The Development, Implementation, and Summative Evaluation of a Therapeutic Hypothermia Online Self-Learning Module, Protocol, and Checklist for Registered Nurses: Implications for Training and Practice

Claire Donnelly

Submitted in partial fulfillment of the
requirements for the degree of Doctor of Education in
Teachers College, Columbia University

2021

Abstract

The Development, Implementation, and Summative Evaluation of a Therapeutic Hypothermia Online Self-learning Module and Protocol for Registered Nurses: Implications for Training and Practice

Claire Donnelly

Nurses, especially those who care for the critically ill, are required to perform high-level intensive clinical care. It is common for complicated procedures such as therapeutic hypothermia (TH) to be done infrequently at small community hospitals. According to the 2020 recommendations by the American Heart Association (AHA), "prompt initiation of targeted temperature management (formally known as TH) is necessary for all patients who do not follow commands after return of spontaneous circulation to ensure optimal functional and neurological outcome" (Panchal et al., 2020, p.S366).

These high-risk, low-frequency protocols typically require nurses to be able to perform these procedures in a time-sensitive manner. If the procedures are not done correctly, they can have negative patient outcomes. Patients are put into medically induced comas, maintained on ventilators, cooled to very low body temperatures, and often medically paralyzed to inhibit shivering. Each of these conditions has the potential for adverse outcomes and together can lead to poor neurological outcomes and even death (Kim et al., 2015). Health educators have the opportunity to provide knowledge and support to these nurses as a way to improve patient outcomes.

In this study, a patient care checklist and an online self-learning module were developed for nurses to learn how to perform this high-risk procedure quickly and effectively. A focus group was then conducted with a group of nurses to gain feedback on the checklist and module, and these data informed specific changes to these materials. Then, drawing on a sample of 60 nurses and using a post-study design, data were collected to determine the effectiveness of the checklist and online module as compared to a control group of nurses who read a scholarly article on the same subject. Data were collected at two time points for both the experimental and control groups.

The results indicated that nurses who used the online learning tool scored higher in the post-assessment than those in the control group ($t = 6.092$, $p < .001$, $B_{Condition} = 3.865$), with a remarkably high effect size, $r^2 = 0.379$. Moreover, 77% of the nurses agreed that protocols and checklists helped nurses minimize disparities in patient health outcomes. Additionally, 95% of the nurses agreed that patient care checklists helped them care for patients when delivering high-risk, low-volume protocols such as TH. This study demonstrated that online learning tools provide an effective way to educate nurses, and checklists and protocols support the implementation of high-risk, low-volume procedures such as TH.

Table of Contents

Page

Acknowledgments

I would like to acknowledge the love and support of my family and friends, especially my husband Laurence Donnelly. I could not have done this without you. In addition, I would like to thank all my professors at Teachers College, Columbia University, especially my dissertation sponsor, Professor Sonali Rajan. Finally, I would like to thank all the members of my extended support network, especially those most near and dear to me—my fellow nurses—who showed me what true bravery is.

Thank you.

C. D.

Chapter 1: Introduction

Background and Study Rationale

Heart disease is the leading cause of death for both men and women in the United States (Kochanek et al., 2020). One consequence of heart disease is the potential for sudden cardiac arrest. The heart may suddenly quiver (fibrillate) in the chest. Consequently, the heart muscle is unable to contract or pump blood throughout the body. The patient becomes unresponsive, pulseless, and apneic (Panchal et al., 2020). Since the heart is not able to circulate blood, the vital organs no longer receive oxygen, and cell death rapidly occurs. If the heart is not returned to a normal perfusing rhythm through cardio-resuscitation (CPR) utilizing chest compressions, external defibrillation, oxygenation, and, often, medication such as epinephrine, the patient will die (Panchal et al., 2020).

Every year, more than 350,000 individuals suffer from out-of-hospital sudden cardiac arrest (Merchant et al., 2020). Bystander CPR is provided to approximately 46% of these people. Of those people who receive CPR, the survival rate is just 12%. Worse, of those people who do survive to discharge home, many suffer poor prognoses and poor quality of life due to complications such as diminished neurological function (Panchal et al., 2020). Moreover, cardiovascular disease (CVD) disparities among African Americans demonstrates the continued inequality of health care within the minority population. Research indicates that the American Black population are "affected by CVD at earlier ages than White Americans," "projecting 65,000 more deaths annually," adjusting for age and gender (Taylor et al., 2020).

When evaluating the outcomes for patients who suffer a cardiac arrest and survive long enough to be admitted to an acute care facility, the patient's prognosis can be poor. These

patients suffer from “brain injury, myocardial dysfunction, systemic ischemia, and reperfusion injury” (Holzer, 2010, p. 1256). This compilation of co-morbidities, a result of the cardiac arrest, is understood as “post-cardiac arrest syndrome” and is so severe and debilitating that only about one-third of these patients will “survive to hospital discharge” (p. 1256). One of the most severe indicators of poor prognosis is neurological. Research indicates that “80% of patients remain comatose for more than 1 hour after resuscitation,” and less than half of these patients will “have a good neurologic recovery” (p. 1256).

Therapeutic Hypothermia

Therapeutic hypothermia (TH) initiated post-cardiac arrest with return of spontaneous circulation (ROSC), administered to individuals who do not regain consciousness, has been proven to positively affect neurological outcomes (Panchal et al., 2020).ROSC is a successful resuscitation after cardiac arrest with the return of a spontaneous heartbeat with a regular, perfusing rhythm. TH is the deliberate reduction of core body temperature to a range of 32–34 degrees Celsius (C) for 12 to 24 hours post-cardiac arrest for patients who have been successfully resuscitated but fail to regain consciousness following CPR. With successful resuscitation, the heart may begin beating again with a regular perfusing rhythm, but the patient may remain in a comatose state. The goal of TH is to minimize neurological damage during the recovery phase by decreasing the metabolic demands of the brain and minimizing the inflammatory response immediately following post-cardiac arrest.

TH gained nationwide support in the medical community after a 2002 study published in the *New England Journal of Medicine* demonstrated a significant improvement in neurological outcomes in people receiving TH after cardiac arrest and resuscitation as compared to normothermic patients. According to the study, “patients treated with mild hypothermia” after

successful resuscitation "had improved neurologic outcomes, without important side effects" when compared to others not treated with TH (Hypothermia after Cardiac Arrest Study Group, 2002, p. 549). Consequently, in 2005, the American Heart Association (AHA) created guidelines that included TH as part of the post-resuscitation treatment provided with the initiation of advanced cardiac life support (ACLS). These guidelines were updated and reinforced in 2010, 2015, and 2020 (Merchant et al., 2020).

During cardiac arrest, the brain suffers from anoxia due to a lack of circulation. This causes the brain to utilize anaerobic metabolism, releasing calcium and glutamate into the brain cells, thereby increasing cellular excitability and further increasing hypoxemia and cerebral edema. The blood-brain barrier is disrupted, resulting in increased fluid in the brain and worsening cerebral edema. After successful resuscitation, cerebral blood flow is restored, which itself can lead to cerebral reperfusion injury. Cell death from the anoxia that occurred during the arrest triggers an inflammatory response, releasing neutrophils and macrophages to eliminate the dead cells. Cell damage continues, worsening the inflammatory response and leading to increased cerebral edema (Deckard & Ebright, 2011). The brain can only "tolerate anoxia for up to 2-6 minutes", if circulation is not restored, the damage becomes irreversible (Lundbye et al., 2012, p. 202). After successful CPR, the reperfusion may "provoke a deleterious chemical cascade" that includes inflammation and "devastating neurological consequences" (Lundbye et al., 2012, p. 202). This cascade of reactions can be counteracted by utilizing TH to reduce the inflammatory response, decrease cerebral metabolism, and reduce cerebral edema.

Research shows that TH "counteracts neuroexcitation in brain cells by stabilizing calcium and glutamate release," thereby reducing cellular death (Deckard & Ebright, 2011, p. 40). In addition, TH "suppresses the inflammatory process," thereby "reducing cerebral edema" (p. 40).

Moreover, cerebral metabolism decreases "6% to 10% for every degree Celsius that body temperature drops" (p. 41). Accordingly, as brain tissue uses less energy, it needs less oxygen.

Disparities in Heart Disease Outcomes

At the same time, racial/ethnic health disparities exist in cardiac care. Heart disease remains the number one killer of both men and women (Kochanek et al., 2020). Despite improvements in health care and clinical outcomes in cardiovascular disease, differences in clinical outcomes persist between Black and White patients in the United States (Taylor et al., 2020). Data underscore that these discrepancies persist even when confounding factors such as income and education are considered (Zajacova & Lawrence, 2018). Based on the literature, health care is not meeting the medical needs of people of color. Therefore, new and divergent strategies will need to be employed and enforced. The causes of health disparities are complex, and much research has focused on understanding the systemic factors that exacerbate health disparities and ways in which quality of care in clinical settings can be improved. (Gopal et al., 2021; Gravlee, 2020). Furthermore, minority patients are more likely to present with greater degrees of severity of cardiovascular risk factors, including obesity and hypertension (McClellan et al., 2019). There has been extensive research in this area. Black communities often have less access to healthy foods and green space and are more likely to have higher rates of poorly controlled diabetes. Black and Hispanic individuals are also less likely to meet the recommended daily physical activity levels. Moreover, Black individuals tend to have an earlier onset of hypertension and are less likely to have their high blood pressure under control (Lewey & Choudhry, 2014; McClellan et al., 2019).

Additionally, research has demonstrated that racial/ethnic minority patients are "less likely to receive cardiovascular therapies of proven benefit, especially timely evidence-based

interventions that are higher cost or higher intensity," leading to poorer clinical outcomes and higher rates of morbidity and mortality (Lewey & Choudhry, 2014, p. 530). For example, although heart disease is the number one cause of death in women, they were less likely to receive therapeutic procedures such as TH after arrest, demonstrating that sex-based disparities exist in cardiac care as well (Kim et al., 2015). One potential reason is that women are less likely to experience cardiac arrest due to a shockable rhythm and are more likely to suffer from asystole-complete heart muscle standstill or pulseless electrical activity—the heart muscle does not pump but the electrical activity remains (Kim et al., 2015). With the AHA recommending that all arrhythmias be evaluated for TH post-cardiac arrest, the potential exists that more women will receive this intervention.

To ensure that all patients have access to high-quality care and to minimize disparities in clinical outcomes, the use of developed protocols and checklists based on evidence-based care is necessary. There is precedent for this kind of effort. For example, "Get With The Guidelines" (GWTG) is a standardized voluntary national treatment program that many hospitals adhere to for heart disease and stroke care (Merchant et al., 2020). Data are collected and reported through a registry, and quality improvement measures and clinical outcomes are subsequently monitored. According to the AHA, using clinical practice protocols from GWTG has improved in-hospital quality of care and reduced treatment disparities (Merchant et al., 2020).

A nurse-implemented protocol and checklist for critically ill patients treated in the ED/ICU is a particularly efficient and feasible practice to improve patient outcomes and reduce disparities. Implementing TH after cardiac arrest is a difficult and "nursing care"-intensive protocol. TH requires extraordinarily complex interventions, such as initiation and maintenance of hypothermia, sedation and analgesia protocols, hemodynamic monitoring and interventions,

ventilator management, arrhythmia control, and the use of neuromuscular blocking agents to prevent shivering, delivered to acutely unstable patients in a time-sensitive manner (Omairi & Pandey, 2021). The complexity of TH, coupled with the likelihood that it is not a common procedure delivered routinely in acute care settings, can cause barriers to its successful execution. In the International Liaison Committee on Resuscitation (ILCOR) consensus statement, the authors recommend a treatment protocol to address structural, personal, and environmental barriers to the implementation of TH (Nolan et al., 2020). Effectively, nurses using a checklist, after an initial education on the process and application of the complex TH, would be able to follow and feel supported delivering care to appropriate patients in the ED and ICU. Similarly, the use of surgical checklists such as "The Universal Protocol" at the time of surgery greatly improved patient outcomes and reduced morbidity and mortality (Lyons & Popejoy, 2014). In this protocol, the nurses must stop the surgical team and document a "timeout" before the surgery begins. The surgical team must then agree on the identity of the patient, the right procedure (i.e., hip surgery), and the right location (i.e., right side), as well as the administration of a prophylactic antibiotic before surgical incision. The use of this procedure prevents obvious surgical mishaps (such as removal of the wrong leg).

Indeed, standardized protocols and physician order sets "have proven a successful method in combating the barriers to implementation of therapeutic hypothermia" and better patient outcomes (Avery et al., 2015, p. 29). Furthermore, health care research has documented that "tools such as checklists can increase adherence to evidence-based practice guidelines" and facilitate the delivery of safe and effective care (p. 29).

Nurse-Led Interventions

Research published by the National Institute of Health (NIH) looked at programs to reduce racial and ethnic disparities and identified "nurse-led interventions" as "promising intervention strategies" to reduce health disparities (Chin et al., 2007, p. 10). Many reasons were cited for nursing's success with improved delivery of care and patient outcomes, such as time spent with the patient, teamwork, and patient-centered and culturally appropriate care (Chin et al., 2007, p. 10). Moreover, nursing interventions have demonstrated improved outcomes in cardiovascular care for minorities. The profession is poised to have a great impact on health disparities. The effectiveness of nurse-led interventions is supported by research, (Lee et al., 2021), citing nurse's ability to interact with many patients for substantial periods of time. According to authors Lewey and Choudhry (2014), "nurse outreach and management has been shown to be effective for patients with a variety of cardiovascular conditions, especially in minority communities" (p. 529).

Evidence-based protocols are based on sound clinical evidence and proven best practice. The goal is to provide care that integrates proven clinical research and clinical expertise and is patient focused. Evidence-based practice is the "conscientious, explicit, and judicious use of current best evidence" gained from scientific research and clinical trials when making "decisions about the care of individual patients" (Hasnain-Wynia, 2006, p. 1). It is about delivering "care based on the best scientific evidence, shaped by the unique requirements and circumstances of each patient" (Engle et al., 2019, p. 175). Using evidence-based medicine is useful in eliminating health disparities. It can reduce bias and stereotyping by ensuring the care provided is based on current research and best practices, helping the clinician avoid unconscious biases based on prejudice or personal beliefs (Brockett-Walker et al., 2021). Authors Lewey and Choudhry

(2014) advocate for standardization of evidence-based care and quality improvement programs in an effort to improve health care for patients with cardiac disease. Race has been shown to be a predictor of health outcomes in the United States according to physician researchers at Johns Hopkins Hospital (Lau et al., 2015). The authors developed a "clinical decision support tool" similar to a protocol and checklist to study the effects on race- and gender-based health care. The results demonstrated that "implementation of the tool eliminated race-based health care disparities" (Lau et al., 2015, p.24). Best practices to reduce disparities are still being developed through clinical research and are an important tool in health disparity reduction. Considering that cardiovascular disease is the number one cause of death for adults in the United States, the "potential impact of eliminating racial/ethnic disparities among patients with cardiovascular disease is tremendous" (Lewey & Choudhry, 2014, p. 530).

Research Aims

The overall purpose of this research was, therefore, to develop and evaluate a nurse-led protocol via a patient care checklist and an online self-learning module to educate nurses on how to conduct TH—a high-risk but necessary procedure—quickly and effectively. The specific research aims of this study are presented below.

Aim 1: To develop a patient care checklist and an online self-learning module that assists registered nurses (RNs) to identify how to implement an evidence-based "Therapeutic Hypothermia Post-Cardiac Arrest" protocol to support that the protocol is implemented correctly and as intended.

