A DNP PROJECT

Validation of a Computer-Based Simulated Patient Surge Drill for Disaster Education in the Emergency Department

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Introduction

Disasters are occurring with an alarmingly growing frequency. Some show us nature's power while others show us humanity's evil. No matter the origin of the disaster hospitals must stand prepared to handle whatever the world throws at them. Merriam-Webster defines a disaster as "a sudden calamitous event bringing great damage, loss, or destruction" (Merriam-Webster). When this is happening the world around the disaster is in chaos, it falls on the nurses to provide calm and direction. However, often hospitals and nurses have limited hands-on training to respond to disasters. A simple solution to this would be to run disaster drills and use simulation as a teaching tool. Despite this, there are very few hospitals that are running drills using real-time hospital data to simulate a patient surge event. Surge events occur when a large number of patients arrive at the hospital. There can be seasonal surges such as during flu season, or when a mass casualty incident (MCI) occurs. For the purpose of this study, a surge event will refer to a MCI. There is, however, plenty of evidence showing that simulations are a valid teaching tool and even allow for retention of the material taught.

This project preformed a study to validate disaster surge simulations as a teaching tool. The validation was performed in three steps. The first step was to have emergency department nursing staff complete the Emergency Preparedness and Information Questionnaire (EPIQ), that has been adapted for this study. It was initially created by the Wisconsin Nurses Association to determine educational needs and has been adapted for many uses over the years (Wisniewski, Dennik-Champion, & Peltier, 2004). Emergency department nurses then underwent a computer-based surge drill; the Hospital Surge Evaluation Tool (US Department of Health and Human Services, 2017) was used. Post

exercise the staff that participated retook EPIQ and the scores were compared. It was hypothesized that there will be an increase in disaster knowledge post-simulation. With this data, hospitals may be more likely to utilize surge simulations to prepare staff for any disaster that might occur in their community. The data shows simulations are a valid method for disaster education and can provide opportunities for more complex disaster drills to be formed and implemented.

Background and Significance

Recent Disasters and Hospital Responses

Disastrous events are occurring more and more, and this has shown that most hospitals have an outdated understanding of how disasters will happen, especially ones due to acts of violence. In March of 2004 in Madrid, Spain, terrorists placed explosives on three trains. The explosion occurred between 7:39 am and 7:42 am, and created 2,000 casualties. The city of Madrid instantly had to treat and accommodate all of those victims (Gutierrez de Ceballos, 2005). This is a staggering amount of victims and is the new reality of the world in which we live.

In Aurora, CO, in July 2012, a lone gunman wounded 58 moviegoers. The University of Colorado Hospital received notice of the incoming victims at 12:56 am, just 5 minutes before the first victims began to arrive. Between 1:01 am and 1:21 sixteen gunshot victims would arrive in the emergency room. The reason for this lack of notification and quick and rapid arrival is that many victims were transported via police car. The police officers on scene elected to not wait for emergency medical services (EMS) and transported the victims themselves (Koehler, Scott, & Davis, 2014). This is a significant issue for hospital disaster plans. Unless an institution's disaster plan has been updated,

most assume that EMS will be transporting. EMS transporting allows the receiving hospital to have a brief report on the victims and an estimate of when the patients would be arriving. Also, treatment would be started, at bare minimum IV/IO access. A study by TariVerdi, Miller-Hooks, and Kirsch (2018) has shown that in recent disasters approximately 90% of victims will not arrive via EMS.

Further deviating from the expectation that victims will arrive by EMS can be seen at The Route 91 Shooting in Las Vegas, NV, in October 2017. This event caused approximately 800 casualties. Almost all of the victims were transported by private automobile or rideshare services such as Uber and Lyft. There was no field triage, there was no advanced notification, and victims were simply being brought to the closest hospital. This means that multisystem trauma patients were being transported to non-trauma centers and there was not an even distribution of patients. One facility would receive 200 victims and the next most, the only Level I trauma center, received 60 (Lake, 2018).

What can be seen by these three examples is that these disaster events do occur. They also provide us the opportunity to see the number of victims an institution can realistically expect. Aurora and Las Vegas were both caused by a singular actor. Many hospitals drill for influxes of twenty or thirty people from nonviolent events such as a bus accident or train derailment. The only way to honestly stress the system and educate the staff is to hold a surge drill to 'live' the event.

Affected Populations

When a disaster strikes a community, no part of the population is unaffected. This also holds true to the staff of the emergency department. While the vast majority of the staff

involved will be clinical, there is also a critical need for nonclinical staff. In some recent disasters, it was seen that the true heroes were housekeeping, they ensured that quick patient turn around was possible by cleaning rooms, beds, and turning over operating rooms. Other disasters have seen that clerical staff was vital to answer phones and call in extra staff. After the November 2015 attacks in Paris, it was noticed that the essential staff in bed management were not listed on a call back list and there were issues with creating bed space (Ghanchi, 2016).

While the completed study directly affects hospital employees, patients and the community are also affected. They will be the victims of disasters. By implementing training, hospitals will be better prepared to treat the victims. While this will not have a day-to-day increase in patients' outcomes, it will serve to improve their outcomes and satisfaction in the event a disaster does occur.

Impact

It is effortless for many institutions to adopt the 'it won't happen to us' mindset. They will only continue to do the minimum disaster preparation drills and exercises that are required by Centers for Medicare and Medicaid Services (CMS) (Centers for Medicare and Medicaid Programs, 2016). In 2018 there were 124 FEMA declared disasters (FEMA, 2018). That is a rate of one every three days. Moreover, FEMA declared disasters certainly do not include events such as motor vehicle accident involving a bus or a massive structure fire or carbon monoxide events. They interestingly do not include events such as those previously mentioned, unless they affect multiple states. The only two FEMA declared disasters related to terrorism are the 9/11 attacks and the Boston Marathon Bombers. Hospitals need to plan for disaster preparation education so that they

can learn how to adapt their operations to optimize patient care during a mass causality event.

It is understandably hard to look at some of the numbers of patients and indeed be able to grasp how large that is. Or again adopt the mindset, 'not us.' However, most hospitals would readily admit that an event could occur that would bring ten critical patients to them at once. If this would happen, it has been seen that there would be a 20x increase in wait time for an open and staffed operating room (TariVerdi, Miller-Hooks, & Kirsch, 2018). The reason to care about disaster preparation is to ensure optimal patient care.

Current Disaster Response Knowledge

It can easily be seen that disasters are happening and that hospitals will be inundated with victims. With that knowledge, one would assume that healthcare workers and hospitals would be prepared. However, there are multiple studies, of various research styles, that show the actual level of preparedness and knowledge is shockingly low.

One of the most compelling studies showing this was performed by Labrague et al. (2018), it is a systematic review of literature detailing how nurses feel about disaster preparedness. It found that 25% of nurses had never read their facilities disaster plan and 10% did not even know where to find it in the event of the disaster. In the case of actual patient care and management Oztekin, et al. (2015) found that only 28.3% of nurses would feel comfortable assuming command and a shockingly low amount of 7% would triage. Both comfort assuming command and disaster triaging can be obtained during simulations. These are roles that cannot be learned solely from didactic lectures or self-paced learning.

