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Implementation of a Conductive Fabric Warming Mattress to Maintain Normothermia in Cesarean Deliveries

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Copyright Acknowledgement Statement

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Abstract

Phase II Site: Naval Medical Center, Portsmouth, VA

Project Title: Implementation of a Conductive Fabric Warming Mattress to Maintain Normothermia in Cesarean Deliveries

Authors: Bokan, M., Camp, J., & Nagle, K.

Background or Problem/Issue: Inadvertent perioperative hypothermia (IPH) occurs in parturients receiving neuraxial anesthesia for cesarean delivery. IPH occurs secondary to neuraxial-induced vasodilation of blood vessels shifting warm blood from the core to the cooler peripheral tissues leading to a reduced core body temperature. This can increase postoperative complications for parturients including, decreased maternal-infant bonding and increased length of hospital stays and healthcare costs.

Clinical Question: In scheduled cesarean deliveries at NMCP, does the use of a conductive fabric warming mattress compared to usual practice, reduce postoperative hypothermia?

Evidence-based solution: To implement a conductive fabric warming mattress during scheduled cesarean deliveries to maintain perioperative normothermia.

Project Design: A pre- and post-implementation process improvement design was utilized. Temperature data was collected on scheduled cesarean deliveries over a two month period. An educational session on IPH and introduction to the conductive fabric warming mattress was delivered to anesthesia providers and labor and delivery registered nurses and ancillary staff. After implementation, a similar set of temperature data for scheduled cesarean deliveries. Data was collected on pre and postoperative temperature, type of warming device (if used), use of intraoperative temperature monitoring, and time until a temperature is taken after arrival in the post-anesthesia care unit (PACU). The comparison between pre- and post-implementation data sets was analyzed using chi-squared and independent samples t-tests.

Analysis of the Results: The change in temperature decline was not statistically significant, and the implementation of the conductive fabric warmer did improve postoperative temperatures more than usual management. However, we did find that our biggest impact was on compliance among anesthesia providers and the labor and delivery nurses.

Organizational Impact/Implications for Practice: The conductive fabric warming mattress is an additional tool for anesthesia providers for preventing perioperative hypothermia; the conductive fabric warming mattress is readily available on the operating room table before each cesarean delivery. Utilization of the conductive fabric warming mattress allows for more continuous use than with the current practice of forced air warming devices (FAW), which were inconsistently utilized by anesthesia providers during cesarean deliveries. Maintaining normothermia has been shown to improve the patient experience and increase patient satisfaction scores. Maintaining normothermia supports the DHA's Quadruple Aim of providing better care and improved readiness at lower cost.

Introduction

Inadvertent perioperative hypothermia (IPH) is defined as a central body temperature below 36° Celsius during the surgical period and is a common complication after general anesthesia. IPH occurs due to the suppression of temperature regulation mechanisms from anesthesia and prolonged exposure to cold operating room temperatures (Warttig, Alderson, Campbell, & Smith, 2014; Madrid et al., 2016). A 1-2^{o} Celsius decrease in temperature can lead to increased blood loss, surgical site infections, myocardial ischemia, shivering, and prolonged length of hospitalization (Roder, 2011; Madrid et al., 2016). Parturients receiving neuraxial anesthesia during cesarean deliveries are also at risk for IPH secondary to vasodilation of blood vessels shunting warm blood from the core to the peripheral tissues, thereby reducing core body temperature (Shaw et al., 2017). Maternal hypothermia is associated with increased rates of infant respiratory distress, hypoglycemia, and neonatal mortality in preterm infants (Allen & Habib, 2018). Shivering can also impair parturients' comfort and delay the initiation of breastfeeding (Munday et al., 2014).

A proposed solution to IPH during cesarean deliveries is the implementation of a conductive fabric warming mattress intraoperatively. The conductive fabric warming mattress is placed on the operating room table and provides active warming throughout the cesarean delivery.

Significance of the Problem

It is estimated that 70% of surgical patients experience IPH (Edis, 2015). In obstetrics, 94% of all cesarean deliveries are performed using neuraxial techniques, and the incidence of IPH has been reported as high as 91% (Juang, Gabriel, Dutton, Palanisamy, & Urman, 2017; Cobb, Cho, Hilton, Ting, & Carvalho, 2016). IPH can worsen cardiac

complications through the stimulation of the sympathetic nervous system and the release of norepinephrine which results in vasoconstriction as well as increased cardiac workload and incidence of myocardial ischemia (Frank et al., 1997). The hypothermia-induced vasoconstriction has been shown to be an independent factor for impaired healing and surgical site infections (Hooper et al., 2010). Hypothermia also alters platelet function and enzymatic reactions causing increased bleeding and blood transfusions (Roder, 2011). Furthermore, hypothermia can reduce metabolic rate, leading to prolonged effects of anesthetic drugs and postoperative shivering (Madrid, 2016).

To maintain normothermia in the perioperative period, warming measures can be utilized including prewarming patients prior to surgery, warm intravenous fluids, forced-air warming (FAW), and a conductive fabric warming mattress. While prewarming has been shown to be effective for maintaining core body temperature during surgery, the ideal length of time that a patient should be prewarmed has not been determined (Poveda, Clark, & Galvao, 2012). Prewarming does reduce the severity of symptoms, but it does not decrease the incidence of hypothermia (Poveda, Clark, & Galvao, 2012). Similarly, warming intravenous fluids have been shown to maintain normothermia better than room temperature fluids; however, the overall difference is a 0.5º Celsius (Campbell et al., 2015). When used alone, neither prewarming nor warmed IV fluids reduce the incidence of inadvertent perioperative hypothermia. The current practice at NMCP is FAW, a type of active warming device (Shaw, Steelman, DeBerg, & Schweizer, 2017). While FAW is effective at preventing heat loss due to its convective heating system, there are limitations with this method. The efficacy of FAW is dependent upon the type of blanket utilized, with upper body blankets

being less effective than lower body blankets (John, Ford, & Harper, 2014). FAW also requires disposable blankets that are a continual cost to the hospital.

An alternative to a FAW is a conductive fabric warming mattress. A conductive fabric warming mattress is a fabric heater that is laid over a pressure-relief foam in order to provide heat uniformly and provide a pressure-neutral pad between the OR table and the patient. This type of warming mattress provides heat for a larger body surface area and equates to an increase in the amount of heat transferred (John, Ford, & Harper, 2014). The conductive fabric mattress warmer also allows for consistent warming because it can be continued during the placement of neuraxial anesthesia and while the patient is prepped and draped for surgery. Forced air warming blankets are typically not turned on until after the patient has been prepped and draped, which leaves the patient susceptible to the cooler ambient air in the OR for more extended periods. The conductive fabric warming mattress is also more cost-effective than FAW in that it is reusable and only has to be replaced every 30 months versus the one time use of the FAW ("Hotdog patient warming", 2018). Although several studies have shown no significant difference in core body temperature between the conductive fabric warming mattress versus a FAW blanket, the conductive fabric warming mattress may be preferred due to its ease of use, ease of access to the patient, and decreased cost compared to the current practice of FAW at NMCP (John, Ford, & Harper, 2014; Sandoval, Mongan, Dayton, & Hogan, 2017; Nieh & Su, 2016),.