Aim 2: To pilot the feasibility and usability of the patient care checklist and online self-learning module among a sample of RNs from acute care hospitals via a focus group with a sub-sample of RNs.

Aim 3A: To utilize an experimental (post-test) study design to assess changes in knowledge after participating in the online self-learning module among a sample of RNs from acute care hospitals (n(E) = 29; n(C) = 31).

Aim 3B: To summatively evaluate, immediately following the post-test and via a written survey, the feasibility and usability of the patient care checklist and online self-learning module among the experimental group participants on the perceived ability of nurses to care for these patients.

Impact of the COVID-19 Pandemic

It should be noted that I launched this study just prior to the onset of the COVID-19 pandemic in the United States, which abruptly shifted this study's recruitment effort. Indeed, this work draws on the participation of RN's who work in acute care hospitals, caring for the most critical of patients in the intensive care units and emergency departments. The burden placed on these frontline nurses during the COVID-19 pandemic has and continues to be deeply traumatic. As such, the number of participants recruited in this study is smaller than initially proposed. However, and despite the enormous challenges brought on by the onset of COVID-19 and their specific impact on my study population, I was able to fully respond to and complete all research questions. I also discuss some of these challenges in further detail in Chapter 5.

Dissertation Structure

The structure of this dissertation consists of five chapters. Chapter 1 introduced the topic of TH and the subsequent rationale for use of evidence-based protocols and checklists to effectively treat this condition. It also described the role of nurses in the reduction of health disparities regarding cardiovascular disease. Chapter 2 provides a comprehensive review of the literature in this field. Chapter 3 describes the study's methodology, including the development

of the online self-learning module checklist for the care of a patient undergoing TH to be used by registered nurses caring for these patients. Chapter 4 presents the results of the study in response to the study's three specific research questions. Finally, the discussion in Chapter 5 summarizes the study's main findings, presents the limitations of this work, and discusses the implications of this research for nursing education, clinical care, and the field of health education more broadly.

Chapter 2: Literature Review

This literature review builds upon the literature presented in Chapter 1 and is broadly divided into two sections. The first section is related to the protocol's content and the second section focuses primarily on the nature of education delivery.

Therapy Efficacy

Research has established that therapeutic hypothermia (TH) initiated post-cardiac arrest with return of spontaneous circulation (ROSC) when administered to individuals who do not regain consciousness will positively affect neurological outcomes. In 2002, the *New England Journal of Medicine* published research that confirmed a significant improvement in neurological outcomes in people receiving TH after cardiac arrest and resuscitation as compared to normothermic patients. The authors stated that "patients treated with mild hypothermia" after successful resuscitation "have improved neurologic outcome, without important side effects" when compared to others not treated with TH (Hypothermia after Cardiac Arrest Study Group, 2002, p. 549). Following this research, in 2005, the AHA created guidelines that included TH as part of the post-resuscitation treatment provided with the initiation of advanced cardiac life support (ACLS). Continued research has caused the AHA to update and reinforce these guidelines in 2010, 2015, and 2020 (Panchal et al., 2020). In a retrospective study of cardiac arrest victims and TH outcomes between 2006 and 2009, the researchers concluded that TH is "an innovative, cardio-cerebral resuscitation therapy that both improves survival and mitigates unfavorable neurological outcomes in cardiac arrest survivors" (Mooney et al., 2011, p. 206). In 2002, two studies published in the *New England Journal of Medicine* affirmed the efficacy and

safety of TH (Bernard et al., 2002); as a result, it is now "considered standard of care in the treatment of patients successfully resuscitated from a ventricular tachycardia (VT/VF) arrest and is recommended as a reasonable option for patients with CA from a nonshockable rhythm" (Scirica, 2013, p. 245). Other studies have found mild TH to be the only therapy that has clinically demonstrated improved survival and neurologic outcomes in patients that are resuscitated but do not regain consciousness (Arrich et al., 2012; Che et al., 2011; Geocadin et al., 2017; Holzer, 2010; Schefold et al., 2009). According to recent research, initiating targeted temperature management (formally known as TH) without delay is "necessary for all patients who do not follow commands after return of spontaneous circulation to ensure optimal functional and neurological outcome" (Panchal et al., 2020). In conclusion, TH is currently considered the "gold standard" in treating patients who have survived resuscitation but have not regained consciousness.

Patient Inclusion and Exclusion Criteria

The initial landmark studies in 2002 included only the two shockable rhythms: ventricular fibrillation (VF) and pulseless ventricular tachycardia (PVT). Additionally, the cardiac arrest needed to be witnessed, and resuscitation (CPR) needed to begin immediately. Furthermore, the patient's heart needed to return to spontaneous circulation within 45 minutes of the administration of CPR. Recent studies have included other rhythms, such as pulseless electrical activity (PEA) and asystole (complete heart standstill), with mixed results. The AHA recommendations were modified in 2015 to include all cardiac arrest victims regardless of initial rhythm following recent clinical trials that included patients with all rhythms showing minimal adverse effects in trials that included TH. Moreover, the incidence of neurologic morbidity and

mortality without any explicit intervention is extremely high, and all evidence suggests that temperature is an important variable for neurologic recovery (Panchal et al., 2020).

Some studies have reported better neurological outcomes after VF cardiac arrest, but no difference in outcome following cardiac arrest associated with other rhythms, such as asystole or PEA, (non-shockable rhythms) has been found. In a large cohort study of patients undergoing TH, Dumas et al. (2011) found that "hypothermia was independently associated with an improved outcome at hospital discharge in patients presenting with VF/VT"; however, TH utilized in patients with non-shockable rhythms (PEA and asystole) did not have good outcomes (p. 880).

In contrast**,** two nonrandomized studies reviewed by the AHA indicated a possible benefit of hypothermia after cardiac arrest caused by non-shockable initial rhythms (Peberdy et al., 2010). Another study reported that treatment with TH at a temperature range of 32–34° C for 24h was related to improved neurological outcomes and reduced morbidity and mortality after witnessed cardiac arrest with non-shockable rhythms (Testori et al., 2011). In support, recent data reported improvements in long-term survival rates of non-shockable cardiac arrest patients after undergoing "targeted temperature management (TTM) between 32 and 36° C for at least 24 hours" based on neurological recovery and survival, (Nuzzo et al. 2018). Based on this available evidence and consensus of expert opinions, international guidelines suggest the use of TTM in post-CA care for comatose CA patients after initial non-shockable rhythm.

There are a few exclusion criteria for TH. Medical conditions for which the risk may be excessive include documented intracranial hemorrhage, severe hemorrhage, continued hypotension despite multiple vasopressors, severe sepsis, and pregnancy (Panchal et al., 2020). Since most patients with cardiac arrest "die due to neurological consequences for which TH is

the only proven beneficial therapy, the decision to withhold TH must be carefully weighed" (Scirica, 2013, p. 246). The current literature is mixed on the efficacy of TH and non-shockable rhythms. When deciding on a risk/benefit analysis regarding the administration of TH, the risk from TH is minimal when compared to the risk of neurological deficits; furthermore, TH should be administered to anyone who is successfully resuscitated but remains comatose because the potential benefits of TH are well documented. The current standards of the AHA advocate for the inclusion of all rhythms in TH therapy (Panchal et al., 2020).

Sedation Used

The two landmark studies on TH in 2002 used midazolam and fentanyl as the sedation and anesthetic combination during treatment. Since then, research has indicated that there are potentially better sedation/anesthetic combinations to use during hypothermia. For instance, researchers found that "higher doses of propofol during therapeutic hypothermia protected patients" neurologically and "correlated with decreases in the duration of delirium" as compared to midazolam during TH (Pollock et al., 2016). In another study, the authors concluded that propofol was more appropriate than midazolam because propofol does not "accumulate to cause hepatic or renal dysfunction" (Chamorrow et al., 2010, p. 1330). The authors cautioned that propofol's "potential toxicity may be increased in hypothermia" in blood concentrations up to 30% compared to normothermic patients receiving the same dose (p. 1330). Another study investigating the neuroprotective effects of anesthetic drugs found that only propofol and midazolam have strong neuroprotective effects (Harman et al., 2012).

A clinical review of studies published between 1997 and 2009 reported that more than half of ICUs reviewed chose midazolam as the sedative during TH. Since hepatic and renal dysfunction are often comorbidities of cardiac arrest, drug metabolism may be delayed and cause

slower clearance rates and altered elimination. Midazolam metabolism is "altered in patients with hepatic dysfunction and in renal dysfunction," resulting in a "5-fold increase" in patients treated with hypothermia (Chamorrow et al., 2010, p. 1329).

In addition, a study using patient volunteers found that midazolam clearance decreased "11.1% for each degree Celsius reduction in core temperature from 36.5°C" (Hostler et al., 2010, p. 781). This study demonstrated that even mild and short duration decreases in core temperature significantly affected midazolam metabolism.

The current literature does not make a strong recommendation regarding preferred types of sedation. The nurse needs to be aware that lower body temperatures affect drug metabolism and that normal dose ranges may be too high, so clearer titration ranges need to be ordered by physicians.

Paralytic

Shivering is the body's response to lowering body temperature. As the body attempts to correct the hypothermia, shivering increases the metabolic rate and oxygen demand and causes cerebral edema. Consequently, neuromuscular blocking agents (NMBAs) are generally included in the hypothermia protocol, and there is consensus that NMBAs are to be used during the initial cooling phase to prevent shivering (Lundbye et al., 2012 p. 245; Smetana et al., 2017).

Protocols differ in the use of paralytics to control shivering. Some protocols order the administration of NMBAs prophylactically, whether the patient shivers or not, while other protocols order the administration of NMBAs only in response to actual shivering (Lundbye et al., 2012, p. 115). In a 2002 study, "to prevent shivering, paralysis was induced by the intravenous administration of pancuronium every 2 hours" during the procedure (Hypothermia after Cardiac Arrest Study Group, 2002). In a review of studies published between 1997 and

2009, the authors found that "NMBAs were routinely used to prevent shivering," but there was great "variability in the neuromuscular blockage protocols" (Chamorrow et al., 2010, p. 1332). Finally, other studies have demonstrated that "vecuronium was preferred over pancuronium for reduction of shivering because the former did not increase myocardial work and was associated with fewer complications" (Logan et al., 2011, p. 25). The evidence presented by TH studies has demonstrated a need for NMBA to be used to control shivering in TH. Administration of NMBA should be on an as-needed basis, and a continuous infusion should only be considered when shivering is refractory to all other treatments. Although the choice of NMBA varies, vecuronium appears to demonstrate the least side effects for this protocol.

Time to Cool

The prevailing practice since the two landmark 2002 studies has been to begin cooling the patient to 32° C as soon as possible, ideally within four hours of ROSC. Furthermore, the recommended time for cooling to continue was for 12–24 hours (Bernard et al., 2010; Che et al., 2011; Lundbye et al., 2012; Scirica, 2013). Studies using animal models suggest that TH should not be delayed, because the potential benefits of hypothermia may diminish over time and should not begin later than 10 hours following ROSC (Holzer, 2010).

A meta-analysis exploring time from ROSC to cooling in 4,700 patients found that early and rapid cooling (less than 3.5 hours) to temperatures less than 34° C (rate of 3 degrees per hour) had superior outcomes as compared with prolonged and slower cooling periods. The rationale was that rapid cooling limited exposure to the harmful effects of cooling, such as shivering (Schock et al., 2016).

In a study reviewing TH patients from 2004 to 2008, the mean time to initiation of TH was 90 minutes, and target temperature was achieved in 260 minutes. Of 986 patients, half

survived, and of those surviving, more than 90% had good neurological outcomes. The authors concluded that the timing of TH was not associated with the outcome (Nielsen et al., 2009).

A trial by Nielsen et al. (2013) using a target temperature of 36° C had good outcomes neurologically. Since this was the only study using a higher temperature, the prevailing wisdom is to continue following the recommendations of 32–34° C (Saigal et al., 2015). Nevertheless, for patients who cannot tolerate lower temperatures due to complications such as developing slower rhythms at such temperatures, such patients may still benefit from TH, albeit at a higher temperature.

Since the evidence suggests that cooling should begin as soon as ROSC occurs, trials that included cooling "in the field" by paramedics were initiated. The results demonstrated that out-of-hospital cooling to reduce time to cool did not improve survival or neurological outcomes and was associated with higher incidence of re-arrest and pulmonary edema (Kim et al., 2014). Other studies found that earlier cooling by paramedics in the field did not improve patient outcomes (Bernard et al., 2010).

After 12–24 hours, the rewarming process occurs as part of the TH protocol. Rapid rewarming should be avoided. To allow for temperature regulation and to avoid adverse effects, such as changes in intracranial pressure and hemodynamic instability, warming should occur at .25–.5°C per hour to normothermia (Lundbye et al., 2012, p. 116). Evidence suggests that the cooling process should begin as soon and as quickly as possible. The goal is to have the patient under 34° C within 4 hours of resuscitation. The warming process should begin 12–24 hours after hypothermia is achieved and should occur at a rate of .25–.5° C per hour (Omairi & Pandey, 2012).

Method for Cooling

Since there is no consensus on which method is best for cooling, this protocol uses cooling blankets. Cooling blankets circulate cold water through the blanket and represent an effective, low-tech, noninvasive method for rapid temperature reduction (Dumas et al., 2011; Mooney et al., 2011).

Use of Protocols/Checklist Procedures to Improve Patient Outcomes

TH is an intensive, complicated, time-sensitive intervention that requires high-level nursing care. In many hospitals, the protocol is implemented infrequently but requires an interdisciplinary approach that starts in the field, continues to the emergency department, and culminates in the intensive care unit. Nurses may be reluctant to initiate this protocol due to unfamiliarity and inexperience. The nurse may be educated and experienced but reluctant due to not having done the procedure in a long time. In all instances, there need to be supporting tools in place to assist the staff in the implementation. Nursing protocols and checklists have become accepted tools to improve performance, facilitate communication, and maintain patient safety (Avery et al., 2015). Studies have shown that utilizing a standardized treatment protocol for TH resulted in improved patient outcomes, better survival rates, and improved neurological recovery (Sunde et al., 2007). Furthermore, studies with critically ill patients in ICUs demonstrated that a nurse-directed protocol had better clinical outcomes than usual care (Mehta et al., 2012).

When studying barriers to successful implementation of TH, researchers identified interdisciplinary collaboration, implementation of a difficult protocol, and poor communication as obstacles to a successful outcome (Kim et al., 2015). A strong recommendation was to utilize specific guidelines to facilitate implementation. When providing a technically difficult therapy such as TH, clinicians are more likely to have a successful outcome when utilizing standard

order sets or guidelines. Using a retrospective analysis of performance after providing a standardized order set to clinicians for TH, the authors demonstrated "the temperature goals of therapeutic HT could be achieved reliably in routine post-cardiac arrest care" with the aid of evidence-based guidelines (Kilgannon et al., 2008, p. 502). Moreover, with any unusual, complex procedure, "the quality of TH will be improved by the use of established guidelines of care, with standardized-order templates and checklists" to ensure optimal care delivered in a safe and time-sensitive manner (Scirica, 2013). Another study looking to improve health care for mothers and newborns in low-income communities demonstrated that checklists were a "method to assess and improve nursing competence" (Helman et al., 2016, p.37). Therefore, the current literature supports the use of checklists in nursing to facilitate safe and effective care, especially in difficult treatments such as TH.

Implications for Reducing Health Disparities

Ethnic and racial minorities have been disproportionately affected by health disparities. In fact, "rates for African Americans remained 20% higher for heart disease and 40% higher for stroke, compared to rates in Whites" (Mensah, 2018). Research demonstrates that most reported health disparities are seen in cardiovascular health (Davis et al., 2007). Joseph (2018) found that women, compared to men, were less likely to "receive intensive treatment for heart attacks, and had longer wait times for EKGs."