There are two crucial reasons to drill. One of the reasons is to discover deficiencies in an institution's plan. In a full-scale exercise involving 16 hospitals, it was found that 0% of the hospitals were compliant in all five of the predetermined categories. These categories included communications, decontamination, command structure, staffing, and patient tracking. In fact, 94% of the hospitals were noncompliant in the communications area alone (Kilma et al., 2012).

The second, and the, purpose of this study is to educate. In general, simulations are widely used in medical education. It has been found that simulations allow for an 11% increase in knowledge post a simulated learning event (Schubert, 2012). There is also data showing that simulation for disaster education is valuable for nursing students. Kaplan, Connor, Ferranti, Holmes, and Spencer (2012) ran a disaster drill with undergraduate nursing students. They found that 95% "agreed or strongly agreed' that the exercise increased their handling and knowledge of disaster events.

Knowledge Gap

Though there is research showing the need for disaster education and the validity of using simulations, there is little evidence that simulations can be used for disaster education. Therefore, a quasi-experimental study, using pre and post-intervention surveys, was proposed to demonstrate that disaster simulations can be used as a valid teaching tool.

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Needs Assessment

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The study occurred at a Level One Trauma Center in Newark, NJ, with an average yearly patient volume of 90,000. Newark is a prime location for a disaster of any origin to occur. The city itself has a population of approximately 285,000 and has many major

highways that flow through its borders (US Census Bureau, 2017). Looking at a larger

scale, Newark is also home to Newark Liberty International Airport, the 14th busiest in

the United States with an annual passenger amount of 43 million (The Port Authority of

NY & NJ, 2018). There is also the Port of Newark and Elizabeth, which holds

approximately 1.3 million containers that arrive by both ship and train (Facilities, 2018).

To further show the risk involved, the two-mile stretch of the New Jersey Turnpike

between the airport and the port has been deemed the most dangerous two miles in

America, related to the risk of terrorism (Kocieniewsky, 2005). Also, the hospital is in

close proximity to New York City, and it can be realistically expected that a large

catastrophe there could have patients arriving at the study site, especially if the New York

City hospitals were to become compromised.

A survey of nurses in the New Jersey chapter of the Emergency Nurses Association

found that 98.9% of them believed a disaster could threaten their facility. It further

showed that 60.6% "disagreed or strongly disagreed" that "I feel comfortable with my

facility's level of emergency preparedness" (Whetzel, Walker-Cillo, Chan & Trivett,

2013). The easiest way to determine needs at the national and global level is to look no

further than the systematic review performed by Labrague et al. (2018). This review was

able to determine that there is a global lack of disaster preparedness. Five of the studies

were performed in the United States. Perhaps more staggering is that 17 additional

countries were included in various research papers, all with the same conclusion. This

shows that the lack of disaster preparedness and education is indeed a global issue.

Despite this issue, there has been little done to address the problem. There are plenty of

studies that show a need for an increased amount of disaster education for all hospital

staff. However, there is a lack of suggestions on how to accomplish this. Most studies that attempt to answer this question are merely left with the conclusion that more research is needed, and thus the purpose of this study.

Problem/Purpose Statement

It can be seen that hospital staff is aware that there is a lack of training in disaster preparedness. With this, there is a lack of a definitive training method to improve their education and response ability. This project demonstrated that using a disaster drill in the form of a drill simulator will allow for increased knowledge in disaster response.

Research Question

In hospitals does the implementation of a computer-based disaster drill allow for increased disaster response knowledge as evidenced by a pre and post survey of disaster based knowledge?

Aims and Objective of the Study

The first objective of this project was to increase disaster knowledge amongst staff. Being that the implementation was simulation-based, it also allowed for exposing any existing deficiencies. One training deficiency was found and will be discussed in the results section. It is possible new policies and training can be created to ensure optimal response and patient care in the event of a mass causality incident resulting in a patient surge. Another objective is that it allowed staff to practice in leadership roles that they may not normally be accustomed to working. The overall aim of this study was seen, staff nurses and leadership demonstrated an increase in disaster knowledge after the computer-based simulation drill.

Review of Literature

Search Strategy

The initial search for literature was performed using the CINHAL database. Two sets of terms were used, both were limited to searching for articles with full-text availability, written in English, and published no earlier than January 1, 2015. The terms "disaster preparedness" + "hospital" yielded 69 results and "emergency preparedness" + "hospital" yielded 63 results. The same search parameters were used on the PubMed database, with 251 results and 291 results respectively. The four searches yielded multiple repeated results, and those duplicate studies were excluded. Next, articles were included or excluded based on the article title. Once those studies were excluded abstracts were reviewed, and a small number of additional studies were excluded. After the exclusion of articles nine articles were found and were included and reviewed.

This style of research provided a number of studies worthy of being included in this literature review. However, to find additional data, the snowball style was used. Many of these articles had long reference lists that were scrutinized. Due to the low amount of recent publications on the topic earlier studies were included on a case-by-case basis. Due to the specialization of this topic, the most significant studies were found by searching the archives of the official journal of the World Association for Disaster and Emergency Medicine, the journal is entitled Prehospital and Disaster Medicine and is published by Cambridge Core and the official publication of the Society of Disaster Medicine and Public Health, Disaster Medicine and Public Health, also published by Cambridge Core. The snowball style was continued with articles found in these journals. In total twelve articles are included in this literature review and can be seen in Appendix A.

Synthesis of Reviewed Literature

Simulations are an integral part of medical education. They have been found to increase base knowledge level by 11%. Not only do they increase knowledge it has been seen that they allow for the retention of knowledge, in addition, a 2-week post test has also shown an additional 15% increase from immediate post testing with similar results dealing with specifically disaster education (Schubert, 2012; Bistaraki, Waddington, & Galanis, 2011).

Full-scale simulations with nursing students found a mean Likert score of 4.5 of 5 for a drill increasing their knowledge base (Kaplan, Connor, Ferranti, Holmes, & Spencer, 2012). Dealing with chemical, biological, radiological, nuclear, and explosive (CBRNE) knowledge, there was a statistically significant increase in awareness by 28.6 points for nurses and 21.8 points for attendings (Subbarao, Bond, Johnson, Hsu, & Wasser, 2006). After completing a computer-based surge simulator, charge nurses were able to decrease time to treatment of victims by over 50% (Jonson, Peetersson, Rybing, Nilsson, & Prytz, 2017). However, there are also studies that have found that simulations do not do as the previously referenced studies claim. Jung, Carman, Aga, and Burnett (2016) found that when comparing pre-, post-, and four-month post-tests, there was not a statistically significant change in overall scores. It is worth noting that in the subsection on communication there was a statistically significant increase between post score and four-month post score, showing that baseline communication knowledge is low and that communication knowledge is absorbed and retained.