Military and Nursing Relevance

Over 40,000 births occur each year at military facilities (Tricare, 2018). Hypothermia during cesarean delivery places the mother at risk for complications, contributes to increased hospital costs, and reduced readiness for the military. The increase in cost for hypothermic

patients is between $2,500 - $7,000 depending on the severity of hypothermia and adverse outcomes ("Hotdog patient warming", 2018). Hypothermia also increases the risks for the infant and indirectly contributes to decreased readiness and financial loss as the active duty service parent requires time away from their military unit to provide care for their child. Postoperative complications lead to increased costs, delayed start of maternity leave, and subsequent delay to return to full duty status which can lead to under-manning and decreased mission readiness.

Due to the numerous adverse effects of IPH, monitoring of body temperature and active warming measures are essential during general and regional anesthesia and is included as a high priority quality measurement for Medicare reimbursement. Requirements of this initiative include the use of active warming measures and documentation of at least one body temperature measurement greater than or equal to 35.5° C within 30 minutes before or 15 minutes after anesthesia end time (American Association of Nurse Anesthetists, 2018).

Clinical Question

In cesarean deliveries at NMCP, does the use of a conductive fabric warming mattress compared to usual practice, reduce postoperative hypothermia?

Focus Areas

This project has five primary focus areas: literature review, pre-data collection, staff education, post-data collection, and sustainment. First, a literature review evaluating the methods for preventing inadvertent perioperative hypothermia was completed. Second, data was collected to evaluate current practices at our facility. Third, a short educational session was created and presented to anesthesia providers and labor and delivery staff regarding IPH, current trends, and the implementation of the conductive fabric warming mattress. Fourth,

after the educational session, we collected and analyzed post-implementation data. Finally, we developed a plan for sustainment ensuring continued documentation of perioperative temperatures and use of the conductive fabric warming mattress in cesarean deliveries.

Short and Long Term Goals

The short-term goals of this project were to educate 80% of anesthesia providers and labor and delivery nurses and ancillary staff on active warming methods and perioperative temperature management, as well as implement the conductive fabric warming mattress. The long-term goals of this project are for anesthesia providers to use the conductive fabric warming mattress and monitor intraoperative temperatures in 100% of all cesarean deliveries at NMCP.

Anticipated Global Impact

IPH can lead to infection and coagulopathy, as well as delayed initiation of breastfeeding and decreased neonatal temperatures and umbilical pH (Munday et al., 2014). The anticipated global impact of this project will be decreased rates of IPH leading to fewer complications, cost savings from shorter hospital stays and fewer interventions, and improved patient experience for the mother during her cesarean delivery.

Organizing Framework

Our organizing framework was the Iowa Model of Evidence-Based Practice to Promote Quality Care (See Appendix A). The Iowa Model employs decision points in a flow diagram to guide evidence-based practice (EBP) projects (White, Dudley-Brown & Terhaar, 2016). With this framework, we identified a clinical problem that was a priority to our organization, organized a team of stakeholders, and conducted a review of current literature. The problem identified was that in patients undergoing elective cesarean delivery, temperature monitoring

and use of a warming device was inconsistent. This problem was determined to be a priority because it can lead to increased post-anesthesia care unit (PACU) time and decreased patient satisfaction. Our stakeholders included members of the anesthesia and the labor and delivery departments.

Project Design

General Approach

This project was a pre- and post- implementation design.

Setting

The project was implemented at Naval Medical Center Portsmouth, a large military medical treatment facility in the eastern United States. The facility provides care to active duty, retirees, and dependent beneficiaries. The hospital has a labor and delivery unit that delivers approximately 3,000 babies annually, including 360 cesarean deliveries. The anesthesia staff includes 28 CRNAs (active duty and civilian), 29 anesthesiologists (active duty and civilian), and 29 trainees (13 SRNAs and 16 residents).

Procedural Steps

Evidence evaluation: A literature review was conducted via electronic searches of PubMed, CINAHL, and Embase using the keywords "conductive fabric warming," "resistive warming device," and "resistive polymer blanket." We limited the search to articles in English, within the last ten years (2008-2018), and human studies. We appraised the quality of evidence through a systematic review using the Johns Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal Tool and placed these results in an evidence table (Appendix C).

Pre-process data collection: Data was collected for a period of two months. Temperature data collected included preoperative temperature, temperature upon arrival to the PACU, and time from arrival in PACU to temperature recorded. We also collected data on the use of an active warming device and intraoperative temperature monitoring.

Educational intervention: We prepared an educational session for NMCP anesthesia staff based on Pettigrew and Whipp's Model of Strategic Management of Change. The session highlighted the temperature monitoring trends we measured during our pre-process data collection. Next, we educated the staff regarding the adverse impacts of hypothermia on the parturient. Then we introduced the conductive fabric mattress warming mattress and the evidence to support this device as a solution to maintain normothermia in scheduled cesarean delivery patients at NMCP. Lastly, we discussed the implementation of the warming mattress and encouraged staff to utilize the fabric warming mattress during cesarean deliveries. We also educated the labor and delivery staff on the PACU temperature trends we measured during the pre-process data collection and the utilization of the conductive fabric warming mattress.

Post-process data collection: We retrospectively collected data from cesarean deliveries over a period of two months after the education session. We collected the same demographic data as the pre-process data collection.

Sustainment: Failure to utilize an active warming device and monitor perioperative temperatures in parturients is a significant problem at NMCP. Access to the materials presented in our educational session will be made available to the department via the orientation manual in the anesthesia department shared drive. The conductive fabric warming mattress will be left in labor and delivery operating room one along with a temporal

temperature probe. There is also a plan to add warming mattresses to the remaining labor and delivery ORs.

HIPAA Concerns

This evidence-based project involved the collection of basic vital sign data with a focus on patient temperature in the perioperative period for scheduled cesarean delivery. We did not collect personally identifiable information (PII) or protected health information (PHI). To ensure the protection of patient health information, we submitted our project for review by the NMCP Privacy Board to ensure compliance with the DoD privacy program, DoD directive 5400.11, and the Health Insurance Portability and Accountability Act (HIPAA). We submitted this project as a quality improvement project and were granted Institutional Review Board (IRB) exemption. All data was de-identified and stored on a CAC enabled computer located in a secured area of the hospital.

Project Results

Evidence Evaluation

We identified 35 articles through our database searches and one additional article from a conductive fabric warmer product website. After duplicates were removed, 29 articles remained. We screened the 29 titles and abstracts for relevance to this project which left us with 18 articles. We assessed the full-text of the 18 articles and excluded four due to a focus on planned hypothermia, infection, or pre-warming intervention only after which 14 articles remained for analysis (Appendix B). We assessed each article using the Johns Hopkins University Evidence Rating Scale.