There is a need for innovative strategies and interventions to combat this disproportionate burden of ill health. Black, Hispanic, and Asian people tend to not receive "clinically appropriate cardiac procedures" and, in fact, "lag behind as new therapies are introduced" (Davis et al., 2007 p. 05). Recent evidence suggests that "hypertension control rates of 80–90% are achievable and racial/ethnic disparities in hypertension control rates can be eliminated, especially in integrated

health systems that implement systematic strategies to manage hypertension" (Mensah, 2018, p.40). What these findings suggest is that continued success in improving cardiovascular health and reducing CVD disparities is possible, but it will require embracing dissemination and implementation research and accelerating widespread and sustained adoption of proven-effective interventions. Hypertension is treatable and a leading cause of heart disease. Interventions that utilize nursing have successful results in addressing cardiovascular disease; interestingly, "strategies involving nurses have shown relatively consistent effectiveness in communities of color," and interventions led by nurses were best demonstrated by programs aimed at "hypertension, HF, and several multitarget coronary artery disease prevention programs" (Davis et al., 2007, p.35). In fact, "nurses tend to interact and spend considerably more time with patients and the rapport and relationship nurses build with patients has been shown to influence patient outcomes including adherence to treatment, satisfaction, and understanding of information" (Rice et al., 2018, p.372). Finally, there is a recommendation for disease management nurse–based solutions, given the profession's potential to promote more "systematic adherence to evidence-based guidelines" (Davis et al., 2007, p. 15).

According to a 2011 AHA review of women and cardiovascular disease, "disparities in cardiovascular health continue to be a serious public health issue," and despite gains in therapies to address the cause and treatment of CAD, women "still show striking disparities in cardiovascular health" (Mosca et al., 2011, p. 1250). The authors concluded that "by establishing scientific levels of evidence and desired treatment strategies, guidelines are fundamental to improving CVD preventive care" (p. 1251).

As stated, Lewey and Choudhry (2014) advocate for standardization of evidence-based care to improve health care for patients with cardiac disease. Recognizing cardiovascular disease

as the number one cause of death for adults in the USA, the "potential impact of eliminating racial/ethnic disparities among patients with cardiovascular disease is tremendous" (p. 530).

Statistics are still be collected and studied from Covid-19, but its immediate impact is already evident. Unfortunately, the Covid-19 pandemic inextricably caused "disproportionate harm" to "historically marginalized groups" (Lopez et al., 2021, p.719). However, the pandemic will hopefully elicit true change and be a catalyst for clinicians to investigate new strategies, such as guidelines and checklists to improve health care for all.

Implications for Practice

Using an evidence-based approach to develop health interventions will potentially reduce errors and enhance the delivery of care. Health disparities can also be addressed using evidence-based protocols and checklists. Protocols and checklists based on best practice and research can reduce bias and stereotyping and ensure that optimal care is accessible to all by helping the clinician avoid "conscious or unconscious decisions" based on prejudice or personal beliefs (Cardarelli & Chiapa, 2007, p. 7). Nurse-led interventions resulted in significant lower rates of hospitalizations among patients with heart failure, and of those hospitalized, patients in nurse-led education programs had significantly shorter hospital stays (Rice et al., 2018).

Improving health care quality for all patients with heart disease can be facilitated by the "standardization of evidence-based care" through best practice and quality control (Lewey & Choudhry, 2014, p.530). Literature reviews regarding health disparities have identified nurse-led programs to be effective intervention strategies for reducing health disparities (Chin et al., 2007). The Centers for Disease Control and Prevention (CDC, 2016) also recommend using evidence-based interventions to reduce racial and ethnic health disparities. A recent editorial in *Critical Care Nurse* entitled "Because Women's Lives Matter, We Need to Eliminate Gender Bias"

(2017) argues there is a pervasive gender bias in health care. Women in the United States receive substandard care compared to men, particularly in intensive care and, specifically, in cardiac care. Accordingly, women are less likely to receive preventive care and invasive procedures and are 19% less likely to receive TH (Alspach, 2017). The author contends that using evidence-based checklists as clinical support devices had the unintended result of reducing gender bias and improving patient outcomes (Alspach, 2017). When examining bias in health care, a group of researchers advocate for a "practical checklist when providing health care in order to minimize … biases when making decisions" (Gopal et al., 2020, p. 43).

Research has demonstrated that nursing interventions are successful in reducing health disparities in racial and ethnic minorities. In addition, research supports the concept of using clinical protocols and checklists to reduce health disparities. However, little research has been conducted on health disparity outcomes when nurses use protocols and checklists in acute and emergency care to provide intensive interventions such as TH to critically ill patients. This is an area that needs further investigation.

Access to new and evolving information is necessary for nurses in the clinical setting to ensure their ability to provide the best care possible. To keep apprised of the continuous advances in health care, classroom education is not always feasible or cost-effective. Nurse educators, to meet this challenge, must facilitate self-directed learning and motivate nurses to adapt their skills and autonomy for lifelong learning. The use of an online self-learning module and electronic resources is an effective and cost-efficient way to impart new information and facilitate the acquisition of new knowledge. TH is a complicated and infrequently practiced therapy that nurses are required to deliver in an expedient and safe manner. Therefore, education and real-time support must be provided. As an alternative to didactic classroom education,

utilizing nurse-initiated learning through self-learners and web-based educational tools is an effective way to facilitate nursing education in the clinical setting (Murad et al., 2010). In a comprehensive meta-analysis of self-directed learning among health professionals, the authors identified that when learning resources included self-study reading material, the participant "demonstrated improved post-intervention knowledge" that positively "affected the participant's clinical practice and care they provided to patients" (Murad et al., 2010, p. 1065). In another study assessing the use of e-learning via online self-learning modules to teach nurses, the authors found improved knowledge using pre-and post-assessments to inform the nurses' practice related to evidence-based learning (Gagnon et al., 2015).

Chapter 3: Methods

Positionality Statement

Prior to presenting the proposed methods for this study, it is worth noting my specific expertise and training, as it has informed the direction of this work. Like the study participants, I am also an RN, having practiced for more than 25 years in an acute care setting. I have also implemented the protocol developed and described in this work as a bedside clinician and as a clinical educator in critical care and emergency care. I am currently the Director of Staff Development at a small community hospital. I experienced firsthand the effect of the pandemic crisis on a small community hospital.

Study Design

There were three components to this study. First, the patient care checklist and online self-learning module were developed. Then, the feasibility and usability of the patient care checklist and online self-learning module were assessed qualitatively via a focus group of RNs. The latter component of this study had an experimental study design. The nurses in the study sample were placed into alternating assignments to either the experimental or the control group. Baseline and follow-up survey data on TH and cardiac health knowledge were collected immediately after viewing the online module (for the experimental group) and after reading an article about cardiac health (for the control group). Comparisons within and across the two research conditions were made. This survey also assessed the nurses' recognition of existing disparities in cardiac arrest treatment and care across racial/ethnic demographic subgroups. Data on key sociodemographic characteristics were collected at baseline.

Setting and Sample

A sample of RNs in the United States who specifically work in acute care settings were recruited for participation in this study. Acute care facilities (such as community and urban hospitals) are places where patients are treated for illness, emergencies, and surgery. Patients who stay in these facilities are considered short-term and are generally admitted for "around the clock" nursing care. In contrast, I did not collect data from nurses working in long-term facilities such as nursing homes, rehabilitation centers, and hospice centers, as these facilities do not provide emergency care.

Participant Recruitment

Participants for this study were recruited online using a "snowball approach." Using social media, specifically Facebook and email, I recruited a sample of US-based RNs who work or have worked in critical care and emergency units in acute care facilities. A significant body of research has demonstrated the role of social media in facilitating improved health communication efforts and increased opportunities for study participation (Dusek et al., 2015). Social media recruitment has been shown to be an efficient and cost-effective method to recruit participants and gather research data (Dusek et al., 2015). Moreover, research recruiting RNs specifically to participate in a study demonstrated that Facebook as a recruitment tool was successful in yielding many participants who completed the study in a short time. The process of utilizing viral marketing and the "snowball effect" via Facebook was also inexpensive (Child et al., 2014). I therefore utilized "snowball sampling" as a demonstrated effective recruitment tool. In this process, I utilized my extensive network of acute care nurses to initially recruit a sample of 15 RNs through email. I was a colleague of these nurses, having worked with them in other capacities, such as former fellow staff nurses from my time as a cardiac ICU nurse and as a

critical care clinical educator. As per snowball sampling, these nurses each recruited other nurses they were in contact with to develop a representative sample of current practicing acute care RNs from hospitals across the United States. This process enabled access to RNs from a variety of geographic and acute care settings. Additionally, this recruitment plan built on the existing resource of social media networks and allowed for the participation of RNs unknown to the study author (Dusek et al., 2015).

I recruited 60 RNs living in the United States to participate in this study (29 participants assigned to the experimental group; 31 participants assigned to the control group). Participants remained in their original assignments through study completion. Participants assigned to the control group were directed to a website with an article about TH, while participants assigned to the experimental group were directed to the online self-learning module. Participants had access to the self-learning module via the online software Qualtrics.

The recruitment process began with a request to the target population on the study author's Facebook and email accounts. The appeal included a brief explanation of the dissertation project (self-study on TH post-cardiac arrest), the time required to participate (1.5 hours), and a request to ask other nurses to participate. Interested nurses were prompted to visit the TC Qualtrics webpage. Immediately after clicking the link, the potential participant was shown the informed consent and participant's rights documents, which they signed with an electronic signature to demonstrate acknowledgement of the two documents. The questionnaires and assessments were available on the website, and the participants were prompted to click a hyperlink for access to the online self-learning module material or the scholarly article.

In order to ensure participants and author were blind to which group the nurses were assigned to email requests and Facebook requests alternated with URL addresses on Mondays

and Tuesdays. This alternate assignment process was to ensure no participant was aware of their group assignment.

Focus Group Participant Recruitment

Focus group participants were recruited from the sample of survey participants and met the following criteria: (1) RNs in acute care settings, (2) had a least two years of experience in critical care, (3) lived in the greater New York City area and were able to participate in a focus group with the study author, and (4) expressed willingness to participate in the focus group. The two-year experience minimum was established because new nurses who have been practicing for less than two years often struggle with the complex roles a nurse in critical care must contend with. Current research in nursing education further indicates that cognitive strategies and effective communication skills are not well developed (Burger et al., 2010). Therefore, the focus group included more experienced nurses to optimize feedback.

Inclusion and Exclusion Criteria

All participants were RNs who had worked or were actively working in acute care and emergency departments in hospitals across the United States.

Informed Consent Procedures

The study protocol was approved by the Teachers College, Columbia University IRB. The informed consent process took place online just prior to beginning the assessment. After clicking on the link to the Qualtrics webpage housing the survey and online module, the participant was prompted to read and electronically sign the consent and participant's rights page. Each question was preceded by text from the self-learner that included the information. The nurse was able to click on links that brought him or her to the protocol, checklist, and coma

scale. Nurses in the focus group were also given an additional consent that included a consent to voice recording and participating with other in the group.

Measures/Instrumentation

An evaluation tool for the online self-learning module and for the nurse's comprehension and understanding of the presented material included a 20-question assessment (Appendix E). The assessment was modeled after the AHA's post-test for the Advanced Cardiac Life Support education program. It included multiple-choice questions. In the text, *The Nurse Educators Guide to Assessing Learning Outcomes*, McDonald (2014) states that multiple-choice questions "provide objective measurement of student achievement" (p. 80). Moreover, with multiple-choice questions, "students have to use critical thinking skills to make subtle distinctions necessary to reason out the correct answer" (p. 81). In addition, multiple-choice questions are easily scored using computerized programs such as Qualtrics, analyzed, and stored (McDonald, 2014). The evaluation reflected the aims of the study. No validated instrument exists to assess knowledge in this area; therefore, I developed an evaluation measure used to assess whether the nurse was better able to implement an evidence-based "Therapeutic Hypothermia Post-Cardiac Arrest" protocol, to ensure this protocol was appropriate for a specific patient, and to ensure that the protocol was implemented correctly. Moreover, the evaluation tested the effectiveness of the online self-learning module on nurses' perceived ability to care for these patients, as well as their recognition of existing disparities in cardiac arrest treatment and care among racial and ethnic groups via a written evaluation tool (Appendix F). The post-assessment was evaluated according to the number of questions answered correctly. The experimental group answered questions following written text from the online learning module and access to the protocol and checklist.

The control group answered the same questions after reading a scholarly article on TH and access to a link for the protocol and checklist.

Data Collection Procedures

Focus Group Data

As the study author, I moderated the focus group, which comprised five RNs who were experienced in critical care and who had been practicing for more than two years. The length of the focus group was 1.5 hours, and I guided the discussion using a set of open-ended questions to determine whether the online self-learning module, assessment, and checklist were useful tools for the RN in delivering care to patients undergoing TH. During the focus group, I took written notes. It should also be noted that I drew on existing best practices for conducting focus groups to ensure that this aspect of the study's data collection process occurred as thoughtfully as possible (Krueger et al. 2001). Any barriers to learning, such as confusing information, misinterpretations, or practice issues, were discussed with the group.

Assessment and Survey Data

Then, drawing on a sample of 60 nurses and using a post-study design, survey data were collected to determine the effectiveness of the checklist and online module as compared to a control group of nurses who read a scholarly article on the same subject. Data were collected at two time points for both the experimental and control groups. The questions were designed to assess an understanding of the aims of this study (Appendices C, D, E, & G). Notably, if a question was found to be consistently answered incorrectly or a goal was not achieved after 20 participants had completed the online self-learning module, then a review of the information would have been initiated.

Data Management and Analysis

Survey data were collected online using Qualtrics. The questionnaire consisted of three sections: demographics, a knowledge section, and a set of questions regarding perspectives on health disparities as they relate to cardiac health outcomes. The demographics section collected basic information of the participants, such as age, gender, years of experience, and previous experience in Therapeutic Hypothermia. The questions did not ask any sensitive identifiable information, such as name or forms of contact. The knowledge section included 20 multiple choice questions with 3 to 4 options. The number of correct answers was added to measure total score out of 20, with one point for each correct answer. The question in the third section contained 4, 5-point Likert scale questions to measure participants' beliefs on health disparities and the effectiveness of the learning module. The complete list of knowledge questions can be found in Appendix E and the list of demographic and health disparities questions can be found in Appendix F. The initial sample size consisted of 70 participants. Out of the initial participants, 10 participants were removed from the analysis having not completed all survey items.

Chapter 4: Results

Results for Research Aim 1

The first research aim was to develop a comprehensive patient care checklist and an online self-learning module that assists RNs in identifying how to implement an evidence-based "Therapeutic Hypothermia Post-Cardiac Arrest" protocol to support that the protocol is implemented correctly and as intended.

Online Learning Module Development

The online self-learning module was created using the survey tool Qualtrics. The experimental group's module provided specific information regarding the nursing care of a patient undergoing TH. This text was followed by a question regarding the information provided. I utilized "The Nurse Educators Guide to Assessing Learning Outcomes" to create an assessment tool that was related to the course content and learning objectives. This assessment tool assisted me in evaluating the participants' learning outcomes.