The next issue that was researched was, is there a need and desire for disaster education? In a survey performed in Massachusetts, it was found that 82% of respondents

would like additional training in emergency operations coordination and 75% would like training in surge management, 77.4% of them cited time away from work as one of the major barriers (Broach & Smith, 2017). Nash (2015) found that only 10.4% of nurses felt prepared for a disaster and 9% felt as if they could handle the first 72 hours. One of the reasons was personal preparedness. Most disaster plans assume nurses and other staff will remain at the hospital, and additional help will come in. While this is reasonably expected for events such as large-scale motor vehicle accidents, will this remain true in the event of a massive terrorist attack or an ongoing natural disaster?

The most telling sign for the value of drills is comparing gaps found during surge simulations with gaps mentioned in after action reports from real-world events. One issue identified by simulations is problems with communication systems; in fact, 94% of hospitals are deemed inefficient with communications (Kilma et al., 2012). This is a significant issue in real-world events, contact information is out of date, failures of phone lines, wrong staff being called in (Waxman et al., 2017; Ghanchi, 2016).

One of the after action reports reviewed stated that they were able to respond so efficiently was because they had recently held a drill at their facility, data from simulations agree that the more one works with surge events, the quicker a patient will receive medical attention (Ghanchi, 2016; Jonson, Peetersson, Rybing, Nilsson, & Prytz, 2017). Waves of patients also come without warning and often are not triaged in the field. It has been seen that in real-world events there is not a steady stream of patients but instead multiple waves (TariVerdi, Miller-Hooks, Kirsch, 2018). The issue with this is that hospitals would use a vast majority of their resources and personnel on the first victims to arrive, not thinking that there could be a lull and more patients, of a higher

acuity, would be arriving. This has been demonstrated to be true, and simulations have been created to mirror this phenomenon (Lake, 2018; Waxman et al., 2017; Ghanchi, 2016) including the simulation that will be used in this project. Surge preparedness historically was focused on an increased percentage of presenting patients. Current events have shown that this is no longer the case. "Hospitals quickly learned that the imperative functions during this incident were throughput and not a surge percentage" (Lake, 2018, pg 21). What Lake is demonstrating is that there is now a need to quickly move the patients through the ER and to their final location, med/surg unit, ICU, or operating rooms.

It can be seen that simulation-based education works in the setting of disaster preparedness. However, there is no definitive data on how to provide this education. Furthermore, it is seen that often while practicing disaster simulations gaps in an institution's plans come to the forefront. Despite this, many institutions do not provide simulations that use real-time hospital data and gain data solid quantitative metrics as to how the drill went forth. One of the issues is the cost incurred with real-world drills and the interruption they cause to real-time hospital operations. Jonson, Peetersson, Rybing, Nilsson, and Prytz (2017) demonstrated that computer-based simulations could increase staff knowledge and ability to function during a surge event. Due to the findings in the literature it was proposed that the Hospital Surge Evaluation Tool (US Department of Health and Human Services, 2017) be used to train staff, receive both quantitative feedback, and identify gaps in an institution's disaster plan, without occurring considerable cost or interrupting hospital operations.

Theoretical Framework

Understanding Theoretical Frameworks for Simulation-Based Learning

Guba in 1990 (as cited in Nestel & Bearman, 2015) presented four worldviews that represent various forms of thinking; positivist, post-positivist, interpretivist, and critical social theorist. All of these worldviews can be used in simulation-based education. By understanding which worldview one fits into allows them to hone into the ideal framework that fits both them personally and the learning situation. The interpretivist worldview fits this education best. The interpretivist sees how simulation can be used as a learning tool and how the learner will interact with the simulation (Nestel & Bearman, 2015). Though it is aimed at using manikin-based simulation the use of computer-based models can be interchanged.

Using simulations as an educational tool has a well-documented history; however, it can be said that using it as a specialist practice, is new (Nestel & Bearman, 2015). Despite it being a new practice multiple theoretical frameworks deal with simulation learning. Understanding this Nestel and Bearman (2015) compiled a list of various theoretical frameworks with brief descriptions of each. Using this as a starting point it was found that Gibbs' Reflective Cycle was best suited for this particular simulation-based project.

Gibbs' Reflective Cycle

Gibbs first introduced his theory in a short text published in 1988 entitled *Learning by Doing*, with an electronic version of the text published in 2013. He explains that his theory is a reinterpretation of the Experiential Learning Cycle created by David Kolb. Gibbs shows that experimental learning is strengthened by its ability to allow an

exploration of experience and the allowance to reflect on the experience. Gibbs'

Reflective Cycle provides six steps that will enable for an understanding of the central

question and allows the learner to provide their action plan in the event the simulation

would occur again or if it was to happen in a real world situation (Gibbs, 2013).

The six steps are a description; feelings; evaluation; analysis; conclusion; and personal

action plan. Gibbs (2013) demonstrates how these six steps allow for a structured

debriefing post-simulation, see Appendix B. Description is perhaps the easiest of the

steps to understand, this is merely the stage when the learners discuss what happened to

during the simulation. Gibbs stresses that this is not the time to draw conclusions. The

next step is feelings, and this is when the learner can discuss what they were feeling and

thinking throughout the simulation. More on this step will be discussed later. The third is

evaluation, what was good and what was bad. No simulation will ever be perfect. This

step provides an opportunity for learners to help the simulation grow and point out flaws

that they could see from their perspective. Next is analysis, what sense can the learner

draw from the simulation? It is essential to also bring from outside experiences and

education in this stage. Also, did all learners experience it similarly or differently? Gibbs

(2013) recommends that the conclusion step is thought of in two parts. The first is

general, while the second being specific. General is simple; what can be generally

concluded from the exercise. Specific focuses more on the individual learner and how did

their specific styles influence the way the simulation worked and its outcome. The final

step is the personal action plan. The description of this step was best said by Gibbs,

"What are you going to do differently in this type of situation next time" (Gibbs, 2013, p.

50)

Two things must be noted with every Theoretical Framework, what learning styles apply best to it and what are its limitations. Gibbs (2013) discusses the learning styles; he states that all learning styles can benefit from simulation-based learning. He notes that the best way to accomplish this is to create groups of mixed learners for participants to receive the full benefits of the simulation and for each to bring in their strengths. This is especially pointed for this project. Any disaster based simulation or real life disaster will require a team. By bringing in participants with different styles, many viewpoints will arrive to allow for the successful hospital response to a disaster surge. Next limitations must be discussed. First is that Gibbs' Reflective Cycle does not necessarily demonstrate how to achieve a better quality of reflection. Second is, despite Gibbs' hope, it can at times lead to a superficial discussion (Husebø, O'Regan, & Nestel, 2015).

Application to DNP Project

Gibbs' Reflective Cycle pairs perfectly with the completed DNP project. This project was simply implemented with a pre-survey of surge response knowledge, followed by the actual surge simulation, then a post-survey to test if knowledge has been gained from the drill. While all six aspects of the framework were used to facilitate the debrief, the second and sixth points were the most important and are why this framework is ideal.

