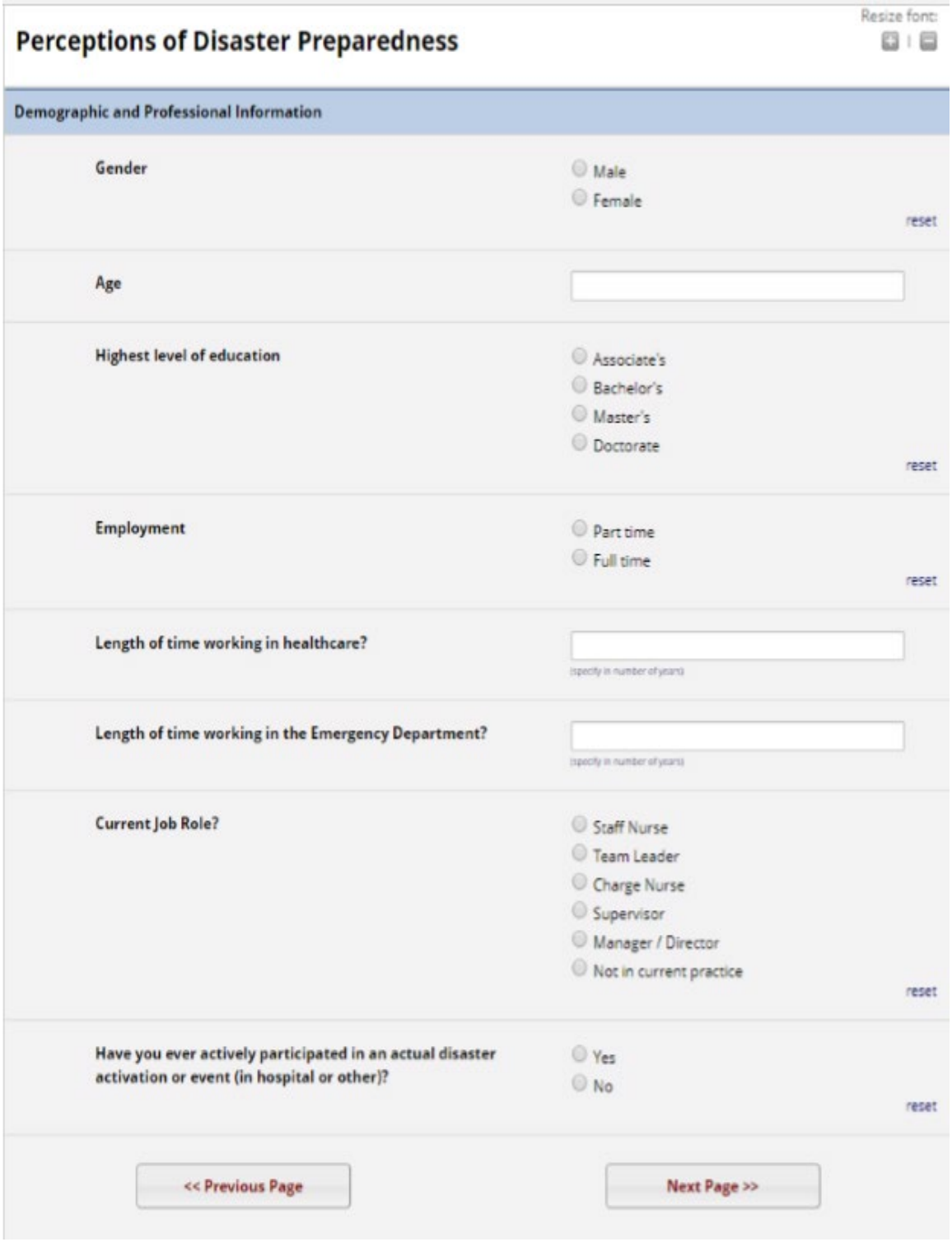
Appendix B

Pre-education Questionnaire



Perceptions of Disaster Preparedness

Resize font:

Demographic and Professional Information

Gender
- Male
- Female

reset

Age

Highest level of education
- Associate's
- Bachelor's
- Master's
- Doctorate

reset

Employment
- Part time
- Full time

reset

Length of time working in healthcare?

(specify in number of years)

Length of time working in the Emergency Department?