The content for the online learning program and the corresponding checklist was developed throughout 15+ years of experience collaborating with physicians and nurses. The online learning program and corresponding checklist provided a protocol that educated nurses and physicians at two community hospitals in the implementation and delivery of TH. I also implemented the protocol with patients in the ICU with successful outcomes. The content of the online self-learner reflected questions and concerns from nurses and doctors related to my real-time experience delivering the protocol. In addition, several hours of online research were necessary to find evidence-based, best practices for improved survival outcomes. In addition,

practical information, such as the temperature required to protect brain cells and how fast the rewarming phase should occur, had to be carefully researched. In total, 20 multiple choice questions were incorporated into the survey.

Checklist Development

A TH protocol checklist was used to answer specific questions that were expressed during the real-time initiation of the protocol. The checklist was developed as a quick guide to reflect the guidelines developed by the AHA, recognizing the need to provide immediate, real-time information for the novice nurse to the expert nurse. As stated, this is a highly intensive nursing procedure that needs to be done in a time-sensitive manner. It is also something community hospitals do infrequently. The checklist was available to both the experimental group and the control group.

Module Development

The online self-learning module was administered using the survey tool Qualtrics. The module itself was designed to provide specific information regarding the nursing care of a patient undergoing TH. This text was followed by a question (or series of questions) regarding the information provided. Information and assessment questions were developed to reflect the learning the author determined was necessary to safely care for patients undergoing TH. After years of training nurses and assisting them in delivering TH to patients, I was aware of what information the nurse needed to be immediately available to effectively deliver the care. As a line nurse working as a cardiothoracic ICU nurse caring for patients undergoing cardiac surgery, I recognized the need for specificity in the protocol. Therefore, I formatted the questions to lead to this clinical course of action. The module contained 20 multiple-choice questions, including "What is the target temperature range for TH during the cooling phase?" "Why is shivering

considered an adverse effect of TH?" and "For patients undergoing TH, at what rate per hour in degrees of temperature should the patients be rewarmed to normothermic?" The questions are examples of information that needs to be specified for the practicing nurse.

Before completing the self-learning module, each participant was asked to read the consent and verify that they had read it. They were also asked to affirm that they were RNs by signing an affirmation.

As noted in Chapter 3 in the data collection procedures section, the control group was provided with a research article from the AHA that describes the care of a patient undergoing TH. The American Heart Association is considered the "gold standard" for the implementation of emergency cardiac care. Nurses in the control group were asked the same questions as the experimental group and were provided with the same protocol checklist.

Both the experimental and control groups were asked to take a brief survey after completing their respective online modules. The survey included specific demographic items. It also included interval/ratio questions via a Likert scale to assess attitudes toward utilizing protocols, checklists, and self-learning modules to assist nurses in caring for patients undergoing a complex procedure such as TH.

Results for Research Aim 2

The second aim was to pilot-test the feasibility and usability of the patient care checklist and online self-learning module among a sample of RNs from acute care hospitals via a focus group with a sub-sample of RNs (anticipated n = 5–8). These results were then utilized to make specific changes to the checklist and self-learning module to maximize both the acceptability and feasibility of utilizing these resources.

Focus Group

A group of five RNs completed the online self-learning module independently and then met as a subgroup with me to provide qualitative feedback regarding the format, perceived efficacy, and acceptability of the program. This group of nurses was known to me. All of the nurses had 10+ years of hospital experience and worked in critical care. They had previous experience caring for patients undergoing TH in the intensive care setting. In line with the study's IRB process, they were asked to complete an online consent form detailing the risks and responsibilities involved in being part of a focus group for this study. The group was asked for a critique of the online education program, their attitudes toward online learning, and the feasibility of administering TH.

I utilized open-ended questions such as "How likely would this online program facilitate your care of a patient undergoing TH?" and "Would you recommend this type of learning program for nurses?" to direct the focus group, which lasted 30 minutes. I then encouraged participants to engage in the discussion and work off each other's answers. Two of the nurses were "surprised about new criteria regarding inclusion criteria," and one nurse was "surprised about the timing of patients being rewarmed." One nurse reported that a question that she answered incorrectly ("Research demonstrates that the nursing profession is in a unique position to reduce racial and ethical disparities. Which of the following statements support this research?") was "too vague," and another was surprised that "women did not receive TH as frequently as men." After finishing the program, participants were encouraged to assess whether this program met their learning needs based on content and test questions. Nurses were encouraged to suggest whether additional information would be needed for the beginning practitioner. The results of the focus group guided me to change the wording of two questions

that were vague or confusing. The feedback on the online learning tool was positive, and it was agreed that the module was user-friendly and would facilitate learning of a high-risk, low-volume procedure. The nurses liked that they could complete the program on their phones and could easily download the nursing checklist to their phones.

The checklist, embedded in the text and clicked on to retrieve, was a tool that allowed the nurses to follow a concise guide for the preparation and delivery of TH. Furthermore, the nurses reported that the questions asked after each informational slide reinforced their learning. The design of reading a passage and then retrieving the information to answer the questions helped solidify their knowledge. Moreover, the immediate feedback regarding what they got right and what they got wrong was viewed as a learning opportunity. In conclusion, the group agreed that the checklist and the online learning module were clear, concise, and useful in facilitating safe, unbiased, and evidence-based nursing care.

The following questions were asked during the focus group session:

1. Would you recommend this type of online learning program to other nurses who care for patients undergoing TH?

All five nurses responded they would recommend this online learning tool. They liked the format of the informational text followed by the questions. They felt that the embedded checklist gave them a lot of necessary information.

2. How would this online learning tool facilitate your care of patients undergoing TH?

All five nurses agreed that a patient care checklist that was a component of the online learning was a valuable tool for administering high-risk protocols that were done infrequently. They agreed that it was difficult to remember all the treatments and exclusion and inclusion criteria for such a high-risk protocol that was done so infrequently. One nurse's comment was

that “it could be many months before you actually implemented the protocol, and it was really stressful because the treatment is so time-sensitive.”

3. Was any of the information confusing or too difficult?

One nurse who answered the question about health disparities incorrectly stated that the question was confusing. The other four nurses had no concerns.

4. Were there any other comments?

The conclusion of the focus group was that the online learning program was a valuable learning method. The five experienced RNs all concluded that it was an effective and meaningful way to educate and support nurses in delivering complicated, high-risk nursing care that was done infrequently.

As a result of the focus group, I rewrote one question to make it less confusing. Moreover, I was encouraged to begin the online learning, and the nurses agreed to share the URL address with their colleagues going forward. It was the beginning of the snowball recruitment method.

Results for Research Aim 3A

This study involved data collection and analysis of a sample of 60 nurses from across the United States. Utilizing the snowball method of recruitment, I recruited an initial 15 RNs and provided every other participant with either the experimental or the control online learning program via social media and email. The participants were not told whether they were assigned to the experimental or control learning program. In a private Facebook group consisting of nurse colleagues, I posted my need for RN volunteers for this study. Included in the post was the study’s website URL. Moreover, I contacted nurses via email and asked for study volunteers. Each post included a request to pass the information to other nurses. The initial participants

therefore passed the link on, and those nurses then forwarded the web address to other nurses. The recruitment period started in May 2019 and concluded in March 2020.

Following this recruitment process, I reviewed each participant's data to ensure they met the study's inclusion criteria and to ensure they had fully completed the training and corresponding survey. Ten participants were removed from the analysis due to incompletion of the online self-learner, resulting in the final sample of N = 60. Nine of the participants were male, the majority of participants had over six years of clinical experience (n = 47), and more than half of the participants had experience in performing TH (n = 23). Please additionally refer to Table 1 in Appendix G for descriptive statistics.

A linear regression analysis was then conducted to compare the difference in assessment score between the treatment online self-learning module (TH) and control online self-learning module (Targeted Temperature Management) group. This analysis was conducted to demonstrate the effect of the online learning module on nurses' knowledge regarding care of patients undergoing TH. The independent variable was the training condition—the nurse either received the learning module or read a scholarly article on the topic. The dependent variable was the score after receiving the training. Recognizing the variation in years of experience as a nurse and experience treating patients undergoing TH, a linear regression model was run to test the covariates. Gender (2 = Female), previous experience in TH (2 = Has experience with patients undergoing TH), and nursing experience (2 = Over 6 years) were included in the analysis as covariates.

The regression test results indicated that the overall regression model was found significant with $p < .001$, implying that at least one of the variables used in the analysis had a significant effect. Upon inspecting the variable coefficients, the treatment variable (Therapeutic

Hypothermia) was found to be a significant predictor of the assessment score. Participants who completed the online self-learning module scored significantly higher than the control group by 4 points on average, $t = 6.092$, $p < .001$, $B_{Condition} = 3.865$, with a remarkably high effect size, $r^2 = 0.379$. However, none of the covariates was found to be a significant contributor to the score (please refer to Table 2 in Appendix G for the full list of coefficients). Surprisingly, previous experience in TH was not a significant predictor in producing higher scores. This survey did not take into account of time interval of previous experience and completion of online learning. Nor did it address the level of experience with TH. No assumption was violated for the analysis, as variance inflation factors of all variables were below 5 and q-q plot and residual plots indicated residual normality.

Results for Research Aim 3B

Research Aim 3B was to summatively evaluate, immediately following the post-test and via a written survey, the feasibility and usability of the patient care checklist and online self-learning module among the experimental group participants on the perceived ability of nurses to care for these patients.

The results of the written survey demonstrated that 77% of the nurses agreed that protocols and checklists helped nurses minimize disparities. Furthermore, 95% agreed that patient care checklists helped nurses care for patients when delivering high-risk, low-volume protocols such as TH. The survey also revealed that 67% of nurses felt that the learning module would help them provide care for patients undergoing TH. Encouragingly, 100% of nurses agree that protocols and checklists would enable them to minimize health disparities in cardiac arrest treatment. In addition, 68% of nurses felt that they were adequately trained on new patient care

protocols. Finally, 85% of nurses who completed this survey felt that they were better able to recognize health disparities among racial and ethnic groups.

Chapter 5: Discussion

In 2005, the AHA published guidelines for hospitals to follow regarding the implementation of therapeutic hypothermia (TH) for patients surviving out-of-hospital cardiac arrest (Koyfman, 2019). In collaboration with the Director of Cardiology and Emergency Department physicians and nurses at a Westchester community hospital, I expanded on these guidelines to develop a comprehensive protocol for TH, following the recommendations from the AHA as a guideline. The initial implementation of this protocol also required me to educate the critical care nurses working in the intensive care unit and emergency department. Each staff member was required to attend a 2-hour lecture led by me, which incorporated visual aids and written handouts. The rollout of this program could not occur until all staff on all shifts were educated. This required pulling staff off units and providing backfill to cover all shifts. It was an intensive and costly educational program for a small community hospital. It was also impossible to get all staff to attend.

After a majority of nurses were educated, the next step was to develop the TH procedure and a corresponding hospital policy detailing its uses. At least 10 months following this protocol implementation passed before a patient who met the criteria—sudden cardiac arrest and successful resuscitation but remaining unconscious—arrived in the emergency department. I found the staff reluctant to implement the protocol, despite having been educated previously, because they "didn't remember exactly what to do." Utilizing the policy and procedure checklist developed for TH, I was able to create additional guidelines for the hospital staff to use as a checklist for the required "around-the-clock" care. In the case of this first patient, the outcome

was successful; the patient regained consciousness and was able to return fully to his family. This experience demonstrated that educational programs and tools are needed in health care for high-risk, low-volume procedures. It also demonstrated that education must be available to all shifts 24 hours a day, 7 days a week. To be cost-effective in a community hospital, education must be created and available online. There also must be tools available to assist the bedside nurse, such as checklists, after the education as a support tool.

The Covid-19 pandemic arrived abruptly and continuing the recruitment of nurse participants became infeasible. Our hospitals were quickly overwhelmed. Nurses were working extended shifts in untenable conditions, such as makeshift personal protective equipment, constant codes, and unimaginable nurse-to-patient ratios. Operating room nurses who had never worked outside the operating rooms were sent to care for patients in med/surg units and ICUs. Nurses from all over the country were being recruited to work in our ICUs, telemetry floors, and emergency departments. Staff, to protect their families, were sleeping in basements and garages, and sending their children away to stay with other family members. The decision to end the study seemed the only practical course of action. The impact of the pandemic and the results of my research directed how staff education at that point in time was conducted.

These nurses required “just-in-time training” to be able to step in and care for the critically ill patients succumbing to Covid-19. As the Director of Staff Development in a community hospital located in the epicenter of the pandemic, I immediately had to develop an education program that readied the nurses from different backgrounds, levels of education, and years of experience to function safely and effectively in this catastrophic environment. Utilizing online learning, protocols, and checklists, I was able to reach all recruited and reassigned nurses quickly and effectively. The checklists and protocols provided support and information needed in

the moment and throughout the nursing care. This disaster reinforced the need for timely education and support for nurses that has been demonstrated in this study.

Implication for Nursing Practice

Nurses, especially those who care for the critically ill, are required to perform high-level intensive care. Complicated procedures such as TH are generally done infrequently at small community hospitals. These protocols are time-sensitive and intense. The patients often come into our emergency departments in cardiac arrest, and the staff must be ready to respond. Once stabilized, the protocol must be initiated immediately, and the patient transferred to the ICU. The nurse accepting the patient must be ready to respond, even if they have never delivered this protocol. This happened throughout the pandemic as health care workers delivered care that was nonroutine and evolving. According to Atul Gawande, MD (2010), "the volume and complexity of what we know has exceeded our individual ability to deliver its benefits correctly, safely, or reliably. Knowledge has both saved us and burdened us" (p. 14). He compels us to "build on experience" and "take advantage of the knowledge people have" while avoiding the failures of "human inadequacies" using the simplest of technologies, "the checklist" (p.14). His book, *The Checklist Manifesto*, was recently recommended to me by a colleague whom I trained as a new nurse to work in a MICU. We were discussing the extremely complicated and overwhelming new information regarding the care and treatment of our sickest patients who had many comorbidities and were positive for Covid-19. The treatment of these patients differed from our past experiences. It was confusing for the nurses and the medical residences assigned to them. I told her of the findings from my research, and she shared that she was assigned to read *The Checklist Manifesto* in graduate school. Reading his book was an "Aha!" moment for me. I

realized that a simple checklist created by doctors and nurses caring for the critically ill could potentially prevent mistakes from occurring in patient care that is complex and rapidly evolving.

The use of checklists and protocols has clear implications for nursing practice in critical care and other emergency interventions. As an example, daily weaning protocols and sedation withdrawal checklists for intubated, ventilator assisted patients would assist both the medical resident and bedside nurse. It would provide a comprehensive guide to assist the physician regarding the decision to assess the patient's ability to be weaned off the ventilator and breathe on their own. Once the physician or other licensed independent practitioner (LIP) ordered the protocol, the nurse could then utilize the checklist to follow evidenced based guidelines for titration of sedation, monitoring parameters, weaning protocols, and post assessment. Research has found that using a comprehensive protocol with checklists for weaning and extubation prevented respiratory failure and reintubation in critically ill adults (Nitta et al., 2019).

Checklists have the power to prevent health disparities, improve consistency of care, and prevent bias in the treatment of diseases. The ready availability of these tools can guide the clinician during emergency situations and help maintain the safety of the patient especially during extreme conditions such as pandemics when nurses and LIP's are expected to work outside their normal area of practice such as an OR nurse assigned to work in the ICU. According to Peter Pronovost MD, checklists have established a higher standard of baseline performance and improved patient safety. By utilizing up-to-date research, clinicians can create protocols or checklists to guide nursing staff in delivering safe and effective care that is free of implicit bias (Pronovost & Vohr, 2010) Research has demonstrated that the use of digital checklists provides patients with more equitable care and better outcomes. Joseph (2018) found that women, compared to men, were less likely to "receive intensive treatment for heart attacks,

less likely to be sent for knee replacements, and had longer wait times for EKGs" (p.2). This disparity resulted in physician researchers deciding on "the checklist in order to increase the standardization of care across all patient demographics" (p. 4). The retrospective results of the study on Johns Hopkins Hospital patients demonstrated that checklists "can enhance the quality of care while simultaneously eliminating any disparities in preventable harm between populations" (p. 5). The use of electronic medical records makes digital checklists easily designed and accessible.