Educational Intervention and Device Implementation

Pre-implementation data was initially collected for two months. During this time, compliance with post-operative temperature documentation was low. It was determined that as many as 35% of the patients might have been hypothermic, but it was not certain as a temperature had not been recorded within 15 minutes of arriving in the PACU. Additionally, overall use of a warming device during this period was 16%, and documentation for monitoring intraoperative temperatures by anesthesia staff was found to be 6%. The labor and delivery Clinical Nurse Specialist was alerted to the poor adherence to unit protocol where a temperature is to be taken within 15 minutes of arrival to the PACU. The CNS educated nurses on appropriate temperature management and unit policies. Pre-implementation data was recollected for the months of June and July which showed 100% compliance of post-temperature collection within 15 min of arrival to PACU.

An educational session was presented to the anesthesia department on August 27, 2019. During this educational session, key information was presented on the importance of monitoring and maintaining normothermia in parturients along with the consequences of IPH. Our initial data findings regarding anesthesia providers compliance with monitoring intraoperative temperatures and utilization of a warming device along with PACU's inconsistent adherence to postoperative temperatures was also disclosed during this session. Introduction and education on appropriate use of the conductive fabric warming mattress was provided to anesthesia providers. The conductive fabric warming mattress was also available for demonstration during the educational session. Educational sessions for the labor and delivery nurses and corpsmen included instructions on maintenance and utilization of the conductive fabric warming mattress as well as re-education on the importance of

postoperative temperature monitoring. The conductive fabric warming mattress was placed in the Labor and Delivery operating room one on September 1, 2019.

Results

We recollected pre-implementation data from June and July to acquire a more complete data set after the labor and delivery PACU nurses were educated about recording postoperative temperatures according to unit policy. We collected post-implementation data during the months of September and October. We discovered that the decrease in temperature changed from -0.30º C to -0.25º C between pre and post implementation groups. Compliance with intraoperative use of the warming device increased from 44% to 76% and documenting an intraoperative temperature increased from 40% to 58%.

Analysis of the Results

An independent samples T- test found that the change in temperature decline between pre and post implementation groups was not statistically significant ($p > 0.01$); the implementation of the conductive fabric warmer did not improve postoperative temperatures more than usual management. However, we did find that our biggest impact was on compliance among anesthesia providers and the labor and delivery nurses. Chi-squared tests found that intraoperative warming and temperature monitoring compliance increased significantly ($p < 0.1$, with a percent change of 72% and 46%, respectively. The data also showed that labor and delivery nurses were consistently documenting postoperative temperatures within 15 minutes of the patient's arrival to PACU.

Organizational Impact/Implications to Practice & Policy

We discovered that what appeared to be a problem of parturients experiencing a decline in temperature during the intraoperative period, may have actually been a problem of

documentation and compliance. As our facility continually experiences turnover, due to it being a large military teaching facility, it is important to have periodic reviews and reminders of best practices, so that we are able to identify when an issue actually exists. In this instance, we found that the type of warming device may not be as important as the actual utilization and documentation of device, documenting an intraoperative temperature, and recording patient's temperature within 15 minutes of arrival to PACU. Though our temperatures did not determine that hypothermia was occurring, it is still important to maintain normothermia and keep our parturients comfortable during the cesarean delivery experience.

Whereas FAW and conductive fabric warming devices may be equivocal in maintaining normothermia, and our findings did show an increase in the utilization of the conductive fabric warming mattress and therefore it may be a better option due to ease of use. The conductive fabric warming mattress is readily available on the operating room (OR) table for any cesarean delivery. Utilization of the conductive fabric warming mattress allows for more continuous use than with the current practice of forced air warming (FAW) which requires a plastic blanket to be draped over the patient and cannot be turned on until after the surgical drapes are in place.

Future Directions for Practice and Research

Further research is needed regarding best methods of maintaining normothermia in patients receiving neuraxial anesthesia; to date, most IPH research looks at general anesthetics rather than neuraxial techniques. There is also a gap in knowledge as to the long-term effects of neuraxial temperature throughout the postoperative period where active warming methods are often discontinued; however, body temperature can continue to decline after a neuraxial technique for hours after placement. Additionally, there are few studies

directly comparing forced air warming vs. conductive fabric warming mattresses in maintaining body temperature.

Conclusion

It was initially believed that IPH was a problem for parturients undergoing cesarean delivery at NMCP; however, analysis of the initial data revealed that this was not the case. The actual problem was compliance among anesthesia providers and the labor and delivery nurses regarding charting. We found that our decline in temperature was not statistically significant when we changed to the conductive fabric warmer, but the conductive fabric warming mattress had a statistically significant increase in use. It is important to ensure that normothermia is being maintained with the method that is most comfortable for the patient.

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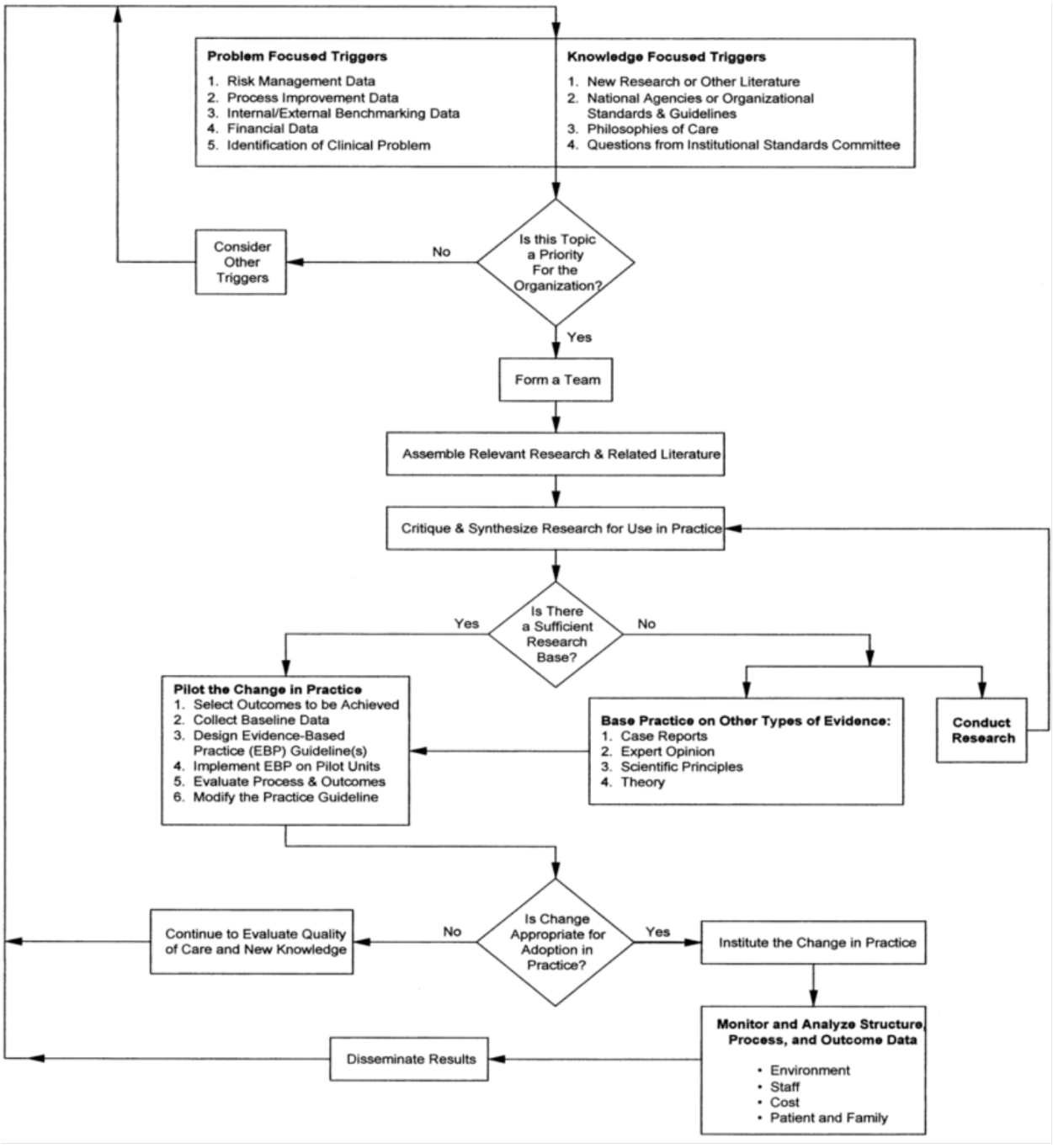
Appendix A.