This project was designed to test a facility's and an individual's ability to cope and make decisions in the setting of a surge event. The surge evaluation tool recommends asking 'how did that feel' during the debrief. There will, of course, be feelings that will arise. In scientific studies, there is very little room for feelings. Even in studies that are of qualitative design, there is generally not an aspect that allows for the discussion of feelings. Mass casualty incidents have always historically been known as emotionally

demanding and often require counseling for staff. A large amount of this is related to the

tough decisions that the situation demands to be made. By allowing a time after a drill to

express these feelings, it will allow staff to be better prepared for a real-world event.

Perhaps the most important and relevant part of the cycle is the personal action plan.

As previously stated it cannot be described better than how Gibbs described it himself.

While simulations are valid teaching tools to learn new ideas and perfect their

administration, it can be argued that their whole purpose is how to do it improve the next

time. One of the advantages of the tool is that it provides instant quantitative feedback in

areas such as transfer out of ED vs. time and ED bed availability vs. time. (US

Department of Health and Human Services, 2017). Using this real-time data, it can be

seen if the strategies employed by the staff truly worked. This aspect of the framework

allows the participants and the drill controllers an opportunity to discuss what they could

have done differently and how they will act if presented with a real-world situation. The

drill allows the learner to formulate their personal action plan and be able to implement

should they ever have to command the ED during a surge event. With these two specific

aspects of Gibb's Reflective Cycle, it shows that this is the ideal framework for this

proposed project.

Methodology

Study Design

The following methodology and study was approved by the Rutgers Institutional

Review Board (IRB), study ID PRO2019000872 (Appendix I), the DNP chair and team

member (Appendix J), and a site approval was obtained (Appendix K). The design of this

study was quasi-experimental. For the design of this study, it was not possible to include

a control group, excluding the possibility of it being an actual experimental study. There was a pre-survey using a modified EPIQ survey, see Appendix C (written permission obtained via email from Dr. James Peltier, see Appendix D) then an implementation in the form of the computer based surge drill, then the post implementation modified EPIQ survey (which contains the same questions) was completed by the participants. This type of study design was shown to be useful with statically significant results seen in a similar study by Jonson, Peetersson, Rybing, Nilsson and Prytz (2017) and Georgino, Kress, Alexander, and Beach (2015).

The Hospital Surge Evaluation Tool was used as the intervention, it was created due to the issue that many disaster drills are pre-scheduled and choreographed. This takes away from any of the drill's potential realism. In order to combat this, in 2015, the US Department of Health and Human Services, sponsored by the Assistant Secretary for Preparedness and Response, created the Hospital Surge Evaluation Tool. The tool was created to function as a no notice drill and pull in real time hospital data in order to increase realism. It was piloted in nine hospitals in 2015 to ensure its ease of use (Waxman, et al., 2017). The Hospital Surge Evaluation Tool is now offered for free and is readily downloadable from the Department of Health and Human Services' website. This tool was created to allow hospitals to perform large-scale surge events without compromising the day-to-day activities of the hospital. The drill is formatted so that participants can be placed into incident command roles to allow them to gain experience as an incident commander. It enabled the drill controller (the study coordinator for this study) to determine the number of patients that will arrive; the controller may choose from 1-250 patients. For this study, 50 patients were generated. The Hospital Surge

Evaluation Tool breaks the patients down into groups that would arrive at 15 minutes, 30 minutes, 60 minutes, and 75 minutes. Of note, the drill did not take this amount of time, via tests runs by the study coordinator the expected run time was between 45 and 60 minutes. In actual implementation it was found that the length varied between 15 and 30 minutes. The amount per wave and acuity of the patients is determined by the simulator to mirror historical norms. The participants needed to triage the victims per the Simple Triage and Treatment algorithm and assign them to ER beds, New Jersey State Triage tags were provided by the study coordinator as a reference for the participants. The tool keeps track of bed availability based on real-world bed census information that was entered prior to the start of the drill. The participants determined the need for intensive care versus floor beds based on a patient's triage. To provide control in this drill, the study coordinator served as the bed controller. After the drill, The Hospital Surge Evaluation Tool provided feedback data to allow participants to see how patients arrived and how quickly they were assigned to ER beds and when admission beds became available. There are additional roles that are allowed in this tool that were not needed for this study and thus were not used.

Study Setting

The setting for this study was a busy Level I trauma center in Newark, NJ. As seen in the needs assessment section of this proposal, there is a substantial possibility of a mass causality incident occurring, leading to a surge of patients into the hospital. Due to the nature of the intervention, the actual study occurred within the Emergency Department.

Study Population

The required sample size was 30 emergency department nurses. The sample size of 30 emergency department nurses was based on the findings of a similar study using an adapted version of EPIQ as a pre and post-survey. The study was completed by Georgino, Kress, Alexander, and Beach (2015). They had a sample size of 63 nurses however their population was much larger, involving various units of their study hospital as opposed to only the emergency department. They were able to produce statistically significant results with this size sample. The study population consisted of emergency room nurses. The participants were of various experience levels and there was also involvement form multiple levels of departmental management.

Study Recruitment

To recruit the subjects, a flyer was distributed. Flyers were posted in common areas of the emergency department such as the break room, locker room, and staff bathroom (see Appendix E).

Consent Procedure / Perceived Risk and Harm

Informed written consent was obtained from all study participants. The consent form that was provided to the participants was the official consent form of the facility's IRB, see Appendix F. There is no perceived risk or harm from the intervention.

Participant Cost and Compensation

There was no cost to the subjects to participate in this study; there was also no compensation to the participants.

Study Intervention and Expected Outcomes

The intervention was the study participants' involvement in a patient surge drill. The drill used was the Hospital Surge Evaluation Tool, created and distributed by the US Department of Health and Human Services. The outcomes that were measured were the comparison of the pre and post-tests provided to the participants.

Project Timeline

The beginning aspects of the project started on 4/18/2019 with the creation of an IRB application. The proposal was also presented to and approved by the study site nursing research council on 6/26/2049. On 7/9/19 the initial submission was submitted through the IRB for departmental approval. It was approved, after some edits, on 8/5/2019. The proposal was assigned to an IRB reviewer on 8/7/209. After various rounds of edits and resubmissions the project was granted IRB approval on 9/11/2019. Data was collected at the study site on 10/9/2019, 10/17/2019, 10/23/2019, and 11/13/2019.

Resources Needed and Economic Considerations

A small number of resources were required. Only a table and one computer, on which the simulation occurred, was needed. Due to the free nature of the surge tool, no economic considerations were needed to be considered.