Building Upon Findings: Determining Best Practice for E-Learning

The findings of this research have important implications for nursing practice and policy. This research is especially timely in the grip of a pandemic that has lasted more than a year. Nurses' attitudes toward learning and education styles, and strategies for "just-in-time" learning during this pandemic, reinforce the need for timely, effective, and up-to-date training on complex care for nurses who are on the frontlines of health care.

An educator's role is to direct teaching to accommodate the individual's learning needs. Future research should focus on how to tailor content to different learning styles and individual learning needs. Education for health care workers must be offered in a way that deepens their understanding while accommodating their intense work schedules and familial and social commitments. It must reflect the "round the clock" reality of work schedules in health care. "Because of the dynamic nature of the clinical environment, emergency nurses are expected to keep pace with advances in research and ensure that their practice is evidence-based"" (Koota et al., 2018, p. 51). During the initial wave of the pandemic, nurses were working in chaos. There was insufficient personal protective equipment (PPE), routes of transmission of Covid -19 were not clearly defined, treatments were failing, and staff were falling ill. Staff had to contend with

conflicting information and grapple with the concept of reusing PPE. The entire staff had to be trained to "don and doff" PPE without contaminating themselves. Then they had to be advised on how to store it to reuse the following day. All staff, from the CEO to the ward clerk, housekeeper, and food staff, needed to be taught. This also had to happen on all shifts. I imagine it happened everywhere in the world. So, an online self-learner was developed for staff to view as often as they needed. Leadership was also trained so they could demonstrate how to "don and doff" to their staff. This example was a miniscule moment of what was happening in reality during the pandemic.

The current practice of pulling nurses off units to sit in a classroom is not feasible in the small community hospitals that exist all over the country. We must accommodate all shifts and learning styles and deliver information quickly and effectively. According to Hirsch et al. (2020), "education rollouts are often time intensive and difficult to coordinate" (p. 309) E-learning enables hospitals to accommodate nurses' schedules. The focus group reported that they liked the convenience of completing e-learning on their personal cell phones. Similarly, a study found that "staff were ecstatic that they could complete the required education on their own time" by utilizing e-learning (p. 309). Research has demonstrated that integrating evidence-based practice into daily clinical practice and decision making has been more challenging than initially expected. Challenges to the implementation of evidence -based practice (EBP) include "time limitations, inadequate EBP knowledge or education, organizational resistance, heavy workloads, resistance from nursing colleagues," and limited resources (Koota et al., 2018, p. 51).

Therefore, it is important for health educators to develop strategies that meet these challenges. For example, nurses who participated in a study that utilized online learning, "significantly improved their knowledge score and self-directed learning readiness" after the

online learning course and expressed "overall satisfied with the course" (Reviriego et al., 2014, p. 8). The challenge exists to create learning programs for frontline workers in health care that support the constant emergence of new information. This education platform must be dynamic and flexible. It must also be cost-effective. Current nursing research reviewed 10 educational programs to access learning outcomes and effective delivery with Emergency Department nurses. The interventions were in-person learning or online self-learning programs. The researchers found that when evaluating computer online training, the nurses reported that "learning objectives were met to a moderate or great extent, the content was relevant, and the method was effective" (Koota et al., 2018, p. 56). Also, "significant improvements in nurses' knowledge were observed after an intervention using self-directed learning material" (p. 56).

The current health care crisis demonstrates that nurses need information for delivering complex intensive care and that research must identify these tools for education. This study found that nurses were satisfied with the flexibility of e-learning. More research needs to be conducted to determine the best approach to teaching and learning. In this study, there was no difference regarding years of experience in reported satisfaction with the online learning; however, further research should focus on how well e-learning performs over longer periods of time and within different cultural contexts. Motivation for learning new skills needs to be addressed by providing creative approaches to "high-stakes nursing skills with low-volume use" (Clarke et al., 2020, p. 18). At a time when we must remain aware and continue social distancing, in-person learning in a hospital is not an option. Since e-learning is available to all staff using mobile electronic medical records for documentation, online learning tools are an accessible education platform that is readily available.

The goal of this study was to demonstrate the most efficient way educators could prepare nurses to feel competent to provide high-risk procedures that are delivered infrequently. This study evaluated the effectiveness of an online self-learning module among the experimental group participants and the perceived ability of nurses to care for these patients. The learning tool demonstrated that nurses who were assigned to the online learning tool scored higher in the post-test than nurses in the control group, who were assigned the scholarly article. The results revealed that the online learning module helped learners focus on what they needed to do, why they needed to do it, and how to do it. This upskill training provided an efficient and effective way to learn and reinforce skills necessary in critical care. The nurses in the experimental group scored higher than the control group, with a median score of 19 versus 14 out of 20 questions, respectively, demonstrating the higher assessment score of nurses in the experimental group.

Recommendations for Future Research

In this research, I chose to study the effect of using an online learning tool to enhance the learning of a high-risk, low-volume nursing protocol. I also explored attitudes toward online learning tools and the use of protocols and checklists to support best practice.

The results of the study suggest that the use of protocols and checklists aids nurses in their practice. The checklist was viewed as a guide and support for delivering extremely intensive nursing care to critically ill patients, with the term “critically ill” referring to patients with life-threatening conditions who require constant monitoring and comprehensive nursing care. Health disparities have become more apparent during the Covid-19 pandemic. Various strategies have been studied and tried, yet bias in health care continues. More research into the use of protocols and checklists to address individuals receiving poorer quality of care needs to be

conducted. Using checklists, health care for all can improve, and systemic bias can be diminished.

The following are suggestions for future research:

- What is the best way to deliver protocols and checklists to bedside nurses caring for critically ill patients?

  Right now, there is no consensus on how to make checklists and protocols easily available to nurses. Electronic Medical Records and handheld devices are examples of two options.

- Does the use of checklists and protocols address health disparities?

  Health inequality is still a major issue in this country. More needs to be done to remove bias in the delivery of medical care. Checklists may prove to be a simple tool towards that goal.

- What is the most efficient way to get new health care treatment education to front-line staff?

  Now more than ever we see the need for rapid dissemination of information and education to frontline workers. New treatments for COVID -19 are constantly evolving and must be implemented with minimal interruption.

- What tools need to be developed to address learning outcomes with nurses in healthcare?

  As health educators we need an assessment tool to evaluate whether the educational programs implemented meet the objectives of the learners. Nurses need to feel comfortable delivering this rapidly evolving nursing care.

- What is the effect of the learning on patient care?

Most importantly, research must assess if the patients are receiving safe and effective care.

- How does the time period between skill training and application effect one's ability to preform required tasks? Does the use of checklist and protocols support the staff in bridging the gap between education and application?

Study Limitations

There are several limitations to this study that must be considered when interpreting these results. The size of the sample may be too small to apply it to a large population. As stated, the pandemic created a situation where the recruitment was no longer feasible. Another limit of the study was the homogeneity of the focus group. The nurses recruited were experienced and worked at the same hospital. They all had had previous experience with TH. Also, comparing an experimental and control group may have missed key variables such as learning styles and motivation to learn.

The limitation of this research directs methods to be addressed in the future. Health care will continue to evolve as new scientific breakthroughs occur. Nurses as the frontline delivering this care must be given the tools they need to provide safe, critical, and compassionate care.

Lessons Learned

This research began as a way in which to thoughtfully study the results of creating a learning tool that was effective in educating and supporting nurses to administer high-risk, low-volume procedures safely and effectively. It included strategies such as checklists and protocols to support nurses after the education and to address the potential for bias in delivering this care. Checklists are created to assist in making sure health care workers have a roadmap to integrate

evidence-based practice to all patients to improve survival rates. A simple checklist is used in every surgery today to make sure the right patient is getting the right procedure on the right body part. Simple, yet lifesaving. The past year has shown how necessary this type of research is. Staff development educators in small community hospitals tend to be part-time or single individuals responsible for the orientation of new staff, educational rollouts, and mandatory yearly competencies. Add the burden of an unprecedented disruption of a pandemic and the challenge becomes obvious. Health care educators need cost-effective educational tools that have reliable outcomes. Currently, educators in health care are struggling to keep up with the developing information regarding best practice.

References

Alspach, J. G. (2017). The checklist: recognize limits, but harness its power. *Critical Care Nurse,* 37(5), 12–18.

Arrich, J., Holzer, M., Havel, C., Müllner, M., & Herkner, H. (2012). Hypothermia for neuroprotection in adults after cardiopulmonary resuscitation. *The Cochrane Database of Systematic Reviews,* (9), CD004128.

Avery, K. R., O'Brien, M., Pierce, C. D., & Gazarian, P. K. (2015). Use of a nursing checklist to facilitate implementation of therapeutic hypothermia after cardiac arrest. *Critical Care Nurse*, *35*(1), 29–37.

Because women's lives matter, we need to eliminate gender bias. (2017, April 1). *Critical Care Nurse, 37*(2), 10–18.

Bernard, S. A., Smith, K., Cameron, P., Masci, K., Taylor, D. M., Cooper, D. J., Kelly, A. M., Silvester, W., & Rapid Infusion of Cold Hartmanns (RICH) Investigators. (2010). Induction of therapeutic hypothermia by paramedics after resuscitation from out-of-hospital ventricular fibrillation cardiac arrest: A randomized controlled trial. *Circulation*, *122*(7), 737-742.

Bernard, S. A., Gray, T. W., Buist, M. D., Jones, B. M., Silvester, W., Gutteridge, G., & Smith, K. (2002). Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. *New England Journal of Medicine, 346*(8), 557-563.

Boulila, C., Ben Abdallah, S., Marincamp, A., Coic, V., Lauverjat, R., Ericher, N., Bougouin, W., Mira, J. P., Cariou, A., & Geri, G. (2016). Use of neuromuscular blockers during therapeutic hypothermia after cardiac arrest: A nursing protocol. *Critical Care Nurse, 36*(6), 33-40.

Braveman, P., Arkin, E., Orleans, T., Proctor, D., Acker, J., & Plough, A. (2018). What is health equity? *Behavioral Science and Policy, 4*(1), 1-14.

Brockett-Walker, C., Lall, M., Evans, D. D., & Heron, S. (2021). Racial bias among emergency providers: Strategies to mitigate its adverse effects. *Advanced Emergency Nursing Journal*, *43*(2), 89–101.

Burger, J. L., Parker, K., Cason, L., Hauck, S., Kaetzel, D., O'Nan, C., & White, A. (2010). Responses to work complexity: The novice to expert effect. *Western Journal of Nursing Research*, *32*(4), 497-510.

Cardarelli, R., & Chiapa, A. L. (2007). Educating primary care clinicians about health disparities. *Osteopathic Medicine and Primary Care*, *1*, 5.

Castrén, M., Silfvast, T., Rubertsson, S., Niskanen, M., Valsson, F., Wanscher, M., Sunde, K., & Task Force on Scandinavian Therapeutic Hypothermia Guidelines, Clinical Practice Committee Scandinavian Society of Anaesthesiology and Intensive Care Medicine. (2009). Scandinavian clinical practice guidelines for therapeutic hypothermia and post-resuscitation care after cardiac arrest. *Acta Anaestesiologica Scandinavica, 53*(3), 280-288.

Centers for Disease Control and Prevention. (2016, March 4). *Health care-associated infections*. https://www.cdc.gov/HAI/

Chamorrow, C., Borrallo, J. M., Romera, M.A., Silva, J. A., & Balandín, B. (2010). Anesthesia and analgesia protocol during therapeutic hypothermia after cardiac arrest: A systematic review. *Anesthesia and Analgesia*, *110*(5), 1328-1335.

Che, D., Li, L., Kopil, C. M., Liu, Z., Guo, W., & Neumar, R. W. (2011). Impact of therapeutic hypothermia onset and duration on survival, neurologic function, and neurodegeneration after cardiac arrest. *Critical Care Medicine, 39*(6), 1423-1430.

Child, R. J., Mentes, J. C., Pavlish, C., & Philips, L. R. (2014). Using Facebook and participant information clips to recruit emergency nurses for research. *Nurse Researcher, 21*(6), 16-21.

Chin, M. H., Walters, A. E., Cook S. C., & Huang, E. S. (2007). Interventions to reduce racial and ethnic disparities in health care. *Medical Care Research and Review: MCRR, 64*(5 Suppl), 7S-28S.

Clarke, B., Haze, N., Sly, J., Thomas, A., Ponte, P. R., & Jurgens, C. Y. (2020). Just-in-time safety training for N95 respirators. *Nursing Management (Springhouse), 51*(11), 17-22.

Davis, A. M., Vinci, L. M., Okwuosa, T. M., Chase, A. R., & Huang, E. S. (2007). Cardiovascular health disparities: A systematic review of health care interventions. *Medical Care Research and Review: MCRR*, *64*(5 Suppl), 29S–100S.

Deckard, M. E., &. Ebright, P. R. (2011). Therapeutic hypothermia after cardiac arrest: What, why, who, and how cooling patients can improve their neurologic outcome. *American Nurse Today*, *6*(7), 23-28.

Dumas, F., Grimaldi, D., Zuber, B., Fichet, J., Charpentier, J., Pène, F., Vivien, B., Varenne, O., Carli, P., Jouven, X., Empana, J. P., & Cariou, A. (2011). Is hypothermia after cardiac arrest effective in both shockable and nonshockable patients? Insights from a large registry. *Circulation, 123*(8), 877–886.

Dusek, G., Yurova, Y., & Ruppel, C. P. (2015). Using social media and targeted snowball sampling to survey a hard-to-reach population: A case study. *International Journal of Doctoral Studies, 10*, 279-299.

Elmer, J., & Rittenberger, M. (2020). *Initial assessment and management of the adult post cardiac arrest. Uptodate*. https://www.uptodate.com/contents/initial-assessment-and-management-of-the-adult-post-cardiac-arrest

Engle, R. L., Mohr, D. C., Holmes, S. K., Seibert, M. N., Afable, M., Leyson, J., & Meterko, M. (2019). Evidence-based practice and patient-centered care: Doing both well. *Health care Management Review*, *46*(3), 174–184. Advance online publication.

Gagnon, J., Gagnon, M. P., Buteau, R. A., Azizah, G. M., Jetté, S., Lampron, A., Simonyan, D., Asua, J., & Reviriego, E. (2015). Adaptation and evaluation of online self-learning modules to teach critical appraisal and evidence-based practice in nursing: An international collaboration. *Computers, Informatics, Nursing: CIN, 33*(7), 285-294.

Gawande, A. (2010). *The checklist manifesto: How to get things right*. Metropolitan Books.

Geocadin, R. G., Wijdicks, E., Armstrong, M. J., Damian, M., Mayer, S. A., Ornato, J. P., Rabinstein, A., Suarez, J. I., Torbey, M. T., Dubinsky, R. M., & Lazarou, J. (2017). Practice guideline summary: Reducing brain injury following cardiopulmonary resuscitation: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*, *88*(22), 2141–2149.

Gopal, D. P., Chetty, U., O'Donnell, P., Gajria, C., & Blackadder-Weinstein, J. (2021). Implicit bias in health care: Clinical practice, research and decision making. *Future Health care Journal*, *8*(1), 40–48.