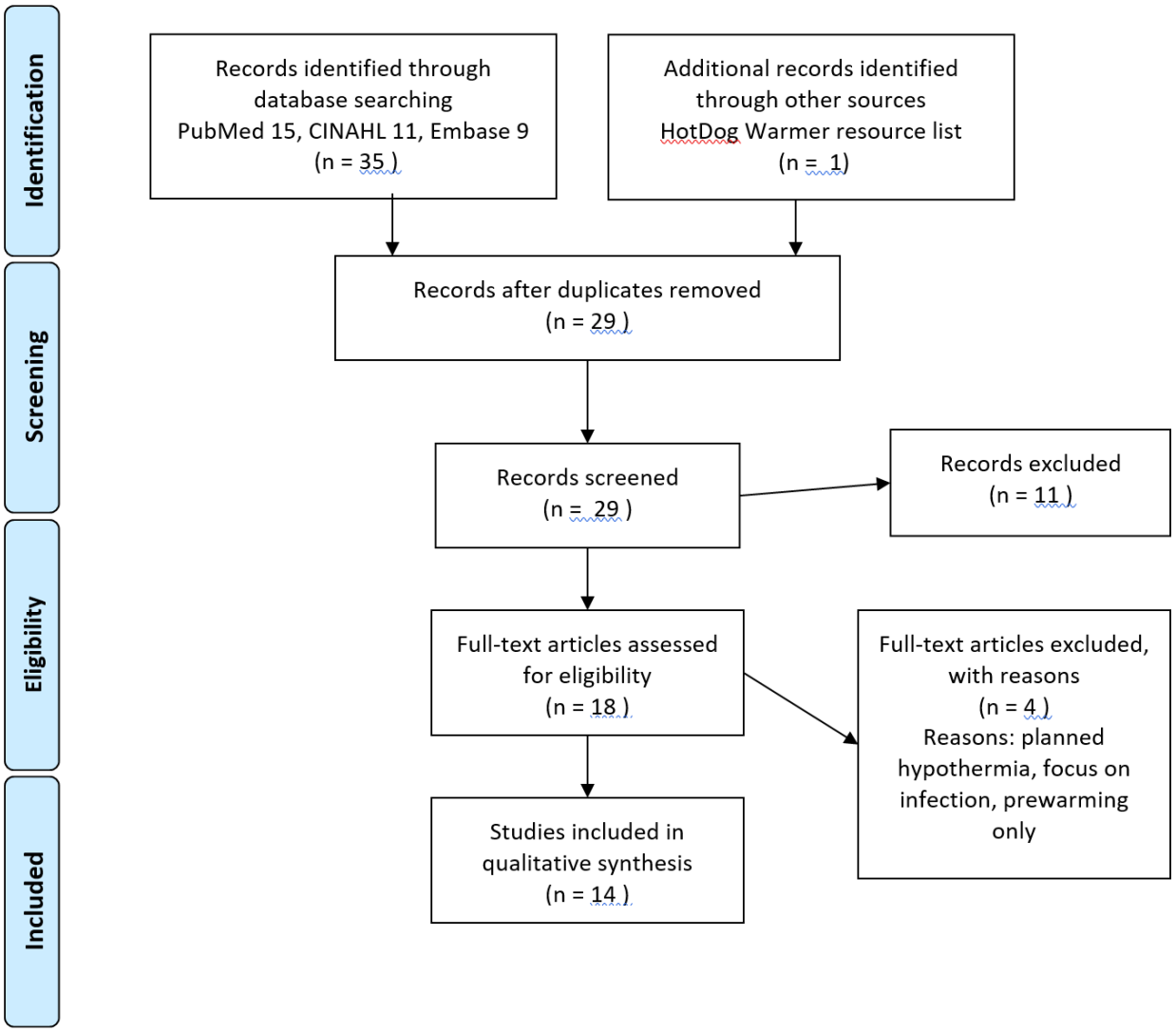
The Iowa Model of Evidence-Based Practice to Promote Quality Care



(Titler et al., 2001)

Appendix B.

Prisma Diagram



(Moher, Liberati, Tetzlaff, & Altman, 2009)

Appendix C.