(specify in number of years)

Current Job Role?
- Staff Nurse
- Team Leader
- Charge Nurse
- Supervisor
- Manager / Director
- Not in current practice

reset

Have you ever actively participated in an actual disaster activation or event (in hospital or other)?
- Yes
- No

reset

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Resize font:

Perceptions of Disaster Preparedness

Please rate your knowledge level with each of the following:

	No Knowledge	Basic/Novice Knowledge	Intermediate Knowledge	Expert Knowledge	
Contents of the Hospital Emergency Operations Plan (EOP).	○	○	○	○	reset
Location of the hospital EOP.	○	○	○	○	reset
Activation of the hospital EOP and command center.	○	○	○	○	reset
Who can activate the hospital EOP and command center.	○	○	○	○	reset
Contents of the Department EOP (DEOP).	○	○	○	○	reset
Location of the DEOP.	○	○	○	○	reset
When to report a potential event.	○	○	○	○	reset
To whom a potential event is reported.	○	○	○	○	reset
Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc)	○	○	○	○	reset
Call back procedures for off-duty staff.	○	○	○	○	reset
The call in procedures for off-duty staff.	○	○	○	○	reset
Initial communication with the hospital command center.	○	○	○	○	reset
Actions to take before patient arrival (EPIC disaster mode, triage locations, patients movement, communication flows).	○	○	○	○	reset
What to do with EMS triage tags.	○	○	○	○	reset
Who to question in the department during an event.	○	○	○	○	reset
Identifying external partners that may present during an event.	○	○	○	○	

Routing external partners that may present during an event to the appropriate area for check in.	○	○	○	○	reset
Proceeding during a fire or other internal department hazard.	○	○	○	○	reset
Proceeding during a need for an emergent or urgent evacuation.	○	○	○	○	reset
Identifying the need to activate the decontamination plan.	○	○	○	○	reset
Activating the decontamination plan.	○	○	○	○	reset
Identifying and isolating a patient suspected of having a high consequence infectious disease	○	○	○	○	reset
Activation of the high consequence infections disease (HCID) plan.	○	○	○	○	reset
Identifying when an IT outage is occuring.	○	○	○	○	reset
How to report IT outages.	○	○	○	○	reset
When to report IT outages.	○	○	○	○	reset
Activating the downtime plan for IT outages (phone, EPIC).	○	○	○	○	reset
Responding as a department to a missing infant or child.	○	○	○	○	reset
Responding as a department to a bomb or suspicious package threat.	○	○	○	○	reset
Responding as a department to an active shooter or person with a weapon threat.	○	○	○	○	reset
Recovery needs from a mass casualty event (additional staff, chaplains, counselors).	○	○	○	○	reset
Recovery needs from an IT event (additional staff, EPIC documentation, etc).	○	○	○	○	reset

What is the best way to help you increase your preparedness level in order to act during a disaster situation in your facility?

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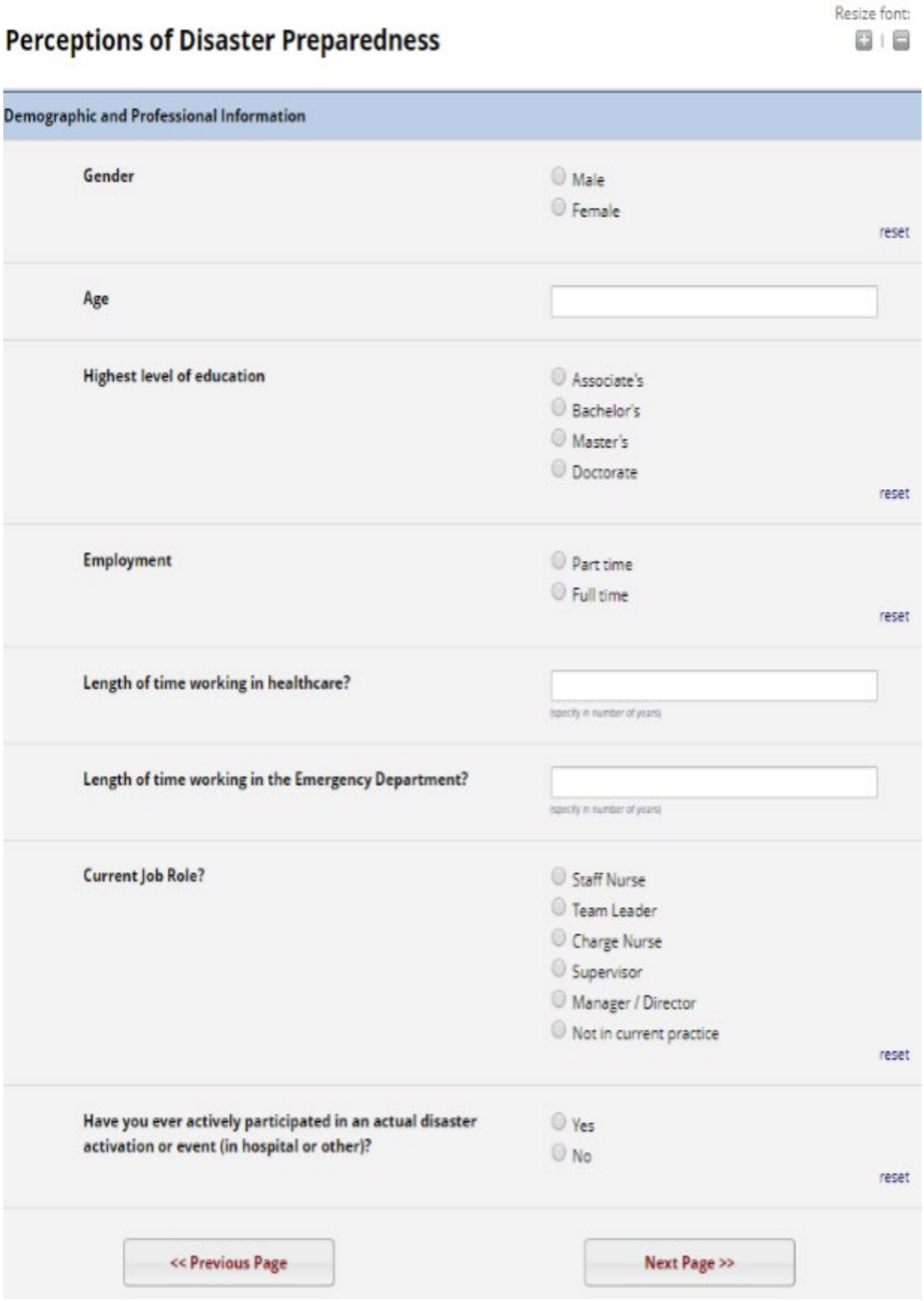
Submit