Gravlee, C. C. (2020). Systemic racism, chronic health inequities, and COVID-19: A syndemic in the making?. *American Journal of Human Biology: The Official Journal of the Human Biology Council*, *32*(5), e23482.

Harman, F., Hasturk, A. E., Yaman, M., Arca, T., Kilinc, K., Sargon, M. F., & Kaptanoglu, E. (2012). Neuroprotective effects of propofol, thiopental, etomidate, and midazolam in fetal rat brain in ischemia-reperfusion model. *Childs Nervous System: ChNS: Official Journal.*

Hasnain-Wynia, R. (2006). Is evidence-based medicine patient-centered and is patient-centered care evidence-based? *Health Services Research*, *41*(1), 1–8.

Helman, S., Lisanti, A. J., Adams, A., Field, C., & Davis, K. F. (2016). Just-in-time training for high-risk low-volume therapies: An approach to ensure patient safety. *Journal of Nursing Care Quality, 31*(1), 33-39.

Hirsch, S. M., Bueno, E., & Tenure, K. C. (2020). Quick response codes: An innovative approach to just-in-time education. *Journal of Neuroscience Nursing, 52*(6), 308-310.

Holzer, M. (2010). Targeted temperature management for comatose survivors of cardiac arrest. *New England Journal of Medicine*, *363*(13), 1256–1264.

Hostler, D., Zhou, J., Tortorici, M. A., Bies, R. R., Rittenberger, J. C., Empey, P. E., Kochanek, P. M., Callaway, C. W., & Poloyac, S. M. (2010). Mild hypothermia alters midazolam pharmacokinetics in normal healthy volunteers. *Drug Metabolism and Disposition: The Biological Fate of Chemicals, 38*(5), 781–788.

Hypothermia after Cardiac Arrest Study Group. (2002). Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. *New England Journal of Medicine, 346*(8), 549-556.

Jain, S., & Iverson, L. M. (2021, June 20). Glasgow Coma Scale. *StatPearl*s [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK513298/

Joseph, P. (2018). Eliminating disparities and implicit bias in health care delivery by utilizing a hub-and-spoke model. *Research Ideas and Outcomes, 4*, e26370

Kilgannon, J. H., Roberts, B. W., Stauss, M., Cimino, M. J., Ferchau, L., Chansky, M. E., Dellinger, R. P., Parrillo, J. E., & Trzeciak, S. (2008). Use of a standardized order set for achieving target temperature in the implementation of therapeutic hypothermia after cardiac arrest: A feasibility study. *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine, 15*(6), 499-505.

Kim, F., Nichol, G., Maynard, C., Hallstrom, A., Kudenchuk, P. J., Rea, T., Copass, M., Carlbom, D., Deem, S., Longstreth, W. T., Jr., Olsufka, M., & Cobb, L. (2014). Effect of prehospital induction of mild hypothermia on survival and neurological status among adults with cardiac arrest: A randomized clinical trial. *JAMA, 311*(1), 45-52.

Kim, Y.-M., Youn, C. S., Kim, S. H., Lee, B. K., Cho, I. S., Cho, G. C., Jeung, K. W., Oh, S. H., Choi, S. P., Shin, J. H., Cha, K.-C., Oh, J. S., Yim, H. W., & Park, K. N. (2015). Adverse events associated with poor neurological outcome during targeted temperature management and advanced critical care after out-of-hospital cardiac arrest. *Critical Care*, *19*, 283.

Kochanek K. D., Xu, J., & Arias, E. (2020). *Mortality in the United States, 2019* (NCHS Data Brief No. 395). National Center for Health Statistics.

Koota, E., Kääriäinen, M., & Melender, H. (2018). Educational interventions promoting evidence-based practice among emergency nurses: A systematic review. *International Emergency Nursing. 41*(10).

Koyfman A. (2019). Targeted temperature management (therapeutic hypothermia). *The Heart.Org.*

Krueger, R.A., Casey, M.A., Donner J., Kirsch, S., and Maack J.N., "Designing and conducting focus group interviews: Social Analysis, Selected Tools and Techniques," *World Bank.* 36. 4-23. 2001.

Lau, B. D., Haider, A. H., Streiff, M. B., Lehmann, C. U., Kraus, P. S., Hobson, D. B., Kraenzlin, F. S., Zeidan, A. M., Pronovost, P. J., & Haut, E. R. (2015). Eliminating health care disparities with mandatory clinical decision support: The venous thromboembolism (VTE) example. *Medical Care, 53*(1), 18-24.

Lee, J. J., Wang, M. P., & Yang, S. C. (2021). Will the tobacco industry ultimately triumph in the midst of COVID-19 pandemic?: A call for nurses' action in tobacco control. *International Journal of Nursing Studies*, *115*, 103726.

Lewey, J., & Choudhry, N. K. (2014). The current state of ethnic and racial disparities in cardiovascular care: Lessons from the past and opportunities for the future. *Current Cardiology Reports, 16***,** 530.

Logan, A., Sangkachand, P., & Funk, M. (2011). Optimal management of shivering during therapeutic hypothermia after cardiac arrest. *Critical Care Nurse, 31*(6), e18-e30.

Lopez, L., Hart, L. H., & Katz, M. H. (2021). Racial and ethnic health disparities related to COVID-19. *JAMA*, *325*(8): 719–720.

Lundbye, J. B., Wallace, S. K., & Abella, B. S. (2012). *Therapeutic hypothermia after cardiac arrest: Clinical application and management.* Springer-Verlag.

Lyons, V. E., & Popejoy, L. L. (2014). Meta-analysis of surgical safety checklist effects on teamwork, communication, morbidity, mortality, and safety. *Western Journal of Nursing Research, 36*(2), 245–261.

McClellan, M., Brown, N., Califf, R. M., & Warner, J. J. (2019). Call to action: Urgent challenges in cardiovascular disease: A presidential advisory from the American Heart Association. *Circulation, 139*(9), e44–e54

McDonald, M. (2014). *The nurse educators guide to assessing learning outcomes* (3rd ed.). Jones & Bartlett Learning.

Mehta, S., Burry, L., Cook, D., Fergusson, D., Steinberg, M., Granton, J., Herridge, M., Ferguson, N., Devlin, J., Tanios, M., Dodek, P., Fowler, R., Burns, K., Jacka, M., Olafson, K., Skrobik, Y., Hébert, P., Sabri, E., Meade, M., … & Canadian Critical Care Trials Group FT. (2012). Daily sedation interruption in mechanically ventilated critically ill patients cared for with a sedation protocol: A randomized controlled trial. *JAMA*, *308*(19), 1985-1992.

Mensah, G. A. (2018). Cardiovascular diseases in African Americans: Fostering community partnerships to stem the tide. *American Journal of Kidney Diseases: The Official Journal of the National Kidney Foundation*, *72*(5 Suppl 1), S37–S42.

Merchant, R. M., Topjian, A. A., Panchal, A. R., Cheng, A., Aziz, K., Berg, K. M., Lavonas, E. J., Magid, D. J., & Adult Basic and Advanced Life Support, Pediatric Basic and Advanced Life Support, Neonatal Life Support, Resuscitation Education Science, and Systems of Care Writing Groups. (2020). Part 1: Executive summary: 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *142*(16 Suppl 2), S337–S357.

Mooney, M. R., Unger, B. T., Boland, L. L., Burke, M. N., Kebed, K. Y., Graham, K. J., Henry, T. D., Katsiyiannis, W. T., Satterlee, P. A., Sendelbach, S., Hodges, J. S., & Parham, W. M. (2011). Therapeutic hypothermia after out-of-hospital cardiac arrest evaluation of a regional system to increase access to cooling. *Circulation, 124*(2), 206-214.

Mosca, L., Benjamin, E. J., Berra, K., Bezanson, J. L., Dolor, R. J., Lloyd-Jones, D. M., Newby, L. K., Piña, I. L., Roger, V. L., Shaw, L. J., Zhao, D., Beckie, T. M., Bushnell, C., D'Armiento, J., Kris-Etherton, P. M., Fang, J., Ganiats, T. G., Gomes, A. S., Gracia, C. R., … & Wenger, N. K. (2011). Effectiveness-based guidelines for the prevention of cardiovascular disease in women—2011 update: A guideline from the American Heart Association. *Circulation*, *123*(11), 1243–1262.

Murad, M. H., Coto-Yglesias, F., Varkey, P., Prokop, L. J., & Murad, A. L. (2010). The effectiveness of self-directed learning in health professions education: A systematic review. *Medical Education, 44*(11), 1057–1068.

Nielsen, N., Hovdenes, J., Nilsson, F., Rubertsson, S., Stammet, P., Sunde, K., Valsson, F., Wanscher, M., Friberg, H., & Hypothermia Network. (2009). Outcome, timing and adverse events in therapeutic hypothermia after out-of-hospital cardiac arrest. *Acta Anaesthesiologica Scandinavica*, *53*(7), 926–934.

Nielsen, N., Wetterslev, J., Cronberg, T., Erlinge, D., Gasche, Y., Hassager, C., Horn, J., Hovdenes, J., Kjaergaard, J., Kuiper, M., Pellis, T., Stammet, P., Wanscher, M., Wise, M. P., Åneman, A., Al-Subaie, N., Boesgaard, S., Bro-Jeppesen, J., Brunetti, I., … & TTM Trial Investigators. (2013). Targeted temperature management at 33°C versus 36°C after cardiac arrest. *New England Journal of Medicine*, *369*(23), 2197–2206.

Nitta, K., Okamoto, K., Imamura, H. *et al.* A comprehensive protocol for ventilator weaning and extubation: a prospective observational study. *Journal of Intensive Care* **7,** 50 (2019).

Nolan, J. P., Maconochie, I., Soar, J., Olasveengen, T. M., Greif, R., Wyckoff, M. H., Singletary, E. M., Aickin, R., Berg, K. M., Mancini, M. E., Bhanji, F., Wyllie, J., Zideman, D., Neumar, R. W., Perkins, G. D., Castrén, M., Morley, P. T., Montgomery, W. H., Nadkarni, V. M., … & Hazinski, M. F. (2020). Executive summary: 2020 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. *Circulation*, *142*(16 Suppl 1), S2–S27.

Nuzzo, A., Peron, N., Voicu, S., Mégarbane, B., & Deye, N. (2018). Targeted temperature management for non-shockable cardiac arrests: the debate must go on. *Journal of Thoracic Disease*, *10*(3), 1304–1307.

Omairi, A. M., & Pandey, S. (2021). *Targeted hypothermia temperature management*. StatPearls Publishing LLC.

Panchal, A. R., Bartos, J. A., Cabañas, J. G., Donnino, M. W., Drennan, I. R., Hirsch, K. G., Kudenchuk, P. J., Kurz, M. C., Lavonas, E. J., Morley, P. T., O'Neil, B. J., Peberdy, M. A., Rittenberger, J. C., Rodriguez, A. J., Sawyer, K. N., Berg, K. M., & Adult Basic and Advanced Life Support Writing Group. (2020). Part 3: Adult basic and advanced life support: 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *142*(16 Suppl 2), S366–S468.

Peberdy, M. A., Callaway, C. W., Neumar, R. W., Geocadin, R. G., Zimmerman, J. L., Donnino, M., Gabrielli, A., Silvers, S. M., Zaritsky, A. L., Merchant, R., Vanden Hoek, T. L., Kronick, S. L., & American Heart Association. (2010). Part 9: Post-cardiac arrest care: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *122*(18 Suppl 3), S768–S786.

Pollock, J. S., Hollenbeck, R. D., Wang, L., Holmes, B., Young, M. N., Peters, M., Ely, E. W., McPherson, J. A., & Vasilevskis, E. E. (2016). Delirium in survivors of cardiac arrest treated with mild therapeutic hypothermia. *American Journal of Critical Care: An Official Publication, American Association of Critical Care Nurses, 25*(4), e81-e89.

Pronovost, P., & Vohr, E. (2010). *Safe patients, smart hospitals: How one doctor's checklist can help us change health care from the inside out*. Hudson Street Press.

Reviriego, E., Cidoncha, M. A., Asua, J., Gagnon, M. P., Mateos, M., Gárate, L., de Lorenzo, E., & González, R. M. (2014). Online training course on critical appraisal for nurses: Adaptation and assessment. *BMC Medical Education, 14*, 136.

Rice, H. Say, R., & Betihavas,V. (2018). The effect of nurse-led education on hospitalisation, readmission, quality of life and cost in adults with heart failure. A systematic review. *Patient Education and Counseling*, *101*(3), 363-374.

Saigal, S., Sharma, J. P., Dhurwe, R., Kumar, S., & Gurjar, M. (2015). Targeted temperature management: Current evidence and practices in critical care. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine*, *19*(9), 537–546.

Schefold, J. C., Storm, C., Krüger, A., Ploner, C. J., & Hasper, D. (2009). The Glasgow coma score is a predictor of good outcome in cardiac arrest patients treated with therapeutic hypothermia. *Resuscitation*, *80*(6), 658-662.

Schock, R. B., Janata, A., Peacock, W. F., Deal, N. S., Kalra, S., & Sterz, F. (2016). Time to cooling is associated with resuscitation outcomes. *Therapeutic Hypothermia and Temperature Management*, *6*(4), 208–217.

Scirica, B. M. (2013). Therapeutic hypothermia after cardiac arrest. *Circulation*, *127*(2), 244-250.

Smetana, Keaton, S., Roe, N. A., Doepker, B. A., & Jones, G. M. (2017). Review of continuous infusion neuromuscular blocking agents in the adult intensive care unit. *Critical Care Nursing Quarterly*, 40(4), 323-343.

.Sunde, K., Pytte, M., Jacobsen, D., Mangschau, A., Jensen, L. P., Smedsrud, C., Draegni, T., & Steen, P. A. (2007). Implementation of a standardized treatment protocol for post resuscitation care after out-of-hospital cardiac arrest. *Resuscitation, 73*(1), 29-39.

Taylor, H. A., Jr., Francis, S., Evans, C. R., Harvey, M., Newton, B. A., Jones, C. P., Akintobi, T. H., & Clifford, G. (2020). Preventing cardiovascular disease among urban African Americans with a mobile health app (the MOYO App): Protocol for a usability study. *JMIR Research Protocols*, *9*(7), e16699.

Testori, C., Sterz, F., Behringer, W., Haugk, M., Uray, T., Zeiner, A., Janata, A., Arrich, J., Holzer, M., & Losert, H. (2011). Mild therapeutic hypothermia is associated with favorable outcome in patients after cardiac arrest with non-shockable rhythms. *Resuscitation, 82*(9), 1162–1167.

Zajacova, A., & Lawrence, E. M. (2018). The relationship between education and health: Reducing disparities through a contextual approach. *Annual Review of Public Health*, *39*, 273–289.

Appendix A: Teachers College Columbia University Online Self-Learning Module

The purpose of this module is to provide RNs with information about therapeutic hypothermia (TH) and outline nursing care for the acute care of a patient post-cardiac arrest with a return to spontaneous circulation (ROSC) and depressed level of consciousness.

When you complete this course, you will be able to:

- Discuss current trends in TH and mild hypothermia management.
- Describe initial management of the TH patient in the Emergency Department.
- Utilizing the patient care checklist, a) describe how to implement an evidence-based "Therapeutic Hypothermia Post-Cardiac Arrest" protocol, b) ensure whether this protocol is appropriate for a specific patient, and c) ensure that the protocol is implemented correctly.
- Demonstrate an understanding of existing disparities in cardiac arrest treatment and care among racial and ethnic minorities.