Evidence Table

	Purpose	Population	Design	Intervention	Outcomes - Success	Outcome - M&M	Statistical Analysis	Results	Level of Evidence	Quality	Inclusion criteria	Exclusion criteria	Search
IPH													
Lopes, I.G., Magalhaes, A.M., Abreau de Sousa, A.L., Batista de Araujo, I.M. (2015). Preventing perioperative hypothermia: an integrative literature review. Revista de Enfermagem Referencia, 4, 147-155. doi: 10.12707/RIV14027	To identify in empirical research the most effective preoperative and intraoperative warming methods to prevent hypothermia.	Full text articles written in English, Spanish or Portuguese in CINAHL and MEDLINE published from 2007 - 2012 that included the following keywords: hypothermia, perioperative nursing, anaesthesia, and rewarming. 7 out of 30 were selected for full analysis.	Integrative literature review		Patient remains normothermic	Patient hypothermic	None	Forced air warming is the most effective method of preventing perioperative hypothermia.	III	Good - some sample sizes were fairly small	Adults, strategies for the prevention of hypothermia, 2007-2012, qualitative or quantitative, English, Portuguese, Spanish, and full text	Children, pregnant women, neurocritical patients, induced hypothermia, variable affecting hypothermia, prior to 2007, protocols, opinion articles, another language, abstracts, ongoing studies.	prior hypothermia search
Munday, J., Hines, S., Wallace, K., Chang, A., Gibbons, K., & Yates, P. (2014). A Systematic Review of the Effectiveness of Warming Interventions for Women Undergoing Cesarean Section. Worldviews on Evidence-Based Nursing, 11, 383-393.	Synthesize the best available evidence related to preventing hypothermia in mothers undergoing cesarean section surgery.	Adults over the age of 18 years, with any comorbidities, undergoing either elective or emergency cesarean section under any mode of anesthesia (spinal, epidural, combined spinal– epidural, or general anesthesia), receiving interventions to prevent or treat heat loss.	Systematic review	Active or passive warming interventions. Active interventions included forced air warming, warmed intravenous fluids, warmed mattresses, and warmed coverings. Passive interventions included unheated coverings.	Maternal core temperature, measured during the preoperative, intraoperative, and postoperative phases.	Maternal shivering, maternal thermal comfort, length of stay in Post-Anesthetic Care Unit (PACU) newborn temperature measured at birth, Apgar scores at 1, 5, and 10 minutes, and newborn umbilical pH	Two independent reviewers assessed methodological quality of papers using the standardized critical appraisal instrument for RCTs from JBI-MASTARI. When meta-analysis was possible, results were combined in a fixed effects meta-analysis using the Cochrane Collaboration Review Manager software.	FAW was less effective in patients who received intrathecal morphine, warmed fluids (to 37 C) are effective in maintaining normothermia, preoperative and intraoperative warming is more effective than solely intraoperative warming.	I	Low - some of the samples were small and the results were not conclusive.			prior hypothermia search
Campbell, G., Alderson, P., Smith, A. F., Warttig, S. (2015). Warming of intravenous and irrigation fluids for preventing inadvertent perioperative hypothermia. Cochrane Database Syst Rev., 13;(4).	Determine effectiveness of preoperative and/or intraoperative warming of irrigation fluids and intravenous fluids to prevent hypothermia in surgical patients	Total of 1250 participants from 24 studies	Systematic review				Independently reviewed by two review authors and any disputes were settled by third review author	Warmed intravenous fluids keep surgical patients core temperature around a half degree warmer during intraoperatively than room temperature fluids. Unclear if utilizing warmed intravenous fluids in combination with other warming methods confers any benefit due to a ceiling effet with multimodal warming methods.	I	Low- few trials and events have been reported on surgical site infections and complicat	Quasi-randomized controlled trials or randomized controlled trials that compared fluid warming or other warming methods versus standard care to maintain normothermia		ancestry - CINAHL resistive warming

Madrid, E., Urrútia, G., Roqué i Figuls, M., Pardo‐Hernandez, H., Campos, J.M., Paniagua, P., … Alonso‐Coello, P. (2016). Active body surface warming systems for preventing complications caused by inadvertent perioperative hypothermia in adults. Cochrane Database of Systematic Reviews, 4.	Assess effectiveness of preoperative and/or intraoperative active body warming systems to prevent unintended hypothermia and its complications in adult surgical patients	67 trials were included with 5438 participants that compromised 79 comparisons	Systematic review				By pairs, several authors screened references to determine elgibility, extract data, and assess risk of bias. Any disagreements were resolved by discussion and consensus, with collaboration by third author	When utilized in preoperative and/or intraoperative phases, forced air warming is beneficial in regards to lower rates of surgical site infections in patients undergoing abdominal surgery. Forced air warming maintains core temperature withing normal range which leads to greater patient comfort perioperatively.	I	Low- few trials and events have been reported on surgical site infections and complications in relation to hypothermia. Patients differed in types of surgery, duration, type of anesthesia, age, and comorbidities. Trials also did not last long with makes it hard to detect clinical effects	Randomized controll trials which compared an active body surface warming system (ABSW) againts other ABSW systems or a control. Eligible studies needed to include relevant clinical outcomes besides measuring temperature alone		ancestry - CINAHL resistive warming
Warttig, S., Alderson, P., Campbell, G., Smith, A.F. (2014). Interventions for treating inadvertent postoperativehypothermia (Review). Cochrane Database of Systematic Reviews, 11.	To estimate the effectiveness of treating inadvertent perioperative hypothermia through postoperative interventions to decrease heat loss and apply passive and active warming systems in adult patients who have undergone surgery.	Randomized controlled trials of postoperative warming interventions aiming to reverse hypothermia compared with control or with each other. Dates ranged from 1950-2014.	Systematic review	Three review authors identified studies for inclusion in this review. One review author extracted data and completed risk of bias assessments; two review authors checked the details. Meta-analysis was conducted when appropriate by using standard methodological procedures as expected by The Cochrane Collaboration.				Active warming, particularly forced air warming, appears to offer a clinically important reduction in mean time taken to achieve normothermia (normal body temperature between 36°C and 37.5°C) in patients with postoperative hypothermia.	I	High quality evidence on other important clinical outcomes is lacking; therefore it is unclear whether active warming offers other benefits and harms. High-quality evidence on other warming methods is also lacking; therefore it is unclear whether other rewarming methods are effective in reversing postoperative hypothermia.			ancestry - CINAHL resistive warming