Data Maintenance and Security

All data that was obtained was held on a Kingston's DataTravler Vault Privacy 3.0 USB Flash drive. This flash drive is encrypted with a 256-bit AES hardware encryption in XTS mode. It is only accessible through an 8-character password that must include upper and lower case letters and well as numbers. The flash drive will auto delete its contents after ten failed attempts to access it. The only people that had access to the data

is the principal investigator (PI) and the study coordinator. When not in active use the flash drive remained in a digitally locked safe in the study coordinator's home office, which no one, save the study coordinator had access to. The home office is located at 77 Park Ave Apt 127 Hoboken, NJ. There was no identifiable data that is collected, and there was no protected health information that was collected.

Results

Data Analysis

Data was collected in the emergency department of a busy Level One trauma center, over four days. A total of 30 participants (N=30) took part in the study. The data
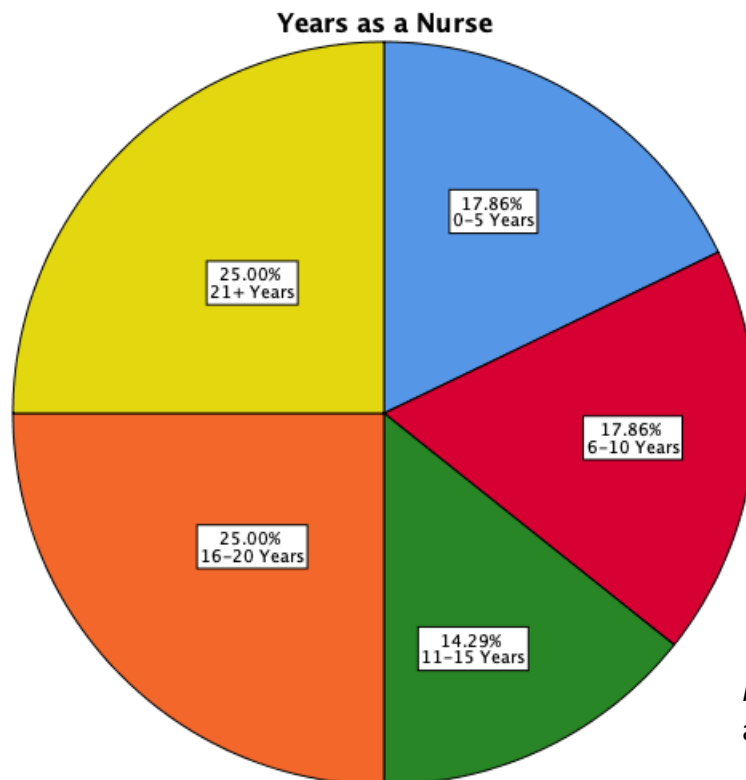
Years as a Nurse

Figure 1. Years as a Nurse

collected from them was their responses to the EPIQ survey (Appendix C). The responses for both the pre-survey and the post-survey was a Likert Scale, with 1 being not familiar and 5 being very familiar. The responses were gathered and analyzed using *SPSS*

Version 26. Only one demographic question was asked to the participants, years of

nursing experience. It was found that there was a wide range of experience levels that

participated in the survey, see Figure 1. Nurses who have worked 0-5 years 16.7%; 6-10

years 16.7%; 11-15 years 13.3%; 16-20 years 23.3%; and 21+ years 23.3% (N=28), two

participants failed to answer.

The first step in data analysis performed was to test if the data was distributed

normally. Due to the sample size of 30 participants, it was most appropriate to use the

Shapiro-Wilk test for normality (Appendix G), the data was not normally distributed. Pre-

test questions 1, 2, 3, 4, 8, and 9 and post-test questions 1, 3, 4, 5, 6, 7, 8, and 9 were not

normal ($p < 0.05$). Four questions were normal pretest questions 5, 6, and 7, along with

posttest question 2 ($p > 0.05$). Due to this finding, it was determined that a Wilcoxon

Signed-Ranks Test was best suited for data analysis.

Data Results

The results of the pre-intervention survey and post-intervention survey were gathered

and analyzed using a Wilcoxon Signed-Ranks Test. The results of the test indicated that

the median post-survey scores were statistically significantly higher than the pre-survey

scores; over all nine questions asked, see Table 1. While all nine questions dealt with

various aspects of disaster event management, question 9 asked the participants to please

provide an assessment of your overall familiarity with response activities/preparedness in

the case of a large-scale emergency event. Question 9 is perhaps the most compelling

question asked in order to express that the Hospital Surge Evaluation Tool is a valid tool

to be used in disaster education. This final question asked had a pretest median of 2.5

with a posttest median of 4 (*Z= -4.631, p = .000*).

Discussion

The results of the data analysis are in-line with some of the previously published

literature on the topic. The findings from the study performed by Labrague et al. (2018)

Table 1
Wilcoxon Signed-Ranks Test

Question	Statistical Data			
	PreTest Median	PostTest Median	Z	Sig.
How to evaluate the effectiveness of your own actions during a large-scale emergency event	3	4	-4.565	.000
The content of the Emergency Operations Plan (EOP) in your agency/organization	2	4	-4.548	.000
To which functional group in the Incident Command system (ICS) you would be assigned during a large-scale emergency event	2	4	-4.367	.000
Your agency's preparedness level for responding to a large-scale emergency event	2	4	-4.454	.000
How to preform a rapid physical assessment of a victim of a large-scale emergency event	3	4	-2.704	.007
Procedures for communicating critical patient information to those transporting patients	3	4	-3.292	.001
Identify the different abilities of key partners in your Emergency Operations Plan (EOP)	3	4	3.784	.000
Appropriate debriefing activities following a large-scale emergency event	2	4	-4.713	.000
Please provide an assessment of your OVERALL FAMILARITY with response activities/ preparedness in the case of a large-scale emergency event	2.5	4	-4.631	.000

demonstrated the discovery of the shockingly low awareness level of nurses regarding

their facilities' disaster plans, correlates with question 4; your agencies preparedness level

for responding to a large-scale emergency event. It was found that the median pre-

intervention score was a 2, slightly familiar. Fortunately, the results of the data were in-

line with the clinical question and that there was a statistically significant increase in

disaster and surge management knowledge after the participants underwent a computer-based simulation using the Hospital Surge Evaluation Tool.

This study was completed with ease due to two main factors. The first being the participants' general interest in the intervention and study; which led to some interesting discussion. The second was the full support and embracement by the leadership staff of the emergency department, many of which also took part in the survey.

There are two issues present in the study during the implementation of the Hospital Surge Evaluation Tool, though neither were truly negative issues. The first is that it was hoped this tool would simulate a stressed environment in the emergency department; however, the study found that there was no true stress felt by any of the participants. The second was that when the surge patients appeared during the drill, there was often no bed space left in the emergency department, which is to be expected and part of the drill. It was found that this did not faze the nurses who participated; it is believed that this is because this emergency department is constantly overpopulated with long waits in the waiting room. It would be an interesting comparison to bring this drill to a smaller hospital, with shorter wait times to see if there is added stress when there are no beds for sick and critical patients. The second point is that it seems that most participants in the drill focused on the triage of the simulated patients. Even though this was not the main purpose of the drill, most participants focused on this aspect.