Trends in Mild Therapeutic Hypothermia Post-Cardiac Arrest with ROSC and Depressed Level of Consciousness

Heart disease is the leading cause of death for both men and women in the United States. One consequence of heart disease is the potential for sudden cardiac arrest. The patient becomes unresponsive, pulseless, and breathless. Since the heart is not able to circulate blood, the vital organs are no longer receiving oxygen, and cell death starts to occur rapidly. If the heart is not returned to a normal perfusing rhythm through CPR utilizing chest compressions, external defibrillation, oxygenation, and, often, medication such as epinephrine, the patient will die.

Every year, more than 350,000 individuals suffer from out-of-hospital sudden cardiac arrest. Bystander CPR is provided to approximately 46% of these people. Of those people who receive CPR, the survivor rate is a dismal 12%. Worse, of those people who do survive to discharge, many suffer poor prognoses and poor quality of life due to complications such as diminished neurological function (Merchant et al., 2020). When evaluating the outcomes of patients who suffer a cardiac arrest and survive long enough to be admitted to an acute care facility, the prognosis can be poor. These patients suffer from "brain injury, myocardial dysfunction, systemic ischemia and reperfusion injury" (Holzer, 2010, p. 1256). This compilation of co-morbidities that result from cardiac arrest is understood as "post-cardiac arrest syndrome" and is so severe and debilitating that only about one-third of these patients will "survive to hospital discharge" (p. 1256). One of the most severe indicators of poor prognosis is neurological. Research indicates that "80% of patients remain comatose for more than 1 hour after resuscitation," and less than half of these patients will "have a good neurologic recovery" (p. 1256).

TH initiated post-cardiac arrest with return of spontaneous circulation (ROSC) administered to individuals who do not regain consciousness has been proven to positively affect neurological outcomes. TH is the deliberate reduction of core body temperature to a range of 90-92°F for 12 to 24 hours post-cardiac arrest for patients who have been successfully resuscitated but fail to regain consciousness following CPR. What may occur after successful resuscitation is the return of a spontaneous heartbeat with a regular, perfusing rhythm, but the patient remains in a comatose state. The goal is to minimize neurological damage during the recovery phase by decreasing the metabolic demands of the brain and minimizing the inflammatory response immediately post-cardiac arrest.

During cardiac arrest, the brain suffers from anoxia due to a lack of circulation. This causes the brain to utilize anaerobic metabolism, releasing calcium and glutamate into the brain cells and increasing cellular excitability, further increasing hypoxemia and cerebral edema. The blood-brain barrier is disrupted, resulting in increased fluid in the brain and worsening cerebral edema. After successful resuscitation, cerebral blood flow is restored, which can lead to cerebral reperfusion injury. Cell death from the anoxia that occurred during the arrest triggers an inflammatory response, releasing neutrophils and macrophages to eliminate the dead cells. Cell damage continues, worsening the inflammatory response and leading to increased cerebral edema (Deckard & Ebright, 2011). The brain can only "tolerate anoxia for up to 2-6 minutes"; if circulation is not restored, the damage becomes irreversible (Lundbye et al., 2012, p. 202). After successful CPR, the reperfusion may "provoke a deleterious chemical cascade" that includes inflammation and "devastating neurological consequences" (p. 202). This cascade of reactions can be counteracted by utilizing TH to reduce the inflammatory response, decrease cerebral metabolism, and reduce cerebral edema.

Research suggests that TH "counteracts neuroexcitation in brain cells by stabilizing calcium and glutamate release," thereby reducing cellular death (Deckard & Ebright, 2011, p. 40). In addition, TH "suppresses the inflammatory process", thereby "reducing cerebral edema" (p. 40). Cerebral metabolism decreases "6% to 10% for every degree Celsius that body temperature drops"; therefore, as brain tissue uses less energy, it needs less oxygen (p. 41).

There are few contraindications for TH. However, medical conditions in which the risk may be excessive include documented intracranial hemorrhage, severe hemorrhage, hypotension despite use of multiple vasopressors, severe sepsis, and pregnancy. Since most patients with cardiac arrest "die due to neurological consequences for which TH is the only proven beneficial

therapy, the decision to withhold TH must be carefully weighed" (Scirica, 2013, p. 246). The current literature is mixed on the efficacy of TH and non-shockable rhythms. Still, the risk of TH is minimal when compared to the risk of neurological deficits and should be administered to anyone who is successfully resuscitated but remains comatose. The current standards of the AHA advocate for the inclusion of all rhythms in TH therapy.

Nurses play a significant role in educating patients and the public about the risk factors of cardiac disease and how to modify them. The challenge is to educate those who have a poor understanding of heart disease and its consequences. Nurses are able to provide education about cardiac arrest, and they play an essential role in educating the public to learn and administer CPR. Prompt resuscitation and medical interventions like TH, when administered promptly and safely, can prevent or minimize neurological damage.

Health Disparities and Nursing's Role

Health disparities exist any time there is not fair and equal access to health care among groups of individuals to obtain their full health potential. There need to be equal access, equal utilization, equal outcomes, and equal distribution to available care as dictated by health needs (Braveman et al., 2018). Unfortunately, racial/ethnic health disparities exist in cardiac care. Heart disease is the number one killer of both men and women, but while health care and clinical outcomes in cardiovascular disease are improving in America, differences in clinical outcomes persist between minority patients and whites. This discrepancy persists, even when confounding factors such as income and education are considered. The causes of health disparities are complex, and much research has been focused on understanding causes and improving quality of care. For instance, racial/ethnic minority patients are "less likely to receive cardiovascular therapies of proven benefit, especially timely evidence-based interventions that are higher cost or

higher intensity," leading to poorer clinical outcomes and higher rates of morbidity and mortality (Lewey & Choudhry, 2014, p. 530). Moreover, although heart disease is the leading cause of death in women, they were less likely to receive therapeutic procedures such as TH after arrest, demonstrating that sex-based disparities also exist in cardiac care (Kim et al., 2015). One potential reason for this disparity is that women are less likely to experience cardiac arrest due to a shockable rhythm and more likely to suffer from asystole of PEA (Kim et al., 2015). With the AHA recommending that all arrhythmias be evaluated for TH post-cardiac arrest, the potential exists that more women will receive this intervention.

To make certain all people have access to the same quality of care and to minimize disparities in clinical outcomes, protocols and checklists based on evidence-based care need to be developed. Research published by the NIH looked at programs to reduce racial and ethnic disparities and identified "nurse-led interventions" as "promising intervention strategies" to reduce health disparities (Chin et al., 2007, p. 10). Many reasons were cited for nursing's success with improved delivery of care and patient outcomes, such as time spent with patients, teamwork, and patient-centered and culturally appropriate care (p. 10). Nursing interventions have demonstrated improved outcomes in cardiovascular care for minorities, and the nursing profession is poised to have a great impact on health disparities. According to authors Lewey and Choudhry (2014), "nurse outreach and management has been shown to be effective for patients with a variety of cardiovascular conditions, especially in minority communities" (p. 529).

Health disparities may be addressed using evidence-based protocols and checklists. Protocols and checklists based on best practice and research can reduce bias and stereotyping by ensuring that optimal care is accessible to all by helping the clinician avoid "conscious or unconscious decisions" based on prejudice or personal beliefs (Cardarelli & Chiapa, 2007, p. 7).

Improving health care quality for all individuals with heart disease can be facilitated by the standardization of evidence-based care through best practice and quality control (Lewey & Choudhry, 2014). Literature reviews regarding health disparities have identified nurse-led programs to be effective intervention strategies for reducing health disparities (Chin et al., 2007). Moreover, the CDC recommends using evidence-based interventions to reduce racial and ethnic health disparities (Centers for Disease Control and Prevention, 2016). Research has demonstrated that nursing interventions are successful in reducing health disparities in minorities. In addition, research supports the use of protocols and checklists to reduce health disparities. However, little research has been conducted on patient outcomes regarding health disparities when nurses use protocols and checklists in acute and emergency care to provide intensive interventions such as TH to critically ill patients. Therefore, this self-learner includes a nurse-directed protocol and checklist to assist the nurse in providing efficient, safe, and equitable nursing care to patients undergoing TH post-cardiac arrest.

Appendix B: Nursing Care Protocol for Therapeutic Hypothermia

Inclusion/Exclusion Criteria

Inclusion

- Witnessed cardiac arrest with initial cardiac rhythm of ventricular fibrillation, ventricular tachycardia, asystole, and/or PEA with initiation of cardiopulmonary resuscitation within 5 minutes of arrest
- Return of spontaneous circulation within 60 minutes of initial arrest
- Presumed cardiac origin of arrest
- Patient is unable to follow commands, does not open eyes to painful stimulus, and Glasgow Coma Scale (GCS) less than or equal to 8 after return of spontaneous circulation

Exclusion

- DNR orders
- CPR greater than 45 minutes with no ROSC
- Recurrent ventricular tachycardia or fibrillation despite appropriate therapy
- Comatose before cardiac arrest
- Responsive to verbal commands after ROSC

Initiation of Hypothermia: *Note: Patient will require intubation and mechanical ventilation prior to initiation of protocol and for length of therapy.
Perform the Glasgow Coma Scale and document. If score is* less than 8, *consider mild therapeutic hypothermia protocol.

Equipment:
The following equipment should be immediately available in the Emergency Department/ICU/CCU for TH:
1) Hypothermia unit
2) Disposable hypothermia blanket(s)/wraps
3) Disposable rectal temperature probe

Procedure
This protocol is time-sensitive; therefore, hypothermia devices must remain immediately available in both the Emergency Department and Intensive Care Units.
Obtain physician's order for hypothermia protocol.
Administer sedation as prescribed by physician.

Sedation Administration. ***Nurses must be aware that decreases in core temperature significantly affect drug metabolism*. Lower body temperatures require titration of**

continuous infusions at lower dose ranges. All medication must be administered using a continuous infusion pump.

Sedation Infusion

- Mix IV **Midazolam (Versed) drip**
  - Remove 50 ml from a 250 ml 0.9% NS bag
  - Add 250 mg of 5 mg/ml Midazolam to the bag
  - **Resulting concentration is 250 mg Midazolam to 250 ml 0.9% NS (1mg/ml)**
  - Start Midazolam infusion at 0.125 mg/kg/hr

OR

- **Propofol (**Diprovan) is an injectable white emulsion
- Initial infusion should be 5 mcg/kg/min (0.3 mg/kg/hr) for at least 5 minutes to allow for onset of medication
- Titrate to maintain sedation with increments of 5 to 10 mcg/kg/min (0.3 to 0.6 mg/kg/hr) every 5 to 10 minutes may be used until desired clinical effect is achieved
- Maintenance rates of 5 to 50 mcg/kg/min (0.3 to 3 mg/kg/hr) or higher may be required. Administration should not exceed 4 mg/kg/hr

Analgesia Infusion

- Mix IV Fentanyl drip (Analgesia Infusion)
  - Add 2 mg of Fentanyl to 100 ml 0.9% Normal Saline (remove 40 ml from 100 ml 0.9% Normal Saline bag, add 2 mg of Fentanyl to 100 ml 0.9% NS)
- **Resulting concentration is 20 mcg Fentanyl/ml**
  - Start Fentanyl infusion at 2 mcg/kg/hr

(Elmer & Rittenberger, 2020)

Initiate Hypothermia

- Place hypothermia vest and leg wraps on patient. If unavailable, place a blanket under patient and insert rectal temperature-monitoring probe. If second blanket is available, place second blanket over patient. Note: If no rectal temperature probe is available, obtain baseline rectal temperature
- Set target patient temperature of cooling device to 32–34°C (89–96.8°F). If unable to reach target temperature within 4 hours, notify physician. **Goal is less than 4 hours to target temperature**
- Hypothermia devices will remain in place for 12–24 hours for appropriate hypothermia to occur
- Patient will be admitted to ICU for observation and careful management
- Obtain baseline admission labs
- Following 12–24 hours of hypothermia treatment, the patient is to be warmed slowly (0.25 to .5°C/hr) over 8 hours via blanket

Shivering Protocol
Shivering is the body's response to hypothermia. As the body attempts to correct the hypothermia, shivering increases the metabolic rate and oxygen demand and causes cerebral edema.

Administration of NMBA should be on an as-needed basis, and a continuous infusion should only be considered when shivering is refractory to all other treatments. Patients must be intubated and adequately sedated before a paralytic is injected.

- Administer Vecuronium 0.1 mg/kg IV Q2h **PRN** to eliminate shivering (may need to lower dose in patients with renal disease)

Sedation should continue to the end of the rewarming phase. When target temperature is achieved (37°C or 98.6°F) during normothermic phase, wean off sedation

Treatment Considerations:

- MAP should be maintained between 65 and 100 mmHg
- Consider requesting an arterial line for BP monitoring and blood drawing
- Consider requesting a triple lumen central venous catheter for fluids and medications
- Patient should be maintained in a normoglycemic state
- All IV solutions should be glucose-free during cooling and warming phases (certain medications such as IV Levophed must be mixed in D5W)
- No heated humidification on ventilator
- Maintain PO2 from 90–100 mmHg with normal pH

Monitoring During Cooling Phase

- Monitor rectal temperature and record every (1) hour
- Maintain patient temperature between 32–34°C using automatic mode on hypothermia machine (may consider temps of 35–36°C for patients who cannot tolerate lower temperatures)
- VS and Neuro Status every 15 minutes X 1 hour, then every (1) hour for length of cooling/rewarming process
- Fluid status should be monitored and maintained due to cold diuresis during hypothermia
- Continuous cardiac monitoring for arrhythmias (bradycardia common)
- Finger-stick blood sugar every six (6) hours. Glucose should be at levels less than 150mg/dL. If refractory hyperglycemia, then institute glucose monitoring every 4 hours
- Basic Metabolic Profile at 12- and 24-hour mark (watch for signs of hypokalemia during cooling, and potassium should be replaced as needed for potassium less than 3.5 (hold potassium replacements prior to rewarming because of risk of hyperkalemia as potassium shifts out of cells)
- CBC at 12- and 24-hour mark
- Check skin integrity every 2 hours while cooling and rewarming, assess for burns/frostbite, potential breakdown

- Blood pressure assessed every 15 minutes for first 2 hours during warming phase due to increased risk of hypotension related to vasodilatation, then hourly
- Vital signs and neuro assessment every hour
- Paralytic treatment to be discontinued 4 hours after the warming phase is started

Rewarming phase
After 12–24 hours (per MD order), the rewarming process occurs. Rapid rewarming should be avoided to allow for temperature regulation and to avoid adverse effects, such as changes in intracranial pressure and hemodynamic instability. The rewarming should occur at .25–.5°C/hr to normothermia

- The patient is to be warmed slowly (0.25–.5°C/hr) over 8 hours via blanket.

Standard ICU care
Nursing care should include frequent turning and positioning, oral care, use of ventilator bundles, maintain head of bed at 30 degrees, strict input and output monitoring, and sterile technique regarding catheter care. Strict glucose control, peptic ulcer and deep vein prophylaxis should be considered for these patients. All other patient treatments/interventions are to continue as ordered by physician.