Griffiths, J.D., Popham, P.A., De Silva, S.R. (2018). Interventions for preventing hypothermia during caesareandelivery under regional anaesthesia (Protocol). CochraneDatabase of Systematic Reviews, 11.	To assess the interventions used for prevention of hypothermia in women undergoing caesarean delivery under regional anaesthesia.	Women undergoing caesarean delivery, either elective or emergency, and under regional anaesthesia.	Systematic review	'forced-air warming' devices (upper body or lower body); 'self-warming' blankets using exothermic chemical reactions; warming mattresses (warming from underneath the woman); pre-warmed intravenous fluids (e.g. from a 'warming cabinet'); co-warmed intravenous fluids (e.g. by a Ranger ® device); 'pre-warming' of women by any means administered prior to surgery.	Results to be published in 2019				I				ancestry - CINAHL resistive warming
Shaw, C.A., Steelman, V.M., DeBerg, J., & Schweizer, M.L. (2017). Effectiveness of active and passive warming for the prevention of inadvertent hypothermia in patients receiving neuraxial anesthesia: A systematic review and meta-analysis of randomized controlled trials. Journal of Clinical Anesthesia, 38, 93-104.	The purpose of this review is to answer the question: Does the type of warming intervention influence the frequency or severity of inadvertent perioperative hypothermia (IPH) in surgical patients receiving neuraxial anesthesia?	Adults undergoing surgery with neuraxial anesthesia. Of 1587 records, 25 studies (2048 patients) were included in the qualitative synthesis. Eleven studies (1189 patients) comparing AW versus PW were included in the quantitative analysis.	Systematic review and meta-analysis.	Perioperative active warming (AW) or passive warming (PW).			Statistical analyses were performed using the Review Manager Version 5.3 software. Risk ratios (RR) were calculated for dichotomous data and mean differences in continuous data with 95% confidence intervals (CI) using a random-effects model. Statistical analyses comparing the effectiveness of interventions were only performed if three or more RCTs were present. Heterogeneity was evaluated by I2 calculation.	During neuraxial anesthesia, AW reduces IPH more effectively than PW.	I				
Hot Dog warmer													
Sandoval, M. F.; Mongan, P. D.; Dayton, M. R.; Hogan, C. A. (2017). Safety and efficacy of resistive polymer versus forced air warming in total joint surgery. Patient Safety in Surgery, 11, 1-6.	To compare the capabilities of patient warming between two different devices that use different mechanisms of warming: forced-air warming and non-air warming	One hundred twenty patients undergoing total hip or total knee arthroplasty	first 60 patients recieved FAW; next 60 patients recieved resistive warming	FAW vs resistive warming	Mean skin temp. preop, intraop, and postoperatively were similar between FAW and resistive warming, with no statistical difference between the devices	Both groups remianed free of injury, incuding burns and sugical site infections	a two-sample T-test assuing equal vaiance was conducted on the lowest core temperatures; P value >0.05.	The core temperature remained similar between both gorups at the inital core temp, preoperative temp, lowest intraoperative core temp., final intraop core temp., and post aneshtesia care unit core temp.	II-quasi-experimental	Low- cut to close times were not similar between warming devices (113 minutes for FAQ vs 88 for resisitive warming; the average OR time was also not similar between devices.	Patients undergoing THA, TKA at one hospital	None discussed in the article	CINAHL - resistive warming + Pubmed
Steelman, V. M. (2017). Conductive Skin Warming and Hypothermia: An Observational Study. AANA Journal, 85, 461-468	To describe patient outcomes of hypothermia after receiving a combination of preoperative and intraoperative conductive skin warming (CSW) and to identify which patients become hypothermic using CSW in this manner.	all adult patients undergoing surgery with general or neuraxial anesthesia between March 1, 2016, and May 31, 2016 (3 months total) as a Midwestern Level II trauma center	Retrospective observational study	conductive, underbody patient warming mat (VitaHEAT UB3, VitaHEAT Medical) or the standard of care, an over-the-body FAW blanket. The decision of which technology to use was ultimately determined by the anesthesiologist and the circulating nurse based on the patient's condition, amount of skin surface area exposed, and the surgical position.			Investigators used statistical software (SAS 9.4, SAS Institute Inc) to prepare and clean data and to calculate descriptive statistics (means, standard deviations, and percentages).	When staff elected to use CSW both preoperatively and intraoperatively, 95.9% of patients remained normothermic. When CSW was used preoperatively and FAW used intraoperatively, 97.7% of patients remained normothermic. When CSW was used preoperatively and the combination of CSW and FAW used intraoperatively, 98.0% of patients remained normothermic.	III - non experimental	good	adults receiving general, spinal, or epidural anesthesia; a surgery duration of 30 minutes or greater; and admission to the PACU	planned hypothermia, preoperative temperature greater than 37.7°C, gastrointestinal endoscopy, and no immediate postoperative temperature recorded. Additionally, patients were excluded if they were positioned with inadequate skin exposure to the conductive mat (prone, fracture table), or on a slip-resistant surface for high lithotomy positioning.	CINAHL - resistive warming

Chakladar, A., Dixon, M.J., Crook, D., & Harpera, C.M. (2014). The effects of a resistive warming mattress during caesarean section: a randomised, controlled trial. International Journal of Obstetric Anesthesia, 23, 309-316.	to investigate whether a resistive warming mattress would reduce the incidence of inadvertent perioperative hypothermia in patients undergoing elective caesarean section.	116 pregnant women booked for elective caesarean section	RCT	intraoperative warming with a mattress or control (no warming)	The primary outcome was the incidence of inadvertent perioperative hypothermia, defined as a temperature <36.0 °C on admission to the recovery room.	Shivering in the perioperative period, severity of shivering and the need for treatment, total blood loss, fall in haemoglobin, incidence of blood transfusion, immediate health of baby, and length of hospital stay were also recorded.	Parametric continuous variables were compared using unpaired, 2-tailed, Student's t tests, non-parametric variables with 2-tailed Mann–Whitney U tests and discrete variables with chi-square tests. Incidence of IPH and shivering were compared using 2-tailed Fisher's exact tests. Statistical tests were conducted using SPSS Version 18.0. Data were analysed on an intention to treat basis. A P value <0.05 was considered statistically significant.	A resistive warming mattress reduced the incidence of inadvertent perioperative hypothermia and attenuated the fall in haemoglobin.	I	good	All women undergoing elective CS were eligible for recruitment.	Women who were unable to fully understand the trial and those aged <16 years at the time of CS	CINAHL - resistive warming
John, M., Crook, D., Dasari, K., Eljelani, F., El-Haboby, A., & Harper, C. M. (2016). Comparison of resistive heating and forced-air warming to prevent inadvertent perioperative hypothermia. British Journal of Anaesthesia, 116(2), 249-254. doi:10.1093/bja/aev412.	Compare the effecitveness of FAW vs. resistive warming	160 patients undergoing non-emergency surgery	Randomixed single-blinded study	FAW vs resistive heating	Final intraoperative temperatures were significantly higher in the FAW group compared to resistive heating. The incidence of hypothermia at the end of surgery was lower in patient with FAW.	No statistical difference between loss of blood and transfusion rate between groups.	Students unpaired t test and Mann-Whitney U test.. Categorical data was analysed using the chi squared test.	FAW was significantly more effective in preventing hypothermia	I	Good	Elective surgery under general anesthesia	Emergency surgery	CINAHL - resistive warming & Pubmed
Wan Fadzlina, W.M.S., Wan Mohd Nazaruddin, W.H., Rhendra Hardy, M.Z. (2016). Passive Warming using a Heat-Band versus a Resistive Heating Blanket for the Prevention of Inadvertent Perioperative Hypothermia during Laparotomy for Gynaecological Surgery. Malaysian Journal of Medical Sciences, 23, 28-37.	This study compared the effectiveness of the heat-band with the RHB in a randomised, controlled trial of patients undergoing a laparotomy for gynaecological surgery under combined epidural-general anaesthesia (GA).	Thirty-two patients undergoing elective gynaecological laparotomies between January 2013 and October 2014.	RCT	passive warming with the heat-band or active warming with the RHB (control group).			an independent t-test, a Chi-square test or Fisher's exact test, where appropriate.	a passive warming device, the heat-band, if used appropriately, was as effective as an active warming device, RHB, in preventing IPH and its associated complications.	I		The inclusion criteria were aged 18–65 years, American Society of Anaesthesiologists (ASA) class I–II and scheduled for elective gynaecological laparotomy under combined epidural-GA, with an expected duration of surgery of at least 2 h (upper limit of 4 h)	Patients with a pre-operative temperature >37.5° C or <36.0° C, a recent history of fever or infection (within three days before surgery), a previous history of malignant hyperthermia, thyroid disorders and pregnancy were excluded.	CINAHL - resistive warming
Nieh, H., & Su, S. (2016). Meta-analysis: Effectiveness of forced-air warming for prevention of perioperative hypothermia in surgical patients. Journal of Advanced Nursing, 72(10), 2294-2314. doi:10.1111/jan.13010	To evaluate the effectiveness of forced-air warming for preneting perioperative hypothermia	29 trials (1875 patients)- randomized contorlled trails publised between 2001 and 2015	Meta-anaylsis		Five trials compared FAW to resistive warming (430 patients) and found no difference in in the effectiveness of FAW and resistive warming for the prevention of hypothermia		Funnel plot and regression analysis	No differnece between FAW and resistive warming devices in preventing IPH in orthopedic and abdominal surgeries.	I	Good	Studies included were randomized experiemental studies, adults, descripted warming intervention used and measured core temperature and thermal comfort	Studies irrelevant to perioperative hypothermia, or literavute reviews were excluded.	Pubmed
Brandt, S., Oguz, R., Hüttner, H., Waglechner, G., Chiari, A., Greif, R., . . . Kimberger, O. (2010). Resistive-polymer versus forced-air warming: Comparable efficacy in orthopedic patients. Anesthesia and Analgesia, 110(3), 834-838. doi:10.1213/ANE.0b013e31	Compare the efficacy of FAW vs resistive warming	80 orthopedic patients	Prospective randomized trial	bair hugger vs Hot Dog warmer	No significant difference between the groups in the course of core temperature and mean skin tmeperature.	No heat induced injuries of devie associated complications occured	Unpaired student t test	Resistive warming performed as effiecently as FAQ in patients undergoing orthopedic surgery	I	Good- low sample	Orthopedic patients undergoing elective surgery with general or conbined general-regional anesthesia	Peripheral artery disease	Pubmed
Perl, T., Flöther, L., Weyland, W., Quintel, M., & Bräuer, A. (2008). Comparison of forced air warming and resistive heating. Minerva Anestesiologica, 74(12), 687-690.	The aim of this study was to compare a resistive heating device with a forced-air warming device.	6 volunteers	Prospective randomized trial.	warming with a forced-air warming device or a resistive heating device	Skin temperature under the covered surface was not statistically different between the two groups but heat transfer was significantly higher in the resistive heating group.		t-test	Heat transfer in the resistive heating system was significantly greater than that of the forced-air warming system	I-randomized trial	Low- low sample using healthy volunteers	healthy volunteers		Pubmed