The study found that mass casualty triage is a knowledge gap in this facility's training. This finding of a knowledge gap is consistent with one of the underlying themes of the literature, simulations, and drills allow for exposing deficiencies within an institution's plan and training. More on this will be discussed in the implications section.

Implications

Clinical Practice

While there will not be a change in the daily clinical practice of the participants, it can

be hoped that undergoing this drill will better prepare the participants for future events.

However, as stated previously, their practice will be significantly affected when a patient

surge event occurs. The thought of what will the nurses do is precisely the point of the

final step in Gibbs' Reflective Cycle, the personal action plan (Gibbs, 2013).

Another aspect of clinical practice will be how and when resources are used during a

surge event. Many of the participants explained how they were surprised that the sicker

patients arrived later in simulation. It was explained that the distribution of patients, both

volume and acuity, was created to mirror historical norms. Many explain that they did not

expect the more critical patients to arrive after the stable patients. Many discussions were

held regarding this, and now the participants see it as necessary to not waste their

resources and personnel on the first arriving patients and to always be prepared for

additional patient volume with more critically ill patients. It is essential to know this

clinical pearl in order to provide the best possible patient care and the best possible

outcomes during a surge event.

Healthcare Policy / Quality and Safety / Economic Considerations

The results of this study have no direct impact on policy at the institutional, local,

regional, state, or national levels. However, the use of the tool can be involved in training

policy for preparing for MCIs. CMS requires hospitals to run two drills a year in order to

maintain funding; the Hospital Surge Evaluation Tool can be used to complete this

requirement.

Similar to this study's impact on healthcare policy, there will be no direct impact on daily patient and institution quality and safety. The study was performed without using patients or interference to the regular operations of the emergency department. However, it can lead to increased patient safety in the event of a patient surge, for reasons described in the clinical practice session.

A small number of resources were required; a table and a computer, on which the simulation occurred, were needed. Due to the free nature of the surge tool, no economic considerations were needed to be considered.

Education

The educational aspect of this drill has been discussed more thoroughly in the clinical practice section. The critical education points to be aware of this are as follows: the first is that there is an obvious need for additional education in disaster triage. The second is that more staff needs to be aware of the distribution of patient arrival in an MCI. The first waves may be small with stable patients. It has been demonstrated that this does not mean it is a low impact event. Instead, staff will need to undergo further education on how to ration resources and staff under the assumption that a larger volume of patients will continue to appear, and they may be more critically ill.

Sustainability

The tool itself has been designed to be sustainable. It is readily formatted to both Mac and PC operating systems and requires no upkeep. If the drill is not used for a significant amount of time, the controller would merely need to reorient themselves with the instructions and will be able to implement it quickly. Within the tool, there are added roles for bed management and hospital command staff that could be incorporated into

future uses. This function can also expand to train those responsible for bed management and anyone who may need to assume command of the hospital during a mass causality incident. Expansion items include operating room availability, current staffing levels, and availability of supplies.

Future Scholarship

As stated multiple times throughout this paper, and supported by previous studies, one of the strengths of stimulation and drills is the identification of deficiencies. One glaring deficiency that was found is the lack disaster triage knowledge. Future study and research is required to look into this issue further. It is possible that this could be solely an institutional deficiency, but if this is found to be a more global nursing deficiency, it could become highly problematic in the event of an MCI. The author has plans to continue future research on this to determine nurses' educational levels in disaster triage. It is thought this could be done in two ways; the first would be a survey simply asking their comfort levels or if participants have officially been trained in disaster triage. The second would be to conduct a test where patients are presented and the participants need to triage them appropriately to see how accurately they triaged the presented patients. This can lead to a large amount of future scholarship in the realm of disaster management and preparation for a patient surge event.

<div align="center">

Conclusion

</div>

An institution must never adopt the 'this will never happen to us' mindset. It is vitally important for an institution to drill and be prepared for a patient surge. The next disaster, mass casualty incident, or merely the next significant motor vehicle accident, is always just around the corner. The results of this study have shown, with statistical significance,

that the Hospital Surge Evaluation Tool leads to increased surge management knowledge.

It should be recommended that hospitals use this tool to better educate their staff.

Simulations are well known to be clinically and cost-effective; now, there is data showing

that simulations are just as useful for preparing for disaster management. It can be

concluded that a computer-based simulated patient surge drill is a valid tool for disaster

education in this emergency department.

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Appendix A
Table of Evidence

Validation of a Computer-Based Simulated Patient Surge as a Teaching Tool for Disaster Education in the Emergency Department

In hospitals does the implementation of a computer-based disaster drill allow for increased disaster response knowledge as evidenced by a pre and post survey of disaster based knowledge?

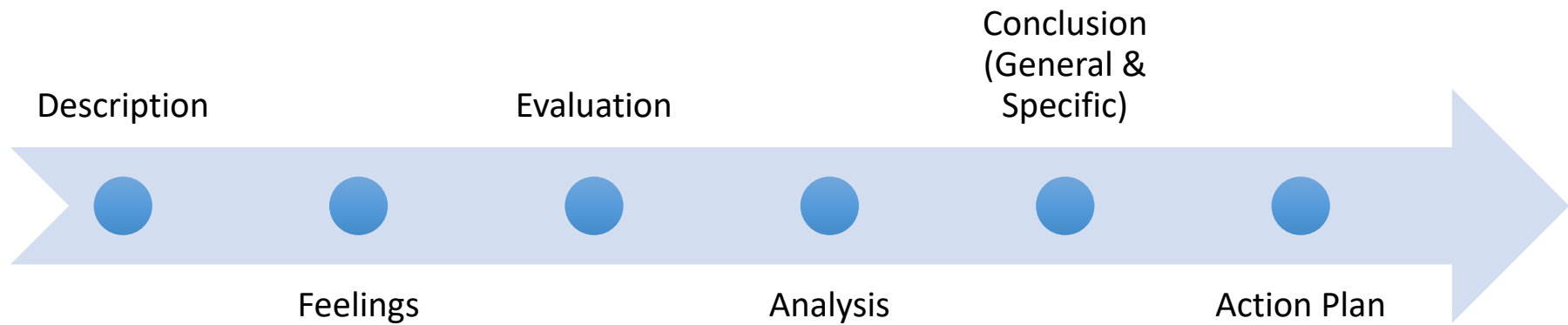| Article Number	Author & Date	Evidence Type	Sample, Sample Size, Setting	Study findings that help answer EBP Question	Limitations	Evidence Level & Quality
1	Jung, D., Carman, M., Aga, R., & Burnett, A. (2016)	Quasi-Experimental	Emergency healthcare providers; 55; Level II Trauma Center	-Increased knowledge retention 4 months post simulation	-Radiological specific injuries -Small sample of ER in an urban setting -Evaluators were not blinded	Level II Grade B
2	Kaplan, B. G., Connor, A., Ferranti, E. P., Holmes, L., & Spencer, L. (2012)	Quasi-Experimental	BSN students in final semesters of senior year; 90; Staged Drill	-Increase in confidence during disaster -Increased knowledge base	-Preassigned roles -Limited sample -No stress of 'real world' ER also occurring	Level II Grade B
3	Schubert, C. R. (2012)	Quasi-Experimental	Med-Surg Nurses; 58; Midwest university	-Simulation based learning increases knowledge base	-Low return on 2 week follow up survey -50% had	Level II Grade B