Appendix C

Post-education Questionnaire



Resize font:

Perceptions of Disaster Preparedness

Demographic and Professional Information

Gender
- Male
- Female

reset

Age

Highest level of education
- Associate's
- Bachelor's
- Master's
- Doctorate

reset

Employment
- Part time
- Full time

reset

Length of time working in healthcare?

(specify in number of years)

Length of time working in the Emergency Department?

(specify in number of years)

Current Job Role?
- Staff Nurse
- Team Leader
- Charge Nurse
- Supervisor
- Manager / Director
- Not in current practice

reset

Have you ever actively participated in an actual disaster activation or event (in hospital or other)?
- Yes
- No

reset

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Resize font:

Perceptions of Disaster Preparedness

Please rate your knowledge level with each of the following:

	No Knowledge	Basic/Novice Knowledge	Intermediate Knowledge	Expert Knowledge	
Contents of the Hospital Emergency Operations Plan (EOP).	○	○	○	○	reset
Location of the hospital EOP.	○	○	○	○	reset
Activation of the hospital EOP and command center.	○	○	○	○	reset
Who can activate the hospital EOP and command center.	○	○	○	○	reset
Contents of the Department EOP (DEOP).	○	○	○	○	reset
Location of the DEOP.	○	○	○	○	reset
When to report a potential event.	○	○	○	○	reset
To whom a potential event is reported.	○	○	○	○	reset
Initial preparation steps for the ED? (Considerations for staff, triage needs, communication needs, etc)	○	○	○	○	reset
Call back procedures for off-duty staff.	○	○	○	○	reset
The call in procedures for off-duty staff.	○	○	○	○	reset
Initial communication with the hospital command center.	○	○	○	○	reset
Actions to take before patient arrival (EPIC disaster mode, triage locations, patients movement, communication flows).	○	○	○	○	reset
What to do with EMS triage tags.	○	○	○	○	reset
Who to question in the department during an event.	○	○	○	○	reset
Identifying external partners that may present during an event.	○	○	○	○	

Routing external partners that may present during an event to the appropriate area for check in.	○	○	○	○	reset
Proceeding during a fire or other internal department hazard.	○	○	○	○	reset
Proceeding during a need for an emergent or urgent evacuation.	○	○	○	○	reset
Identifying the need to activate the decontamination plan.	○	○	○	○	reset
Activating the decontamination plan.	○	○	○	○	reset
Identifying and isolating a patient suspected of having a high consequence infectious disease	○	○	○	○	reset
Activation of the high consequence infections disease (HCID) plan.	○	○	○	○	reset
Identifying when an IT outage is occuring.	○	○	○	○	reset
How to report IT outages.	○	○	○	○	reset
When to report IT outages.	○	○	○	○	reset
Activating the downtime plan for IT outages (phone, EPIC).	○	○	○	○	reset
Responding as a department to a missing infant or child.	○	○	○	○	reset
Responding as a department to a bomb or suspicious package threat.	○	○	○	○	reset
Responding as a department to an active shooter or person with a weapon threat.	○	○	○	○	reset
Recovery needs from a mass casualty event (additional staff, chaplains, counselors).	○	○	○	○	reset
Recovery needs from an IT event (additional staff, EPIC documentation, etc).	○	○	○	○	reset

What is the best way to help you increase your preparedness level in order to act during a disaster situation in your facility?

My comfort level with the DEOP has increased since receiving education.

- ○ Strongly Agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

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