Fanelli, A., Danelli, G., Ghisi, D., Ortu, A., Moschini, E., & Fanelli, G. (2009). The efficacy of a resistive heating under-patient blanket versus a forced-air warming system: A randomized controlled trial. Anesthesia and Analgesia, 108(1), 199-201. doi:10.1213/ane.0b013e318 18e6199	Compared temperature changes in patients undergoing hip replacement with spinal and regional anesthesia during warming with a resistive heating blanket or air-forced system.	56 patients undergoing hip replacement	Prosceptive randomized trial	Forced air warming vs resistive heating blanket	There was no statistical difference between groups either at baseline (T0) or at the last mean measurement.		T-test	During spinal anesthesia and lumbar plexus block for total hip replacement, a resistive carbon-fiber heating blanket results in body temperature changes that are similar to those achieved with a forced-air warming system. Both groups ended surgery with mild hypothermia as a consequence of core-to- periphery redistribution of body heat, in the absence of prewarming.	I- randomized control trial	High	18 and 80 yr, ASA physical status I-III and duration of anesthesia longer than 1 h	neurological deficits, history of head injury, thyroid disease, disturbance of autonomic function, se- vere cardiovascular and respiratory disease, preopera- tive core temperature 37.5°C, evidence of current infection, the use of steroids and vasoactive drugs or contraindications to regional anesthesia	Pubmed
Kimberger, O., Held, C., Stadelmann, K., Mayer, N., Hunkeler, C., Sessler, D. I., & Kurz, A. (2008). Resistive polymer versus forced-air warming: Comparable heat transfer and core rewarming rates in volunteers. Anesthesia and Analgesia, 107(5), 1621-1626. doi:10.1213/ane.0b013e318	We compared the efficacy of a standard forced-air warming system with the resistive polymer system in volunteers	80 healthy volunteers	Experimental	Unanesthetized volunteers were cooled to a core temperature (tympanic mem- brane) of 34°C by application of forced-air at 10°C and a circulating-water mattress at 4°C. Meperidine and buspirone were administered to prevent shivering. In a randomly designated order, volunteers were then rewarmed by force air warming or resistive heating	Heating efficacy and core rewarming rates were similar with full- body forced-air and full body resistive polymer heating in healthy volunteers		T-test	After a 30-min delay, core temperature increased nearly linearly by 0.98 (95% confidence interval 0.91–1.04)°C/h with forced-air and by 0.92 (0.85–1.00)°C/h with resistive heating	I-experiemental trial	Good	healthy volunteers		Pubmed
Packham A.O., Gross J. Audit of patient warming for orthopaedic surgery with forced air warming and inditherm alpha warming mattresses. Anaesthesia 2013 68 SUPPL. 2 (22-)	to ascertain whether the introduction of resistive warming with the Inditherm system improved our compliance with NICE recommendations and our prevention of hypothermia	elective orthopaedic surgery	Retrospective review	Audit Aexamined our current practice with FAW. After audit A, trial units of the Inditherm Alpha system were introduced to the theatres with two days of training from company representatives. Audit Btook place the next week			Median temp calculated	introduction of Inditherm warming mattresses improved compliance with NICE recommendations for active warming. In practicalclinical use, the efficacy of resistive warming appears to be at least equivalent to that of FAW. The drop in temperatures between theatre and recovery seen with FAW was not seen with resistive warming.	III	good - sample sizes of 72 and 74 for each group		positioned prone or they did not have a general or regional anaesthetic for >30 minutes.	Embase - resistive warming
Egan C., Bernstein E., Reddy D., Ali M., Paul J., Yang D., Sessler D.I. A randomized comparison of intraoperative perfectemp and forced-air warming during open abdominal surgery Anesthesia and Analgesia 2011 113:5 (1076-1081)	tested the hypothesis that intraoperative distal esophageal (core) temperatures with the PerfecTemp (underbody resistive) warming system are noninferior to upper-body forced-air warming in patients undergoing major open abdominal surgery under general anesthesia. The secondary hypotheses include that (1) time-weighted average (TWA) intraoperative core temperatures are superior with underbody resistive warming than with upper-body forced-air warming; (2) final intraoperative core temperature is noninferior with underbody resistive warming than with upper-body forced-air warming; and (3) final intraoperative core temperature is superior with underbody resistive warming than with upper-body forced-air warming.	patients scheduled for elective major open abdominal surgery (liver, pancreas, gynecological, and colorectal surgery) under general anesthesia with an expected operating time of at least 2 hours.	RCT	underbody resistive warming or forced-air warming	Intraoperative core temperature, a secondary outcome, the proportion of patients with temperatures above 36°C at the end of surgery		descriptively compared for balance on baseline potential-confounding variables using the standardized difference, which is the difference in means or proportions divided by the pooled SD. The noninferiority was assessed using analysis of covariance (ANCOVA), adjusting for the observed imbalance baseline covariables and the preoperative oral temperature.	In summary, mean intraoperative TWA core temperatures were no different, and significantly noninferior, with underbody resistive heating than with upper-body forced-air warming. Underbody resistive heating may be an alternative to forced-air warming.	I	low - Results with one underbody resistive heating system should thus be extrapolated to others only with considerable caution.	Patients were eligible to participate when their body mass index was <36 kg/m2, age was 18 to 75 years, ASA physical status was 1 to 3, and the surgical position was supine with or without lithotomy.	Patients were excluded when they had a preoperative fever or serious posterior skin lesions.	Embase - resistive warming