			medical center	by 11%	worked previous night shift	
4	Subbarao, I., Bond, W. F. Johnson, C., Hsu, E. B., & Wasser, T. E. (2006)	Quasi-Experimental	Emergency Personnel; 54;	-Statistically significant increase in CBRNE test scores between pre and post simulation	-Tests have not been validated -Long-term retention not assessed	Level II Grade B
5	Broach, J. & Smith, M. (2017)	Univariate Descriptive	Healthcare and public health professionals; 796; Massachusetts	-82% want additional training in emergency operations coordination -75% want additional training in surge management -77.41% states time away from work is a major barrier	-Low response rate, 15% -Location specific	Level III Grade B
6	Nash, T. (2015)	Quasi-Experimental	Nurses in graduate school; 66; Southern United States	-Nurses are not personally prepared for disaster -Statistically significant improvement in	-Very small sample -Does not describe intervention -Does not provide post	Level II Grade C

				preparedness score between pre and post intervention	intervention data	
7	Kilma, D. A. et al. (2012)	Nonexperimental Quantitative Retrospective	Hospitals; 16 including 1 ACS Level I Trauma Center; North Carolina	-0% of the hospitals were fully compliant with predefined competency areas -94% of hospitals were deficient with communications -56% had suboptimal command structures	-Small sample size -Preannounced drill	Level II Grade B
8	Bistaraki, A., Waddington, K., & Galanis, P. (2011).	Quasi-Experimental	Healthcare workers; 91, 56 intervention, 35 control; Athens, Greece	-Increase in disaster knowledge post intervention, knowledge remained increased one-month post intervention -Increase over control group	-Opportunistic selection process -Small sample size	Level II Grade B
9	Jonson, C.,	Quantitate	Emergency	-Decrease in	-Small sample	Level I

	Pettersson, J., Rybing, J., Nilsson, H., & Prytz, E. (2017).	Experimental	Department charge nurses; 13; Community Swedish hospital	time to treatment by over 50% from drill 1 to drill 2	size -Location specific	Grade C
10	Lake, C.K.	Case Study	Las Vegas Mass Shooting of 2017	-Lack of consistency in triage -Internal communication systems were overwhelmed -Inadequate surge plans		Level V Grade A
11	Waxman, D. A., Chan, E. W., Pillemer, F., Smith, T. W. J., Abir, M., & Nelson, C. (2017).	Expert Opinion	Creation of the Hospital Surge Evaluation Tool	-Need of tool -Advantages of no notice drill -Pulls in real time ER and hospital data -No compromise in patient care	-No hard data provided to validate the use of the Hospital Surge Evaluation Tool	Level V Grade B
12	Ghanchi, A. (2016)	Case Study	Overview of the response of French hospital response to large scale terrorist attack	-Findings of the shortcomings of preplanned responses -Honest look at policies and procedures that did not function	-No input from staff level employees of the hospital response -Limited discussion on recommendations for future	Level V Grade A

				as expected when real world tested	practice	

Appendix B
Gibbs' Reflective Cycle

Description   Evaluation   Conclusion (General & Specific)

Feelings   Analysis   Action Plan

(Adapted from Gibbs, 2013)

Appendix C
Adapted Emergency Preparedness Information Questioner

Please rate how familiar you feel with the following activities and ideas. Please rate from 1-5, with 1 being not familiar and 5 being

very familiar.

1. How to evaluate the effectiveness of your own actions during a large-scale emergency event   _____

2. The content of the Emergency Operations Plan (EOP) in your agency/organization   _____

3. To which functional group in the Incident Command system (ICS) you would be assigned

   during a large-scale emergency event   _____

4. Your agency's preparedness level for responding to a large-scale emergency event   _____

5. How to preform a rapid physical assessment of a victim of a large-scale emergency event   _____

6. Procedures for communicating critical patient information to those transporting patients   _____

7. Identify the different abilities of key partners in your Emergency Operations Plan (EOP)   _____

8. Appropriate debriefing activities following a large-scale emergency event   _____

9. Please provide an assessment of your OVERALL FAMILARITY with response activities/

   preparedness in the case of a large-scale emergency event   _____

Adapted from the Emergency Preparedness Information Questionnaire (Wisniewski, Dennik-Champion, & Peltier, 2004) Permission granted from Dr. James Peltier

Appendix D
Permission to Use EPIQ

Re: Emergency Preparedness Information Questionnaire

Keith Peterson

Wed 4/10/2019 12:51 PM

████████████████████

Thank you very much

--
Keith Peterson, RN, BSN, TCRN, CEN

████████████████

From: ████████████████████████████
Sent: Wednesday, April 10, 2019 12:26:35 PM
To: Keith Peterson
Subject: Re: Emergency Preparedness Information Questionnaire

Feel free to use and cite it Keith. Survey was online so you will need to create based on article.

Sent from my iPhone

On Apr 10, 2019, at 9:13 AM, Keith Peterson ████████████████ wrote:

████████

My name is Keith Peterson, I am a Doctor of Nursing Practice student at Rutgers University School of Nursing. I am currently planning my final DNP project and will be focusing on hospital disaster management and preparedness research. I am hopeful to use the EPIQ survey in my research. In my attempts to secure permission to use it I was in contact with Dr. Sharon Farra who suggested I contact you. Any help you could provide me would be greatly appreciated.

Thank-you,
Keith Peterson, BSN, RN, TCRN, CEN

████████████████████

Appendix E
Informational Flyer

CONSENT TO TAKE PART IN A RESEARCH STUDY

Title of Study: Validation of a Computer-Based Patient Surge as a Teaching Tool for Disaster Education in the Emergency Department

Principal Investigator: Mary DiGiulio, DNP, APN, FAANP
Study Coordinator: Keith Peterson, BSN, RN, TCRN, CEN

> **STUDY SUMMARY:** This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. It is your choice to take part or not.   This project proposes a study to validate disaster surge simulations as a teaching tool. This will be performed in three steps. The first step would be to have emergency department nurses complete an adapted version Emergency Preparedness and Information Questionnaire (EPIQ) (Wisniewski, Dennik-champion, & Peltier, 2004). Emergency department nurses will then undergo a surge drill using the Hospital Surge Evaluation Tool (US Department of Health and Human Services, 2017). Once the drill is completed the participants will retake EPIQ and the scores will be compared, in addition the tool provides its own recommended qualitative questions, which will be asked of the participants. It is hypothesized that there will be an increase in disaster knowledge post simulation.
>
> The **purpose of the research** is to validate a computer based tool for disaster education. If you take part in the research, you will be asked to complete a survey, then undergo a computer based training tool, the again complete the same survey. Your time in the study will take one hour, with an additional ten minutes for informed consent.
>
> **Possible harms or burdens** of taking part are there is no risk of harm to the participants from the research procedures
>
> **An alternative to taking part in the research study** Your alternative to taking part in the research study is not to take part in it.