Family/Significant Other Education: Education regarding the purpose of the hypothermia protocol and the importance of maintaining hypothermia for 24 hours post-cardiac arrest should be provided. Education should include the following at minimum:

- Explanation of TH and the need for sedation and paralysis
- What to anticipate for the initial 24 hours of mild hypothermia
- Explanation of the rewarming phase
- Responses to any questions regarding the patient's care
- Emotional support

Appendix C: Glasgow Coma Scale

Eye Opening Response

• Spontaneous – open with blinking at baseline 4 points

• To verbal stimuli, command, speech 3 points

• To pain only (not applied to face) 2 points

• No response 1 point

Verbal Response

• Oriented 5 points

• Confused conversation, but able to answer questions 4 points

• Inappropriate words 3 points

• Incomprehensible speech 2 points

• No response 1 point

Motor Response

• Obeys commands for movement 6 points

• Purposeful movement to painful stimulus 5 points

• Withdraws in response to pain 4 points

• Flexion in response to pain (decorticate posturing) 3 points

• Extension response in response to pain (decerebrate posturing) 2 points

• No response 1 point

Categorization: Coma: No eye opening, no ability to follow commands, no word verbalizations (3-8)

(Jain & Iverson 2021)

Appendix D: Nursing Care Checklist for Therapeutic Hypothermia

Initiation of Hypothermia:

- **Patient must be intubated and on mechanical ventilation prior to initiation of protocol and for length of therapy.**
- Perform the Glasgow Coma Scale and document in chart. If score is less than 8, consider mild therapeutic hypothermia protocol.
- **Gather Equipment:**

  The following equipment should be immediately available in the Emergency Department/ICU and is required for this protocol:
  1) Hypothermia unit
  2) Disposable hypothermia blanket(s)/wraps
  3) Disposable rectal temperature probe

Nursing Procedure

✓ **Obtain physician's order for hypothermia protocol**

✓ **Administer sedation and analgesia as prescribed by physician**

Sedation Administration

***Nurses must be aware that decreases in core temperature significantly affect drug metabolism*.** Lower body temperatures require titration of continuous infusions at lower dose ranges. All medication must be administered using a continuous infusion pump.

Sedation Infusion

1. **Mix Sedation**

   IV **Midazolam (Versed) drip**
   - Remove 50 ml from a 250 ml 0.9% NS bag
   - Add 250 mg of 5 mg/ml Midazolam to the bag
   - **Resulting concentration is 250 mg Midazolam to 250 ml 0.9% NS (1 mg/ml)**
   - Start Midazolam infusion at 0.125 mg/kg/hr

   OR

   IV **Propofol (Diprovan)**
   - Initial infusion should be 5 mcg/kg/min (0.3 mg/kg/hr) for at least 5 minutes
   - Titrate to maintain sedation with subsequent increments of 5 to 10 mcg/kg/min (0.3 to 0.6 mg/kg/hr) over 5 to 10 minutes may be used until desired clinical effect is achieved
   - Maintenance rates of 5 to 50 mcg/kg/min (0.3 to 3 mg/kg/hr) or higher may be required. Administration should not exceed 4 mg/kg/hr

Analgesia Infusion

1. Mix IV Fentanyl drip (Analgesia Infusion)
   - Add 2mg of Fentanyl to 100 ml 0.9% Normal Saline (remove 40 ml from 100 ml 0.9% Normal Saline bag, add 2 mg of Fentanyl to 100 ml 0.9% NS)
   - **Resulting concentration is 20 mcg Fentanyl/ml**
   - Start Fentanyl infusion at 2 mcg/kg/hr

Initiate Hypothermia

- Place hypothermia vest and leg wraps on patient; if unavailable, place a blanket under patient and insert rectal temperature monitoring probe. If second blanket is available, place second blanket over patient. Note: If no rectal temperature probe is available, obtain baseline rectal temperature
- Set target patient temperature of cooling device to 32–34°C (89–96.8°F). If unable to reach target temperature within 6 hours, notify physician. **Goal is 4 hours or less to target temperature**
- Hypothermia devices will remain in place for 12–24 hours for appropriate hypothermia to occur
- Obtain baseline admission labs
- Following 12–24 hours of hypothermia treatment, the patient is to be warmed slowly (0.25–.5°C/hr) over 8 hours via blanket

Shivering protocol

Shivering is the body's response to hypothermia. As the body attempts to correct the hypothermia, shivering increases the metabolic rate and oxygen demand and causes cerebral edema.

Administration of NMBA should be on an as-needed basis, and a continuous infusion should only be considered when shivering is refractory to all other treatments. Patients must be intubated and adequately sedated before a paralytic is injected.

- Administer Vecuronium 0.1 mg/kg IV Q2h **PRN** to eliminate shivering (may need to lower dose in patients with renal disease)

Sedation should continue to the end of the rewarming phase. When target temperature is achieved (37°C or 98.6°F) during normothermic phase, wean off sedation

Monitor through treatment

- MAP should be maintained between 65 and 100 mmHg
- Consider requesting an arterial line for BP monitoring and blood drawing
- Consider requesting a triple lumen central venous catheter for fluids and medications
- Patient should be maintained in a normoglycemic state
- All IV solutions should be glucose-free during cooling and warming phases unless otherwise specified by manufacturer, such as Levophed
- No heated humidification on ventilator
- PO2 should be maintained from 90–100 mmHg with normal pH
- Urinary catheter to straight drainage with strict I&O

Monitoring During Cooling Phase

- Monitor rectal temperature and record every (1) hour
- Maintain patient temperature at 32–34°C using automatic mode on hypothermia machine
- VS and Neuro Status every 15 minutes X 1 hour, then every (1) hour for length of cooling/rewarming process
- Fluid status should be monitored and maintained due to cold diuresis during hypothermia
- Continuous cardiac monitor for arrhythmias (bradycardia common)
- Finger-stick blood sugar every six (6) hours. Glucose should be at levels less than 150mg/dL. If refractory hyperglycemia, glucose monitoring every four hours

- Basic Metabolic Profile and CBC at 12- and 24-hour mark
- Check skin integrity every 2 hours while cooling or rewarming, assess for burns/frostbite

Rewarming Phase
After 12–24 hours (per MD order), the rewarming process occurs. Rapid rewarming should be avoided to allow for temperature regulation and to avoid adverse effects, such as changes in intracranial pressure and hemodynamic instability. The rewarming should occur at .25–.5°C/hr to normothermia

- ***Paralytic treatment to be discontinued 4 hours after the warming phase is started***
- The patient is to be warmed slowly (0.25–.5°C/hr) over 8 hours via blanket
- Monitor rectal temperature and record every (1) hour
- Warm to normothermia of 37°C
- Blood pressure assessed every 15 minutes for first 2 hours during warming phase due to increased risk of hypotension related to vasodilatation, then hourly
- TPR and Neuro Status every (1) hour for length rewarming process
- Continuous cardiac monitoring for arrhythmias
- Finger-stick blood sugar every six (6) hours. Glucose should be at levels less than 150mg/dL. If refractory hyperglycemia, glucose monitoring every 4 hours
- Basic Metabolic Profile and CBC at 12- and 24-hour mark
- Check skin integrity every 2 hours while rewarming, assess for burns/frostbite

Standard ICU care
Nursing care should include frequent turning, oral care, use of ventilator bundles, head of bed at 30 degrees, strict input and output, sterile technique when manipulating catheters, glucose level control, and peptic ulcer and deep vein prophylaxis. All other patient treatments/interventions are to continue as ordered by physician.

Family/Significant Other Education: Families should be given education regarding the purpose of the hypothermia protocol and the importance of maintaining hypothermia for 12–24 hours post-cardiac arrest. Education should include the following at minimum:

- Explanation of hypothermia and the need for sedation and paralysis
- What to anticipate for the initial 24 hours of mild hypothermia
- Explanation of the rewarming phase
- Responses to any questions the family may have

Appendix E: Therapeutic Hypothermia Online Self-Learning Module Post-Evaluation

1. What is the leading cause of death in the United States?
    A. Stroke
    B. Heart Disease
    C. Cancer

2. After successful resuscitation post-cardiac arrest, 80 percent of patients will suffer from complications related to
    A. Unstable angina
    B. Return of ventricular fibrillation
    C. Failure to regain consciousness

3. One treatment shown to have a positive outcome in patients post-cardiac arrest with ROSC who do not regain consciousness is
    A. Cardioversion
    B. Coronary angioplasty
    C. Therapeutic hypothermia

4. During resuscitation, the body reacts by producing an inflammatory response leading to cerebral edema. TH counteracts this process by reducing the inflammatory response, decreasing cerebral metabolism, and
    A. Reducing cerebral edema
    B. Increasing heart rate
    C. Widening pulse pressure

5. When determining inclusion criteria for TH, which cardiac arrhythmia(s) are included in the protocol?
    A. Asystole
    B. Ventricular fibrillation
    C. Pulseless ventricular tachycardia
    D. All of the above

6. A nurse assessing the level of consciousness of a patient for eligibility for inclusion in the TH protocol uses which standardized scale?
    A. NIH stroke scale
    B. Glasgow coma scale
    C. Train-of-Four

7. Which medications are used in TH for sedation?
    A. Morphine or Demerol
    B. Valium or Ativan
    C. Propofol or Versed

8. What is the target temperature range for TH?
    A. 36–37 degrees C
    B. 32–34 degrees C
    C. 30–32 degrees C

9. What is the optimal time span to reach the targeted temperature in TH?
    A. Less than 12 hours
    B. Less than 6 hours
    C. Less than 4 hours

10. Why is shivering considered an adverse effect of TH?
    A. Shivering raises the patient's core temperature.
    B. Shivering increases the pulse pressure.
    C. Shivering can cause a decreased pulse rate.

11. A client undergoing TH begins to shiver during the cooling process. Which of these actions would be appropriate for a nurse to take?
    A. Discontinue cooling therapy and call physician
    B. Increase temperature of cooling blanket
    C. Administer NMBA as ordered to control shivering

12. How many hours is TH maintained after the initiation of cooling?
    A. 3–6 hours
    B. 12–24 hours
    C. 24–48 hours

13. For a patient undergoing TH, at what rate per hour in degrees of temperature should the patient be rewarmed to normothermic?
    A. 1–1.5 degrees C
    B. 0.5–1.0-degree C
    C. 0.25–0.5 degrees C

14. The patient undergoing TH is entering the rewarming phase. The nurse recognizes that rapid rewarming should be avoided to prevent which complications?
    A. Increased intracranial pressure
    B. Hemodynamic instability
    C. All the above

15. A nurse is caring for a patient undergoing TH post-resuscitation from cardiac arrest. As the body temperature lowers, the patient starts shivering. Before administering any medication, what does the nurse need to know about the effect of lowering the body's core temperature on medication metabolism?
    A. Lower body temperatures require titration of medication infusions at lower dose ranges
    B. Lower body temperatures require titration of medication infusions at higher dose range
    C. Lower body temperature has no effect on drug metabolism

16. Health disparities exist any time there is not fair and equal access to health care among groups of individuals to obtain their full health potential. Which statement(s) support this?
    A. Minorities are less likely to receive cardiovascular therapies that are expensive or more invasive
    B. Women are more likely than men to receive therapeutic procedures such as TH after arrest, demonstrating that sex-based disparities exist in cardiac care
    C. All the above

17. Research demonstrates the nursing profession is in a unique position to reduce racial and ethical disparities. Which of the following statements support this research?
    A. Nursing care is patient-centered
    B. Nurses provide culturally appropriate care
    C. Nurses utilize teamwork in caring for patients
    D. All the above

18. Evidence-based care, when standardized, may help reduce racial and ethnic disparities by removing bias in the delivery of care. Which of the following statements are true?
    A. Evidence-based, standardized care based on best practices and research can reduce bias and stereotyping by ensuring the disease is treated, not the individual.
    B. Evidence-based, standardized care ensures optimal care is accessible to all by helping the clinician to avoid decisions based on prejudice or personal beliefs.

19. How do nursing protocols and checklists facilitate the delivery of care in complex therapies such as TH?
    A. Protocols and checklists based on best practices and research can reduce bias and stereotyping by ensuring the disease is treated, not the individual.
    B. Protocols and checklists ensure optimal care is accessible to all by helping the clinician to avoid decisions based on prejudice or personal beliefs.
    C. Using established guidelines of care, such as protocols and checklists, ensures optimal care is delivered in a safe and time-sensitive manner by providing resources to nurses who must deliver difficult intensive care infrequently.

20. All nursing care includes health education for the patient, family, and significant others. The education for patients undergoing TH should include an explanation of hypothermia and the need for sedation and paralysis, as well as
    A. Responses to any questions the family may have
    B. What to anticipate for the initial 24 hours of mild hypothermia
    C. Explanation of the rewarming phase
    D. All above

Appendix F: Online Self-Learning Module Evaluation

Please answer the following questions:

- What is your gender?
- What is your race?
- How many years have you practiced as an RN?
- Have you ever cared for a patient undergoing therapeutic hypothermia?
- Is your work primarily with urban, suburban, or rural populations?
- What are your attitudes/beliefs/fears toward or about implementing new protocols?

Using the Likert scale, please rate the following questions.

5 Strongly agree
4 Somewhat agree
3 Neutral
2 Somewhat disagree
1 Strongly agree

1. The patient care checklist will assist you as an RN to identify:

   a) how to implement an evidence-based "Therapeutic Hypothermia Post-Cardiac Arrest" protocol,

   b) whether this protocol is appropriate for a specific patient, and

   c) that the protocol is implemented correctly.

2. This online self-learning module will assist you as an RN to provide care for patients undergoing therapeutic hypothermia post-cardiac arrest with return to spontaneous circulation and depressed level of consciousness.

3. After completing the self-learner, do you better recognize existing disparities in cardiac arrest treatment and care among racial and ethnic groups?

4. The nursing profession is positioned to help minimize health disparities by using tools such as nursing protocols and checklists based on evidence-based research to provide best care.

Appendix G: Results for Research Aim 3A

Table 1. *Descriptive Statistics* (N = 60)

Condition	N
TH (Treatment)	29
Targeted Temperature Management (Control)	31
Gender	
Male	9
Female	51
Years of Experience	
0-5	13
6-10	9
11+	38
Age Group	
20-35	13
36-50	20
51+	27
Previous Experience in TH	
Yes	37
No	23

Scores by Condition	Mean	SD	Median	Min	Max
Treatment	18.379	2.815	19	14	20
Control	14.387	3.138	14	9	19

Model Summary:

Regression Test Result

F	p	R	R^2 (Adjusted)
12.574	< .001	0.691	0.440

Table 2. *Linear Regression Results*

Effect	B	SE	95% CI		p
			Lower Bound	Upper Bound	
Intercept	20.327	2.413	15.491	25.163	<.001
Condition (1 = Control, 2 = Treatment	3.865	.634	2.594	5.137	<.001
Gender (1 = Female)	1.725	.886	-.051	3.502	.057
Experience in TH (1 = No, 2 = Yes)	-1.132	.649	-2.432	.168	.087
Experience Over 6 Years (1 = No, 2 = Yes)	.625	.776	-.931	2.181	.424

Table 3. *Survey Question Responses*

The patient care checklist will successfully assist you as a registered nurse to a) implement an evidence-based "Therapeutic Hypothermia Post Cardiac Arrest" protocol, b) determine whether this protocol is appropriate for a specific patient, and c) ensure that the protocol is implemented correctly.					
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
%	76.7	18.3	3.3	0	1.7
This online self-learning module will assist you as a registered nurse to provide care for patients undergoing TH post-cardiac arrest with return to spontaneous circulation and depressed level of consciousness.					
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
%	66.7	0	25.0	5.0	3.3
The nursing profession is positioned to help minimize health disparities by using tools such as nursing protocols and checklists based on evidence-based research to provide best care.					
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
%	78.3	21.7	0	0	0
When implementing new protocols for patient care, does the hospital provides adequate training?					
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
%	35.6	32.2	23.7	3.4	5.1
After completing the self-learner, you are better able to recognize existing disparities in cardiac arrest treatment and care among racial and ethnic groups.					
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
%	60.0	25.0	6.7	5.0	3.3