The information in this consent form will provide more details about the research study and what will be asked of you if you choose to take part in it. If you have any questions now or during the study, if you choose to take part, you should feel free to ask them and should expect to be given answers you completely understand. After your questions have been answered and you wish to take part in the research study, you will be asked to sign this consent form. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form.

Who is conducting this study?
Mary DiGiulio is the Principal Investigator of this research study and Keith Peterson is the Study Coordinator. A Principal Investigator has the overall responsibility for the conduct of the research. However, there are often other individuals who are part of the research team. The Principal investigator or another member of the study team will also be asked to sign this informed consent. You will be given a copy of the signed consent form to keep.

Keith Peterson

██████████

Why is this study being done?
This study is being done to determine the validity of a computer based tool for disaster education in the Emergency Department.

Who may take part in this study and who may not?
This study is open to any registered nurse currently employed at the Emergency Department of ████████ ██████

Why have I been asked to take part in this study?
You have been asked to take part in this study because you are a registered nurse at the Emergency Department of ████████ ██████

How long will the study take and how many subjects will take part?
The study will completed over a period of 3 months. Your participation will require one hour of time on one occasion, with an additional ten minutes for informed consent. A total of 30 participants will be included.

What will I be asked to do if I take part in this study?
You will first be asked to complete the Adapted Emergency Preparedness Questioneer. The questioneer will contain questions such as "Please provide an assessment of your overall familiarity with response activities/preparedness in the case of a large-scale emergency event." After the completion you will undergo a computer based patient surge simulation. That will be a computer-generated drill simulating the arrival of 50 patients into the emergency department. You will be asked to quickly triage them and assign them to open beds in the simulated emergency department. After the simulation the same questioner will be provided and you will be asked to complete the questioneer once more.

What are the risks of harm or discomforts I might experience if I take part in this study?
There are no risks of harm for participating in this study.

Are there any benefits to me if I choose to take part in this study?
The benefits to choosing to take part in the study is an increased understanding of response to a patient surge event.

What are my alternatives if I do not want to take part in this study?
Your alternative is not to take part in this study.

How will I know if new information is learned that may affect whether I am willing to stay in the study?
You will know if new information is learned by being updated about any new information that may affect whether you are willing to continue taking part in the study. If new information is learned that may affect you after the study or your follow-up is completed, you will be contacted.

Will I receive the results of the research?
Results of the study will be made available, free of charge, to any participant that requests the results.

Will there be any cost to me to take part in this study?
There will be no cost to taking part in this study.

Will I be paid to take part in this study?
You will not be paid to take part in this study.

How will information about me be kept private or confidential?
All efforts will be made to keep your personal information in your research record confidential, but total confidentiality cannot be guaranteed. All collected data will be deidentified including to the study team.
All data that is obtained will be held on a Kingston's DataTravler Vault Privacy 3.0 USB Flash drive. This flash drive is encrypted with a 256-bit AES hardware encryption in XTS mode. It is only accessible through an 8-character password that must include upper and lower case letters and well as numbers.

What will happen if I do not wish to take part in the study or if I later decide not to stay in the study?
It is your choice whether to take part in the research. You may choose to take part, not to take part or you may change your mind and withdraw from the study at any time.

If you do not want to enter the study or decide to stop taking part, your relationship with the study staff will not change, and you may do so without penalty and without loss of benefits to which you are otherwise entitled.

You may also withdraw your consent for the use of data already collected about you, but you must do this in writing to:

Mary DiGiulio

████████
████████

Who can I contact if I have questions?
If you have questions about taking part in this study or if you feel you may have suffered a research related injury, you can contact the Principal Investigator: Mary DiGiulio. Rutgers School of Nursing ████████ or Study Coordinator Keith Peterson ████████

If you have questions about your rights as a research subject, you can contact the Rutgers IRB Director at: Newark HealthSci IRB, 65 Bergen St., SSB 511, Newark, NJ 07107, (973)-972-3608.

Who May Use, Share or Receive My Information?
The research team may use or share your information collected or created for this study with the following people and institutions:
- Rutgers University Investigators Involved In The Study
- The Rutgers University Institutional Review Board and Compliance Boards
- The Office for Human Research Protections in the U.S. Dept. of Health and Human Services

Will I Be Able To Review My Research Record While The Research Is Ongoing?
No. We are not able to share information in the research records with you until the study is over. To ask for this information, please contact the Principal Investigator, the person in charge of this research study.

Do I Have To Give My Permission?
No. You do not have to permit use of your information. But, if you do not give permission, you cannot take part in this study. (Saying no does not stop you from getting medical care or other benefits you are eligible for outside of this study.)

If I Say Yes Now, Can I Change My Mind And Take Away My Permission Later?
Yes. You may change your mind and not allow the continued use of your information (and to stop taking part in the study) at any time. If you take away permission, your information will no longer be used or shared in the study, but we will not be able to take back information that has already been used or shared with others.

If you say yes now but change your mind later for use of your information in the research, you must write to the researcher and tell him of your decision:

Keith Peterson

How Long Will My Permission Last?
Your permission for the use and sharing of your information will last until May 1, 2020.

AGREEMENT TO PARTICIPATE

Subject Consent:

I have read this entire consent form, or it has been read to me, and I believe that I understand what has been discussed. All of my questions about this form and this study have been answered. I agree to take part in this study.

Subject Name (Print):_____

Subject Signature:_____ Date:_____

Signature of Investigator/Individual Obtaining Consent:

To the best of my ability, I have explained and discussed all the important details about the study including all of the information contained in this consent form.

Investigator/Person Obtaining Consent (Print):_____

Signature:_____ Date: _____

Appendix G
Shapiro-Wilk Test for Normality

Tests of Normality

| | Shapiro-Wilk | | |
	Statistic	df	Sig.
PreTest Question 1	.861	28	.002
PreTest Question 2	.871	28	.003
PreTest Question 3	.835	28	.000
PreTest Question 4	.880	28	.004
PreTest Question 5	.885	28	.005
PreTest Question 6	.910	28	.019
PreTest Question 7	.890	28	.007
PreTest Question 8	.750	28	.000
PreTest Question 9	.826	28	.000
PostTest Question 1	.850	28	.001
PostTest Question 2	.892	28	.008
PostTest Question 3	.848	28	.001
PostTest Question 4	.857	28	.001
PostTest Question 5	.819	28	.000
PostTest Question 6	.848	28	.001
PostTest Question 7	.873	28	.003
PostTest Question 8	.860	28	.002
PostTest Question 9	.856	28	.001