Röder G; Sessler DI; Roth G; Schopper C; Mascha EJ; Plattner O. Intra-operative rewarming with Hot Dog((R)) resistive heating and forced-air heating: a trial of lower-body warming.Anaesthesia, Aug2011; 66(8): 667-674.	tested the hypothesis that the Hot Dog resistive heating blanket and a forced-air system rewarm hypothermic patients at comparable rates	28 adults having major maxillary-facial reconstructive surgery expected to last about 5 h	RCT	patients were randomly assigned to a Hot Dog resistive heater or the Bair Hugger forced-air warming system	rate of core rewarming over the range from 35 to 37 C during the surgery.		Descriptive statistics were used to compare the randomised groups on potentially confounding baseline characteristics. We assessed balance with the standardised difference, which is the difference in means or proportions divided by pooled standard deviation	the Hot Dog rewarms surgical patients at about half the rate of a Bair Hugger forced-air heating	1	good - though only looking at lower half of body and low sample		patients with Reynaud's disease, thyroid dysfunction, insulin-dependant diabetes mellitus, or who were of ASA physical status > 3.	Cinahl resistive warming
Sugai, H., Koizumi, T., Sumita, S., & Yamakage, M. (2018). Relative clinical heat transfer effectiveness: Forced-air warming vs. conductive fabric electric warming, a randomized controlled trial. *Journal of Anesthesia and Surgery,* 5(2) 123-126. doi: 10.15436/2377-1364.18.1963	To test hypothesis that when body surface area is doubled in conductive contact with heat, it will improve the clinical heat transfer of warming systems	41 ASA 1 & 2 patients undergoing open GI procedures that were greater than 2 hours surgical time and did not require fluid warming.	RCT with two group, parallel design	2 groups: FAW group--> had Warmtouch upper or lower body blanket; CFW group: had HotDog upper or lower body blanket plus an underbody heated mattress	CFW resulted in significantly higher patient warming rates than that of FAW system, when all other relevant variables were held constant, to include warming temperatures.		Statistical significance determined by 2-way ANO-VA and Bonferoni tests for comparison between the data of the two groups	CFW group had a higher warming rate of 0.35 deg C/hr over 2 hours than the FAW group (0.01 deg C/hr)	II	good- though results do not represent highest patient warming rates for both CFW and FAW due to CFW mattress limited to highest temperature of 39 deg C	Adult patients undergoing open GI surgical procedures that would last greater than 2 hours, with BMIs between 17-30 kg/m2, and no need for fluid warming		HotDog Warming system website list of research articles

Appendix D**.**

Data Collection Tool

Patient #	**Date**	**Age**	**BMI**	**Gravida**	**EBL**	**OR time**	**Type of anesthesia**	**Warming Device (Y/N)**	**Type of warming device**	**Preop temp.**	**Postop temp.**
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
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16											
17											
18											
19											
20											

Citi Certificates

Completion Date 28-Aug-2017
Expiration Date 27-Aug-2020
Record ID [redacted]

This is to certify that:

Melissa Bokan

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w672f6e3d-fe89-4d72-b9e9-9d7cb0709e26-24341522

CITI PROGRAM

Completion Date 26-Aug-2017
Expiration Date 25-Aug-2020
Record ID [redacted]

This is to certify that:

Julia Camp

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wdcf919d5-d761-4298-ba08-96a3a1dc8662-24291296

CITI PROGRAM

Completion Date 23-Aug-2017
Expiration Date 22-Aug-2020
Record ID [redacted]

This is to certify that:

Kelly Nagle

Has completed the following CITI Program course:

Responsible Conduct of Research (RCR) (Curriculum Group)
Responsible Conduct of Research (RCR) (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wa603da85-ba73-4742-8af5-752e9850f8dd-24291741

USU Form 3202N

USUHS FORM 3202N
DANIEL K. INOUYE GRADUATE SCHOOL OF NURSING
EVIDENCE-BASED PRACTICE/PERFORMANCE IMPROVEMENT PROPOSAL

VPR Date Stamp

Project Number: _____ (VPR will assign)

Project Title: **Implementation of Conductive Fabric Mattress to Maintain Normothermia in Scheduled Cesarean Deliveries**

SECTION A: STUDENT POC INFORMATION

1. Name (Last, First, MI): **Bokan, Melissa M** Student E-mail: **melissa.bokan@usuhs.edu**
2. Home Address: [redacted]

SECTION B: COMMITTEE CHAIR / SENIOR MENTOR INFORMATION

3. Name (Last, First, MI): **Suszan, Lauren**
4. Telephone: **757-953- 3198** Fax: E-mail: **lauren.suszan@usuhs.edu**
5. USUHS Building/ Room No.: **NMCP, Phase II**

SECTION C: PROJECT INFORMATION

6. Attach the Abstract for the proposal, including the following sections: Site Location of the Project, Title, Authors, Background or Problem/Issue, Clinical Question/Purpose, Project Design, Anticipated Organizational Impact/Implications for Practice and also include the Proposed Timeline. Single space the abstract and use Times New Roman font, size 12.
7. Is this proposal related to an active research project of the Chair/Senior Mentor identified in Section B? ☐ Yes ☒ No
   If yes, complete below; if no, proceed to Part 8.
   Project Number: _____
   Project Title: _____
   Project Start Date: _____ Project End Date: _____
8. Anticipated period of performance: Project Start Date: **1/2/2019** Project End Date: **4/1/2020**
9. Performance Site(s): **Naval Medical Center Portsmouth**
10. Does this project involve any classified information? (Contact the USUHS Security Office for guidance) ☐ Yes ☒ No
11. Do you have a funding source for this project? ☐ Yes ☐ No ☒ NA
    If yes, specify the funding agency and the amount provided:

SECTION D: SIGNATURES

The following signatures attest to the validity of the above information:

BOKAN.MELISSA.MARIE. [redacted]
Student (Project Point of [redacted] Date)

SUSZAN.LAUREN.THERESE. [redacted]
Chair/Senior Mentor (Signature and Date)

BONDS.RAYMOND.L. [redacted]
7
Chair/Program Director (Signature and Date)

Chair/Program Director (Signature and Date)

WANZER.LINDA.JEANNE. [redacted]
DNP Project Director or PhD Director (Signature and Date)

SEIBERT.DIANE.C. [redacted]
Associate Dean for Academic Affairs, GSN (Signature and Date)

WASSERMAN.JOAN.E. [redacted]
Associate Dean for Research, GSN (Signature and Date)

ROMANO.CAROL.A. [redacted]
294
Dean, DKI Graduate School of Nursing (Signature and Date)

In light of the above signatures, the project is approved.

[redacted]
USUHS Vice President for Research

2 July 2019
Date

USUHS Form 3202N (VPR) - Revised Sep 2015 v1.2
Previous versions are obsolete

Figure 1

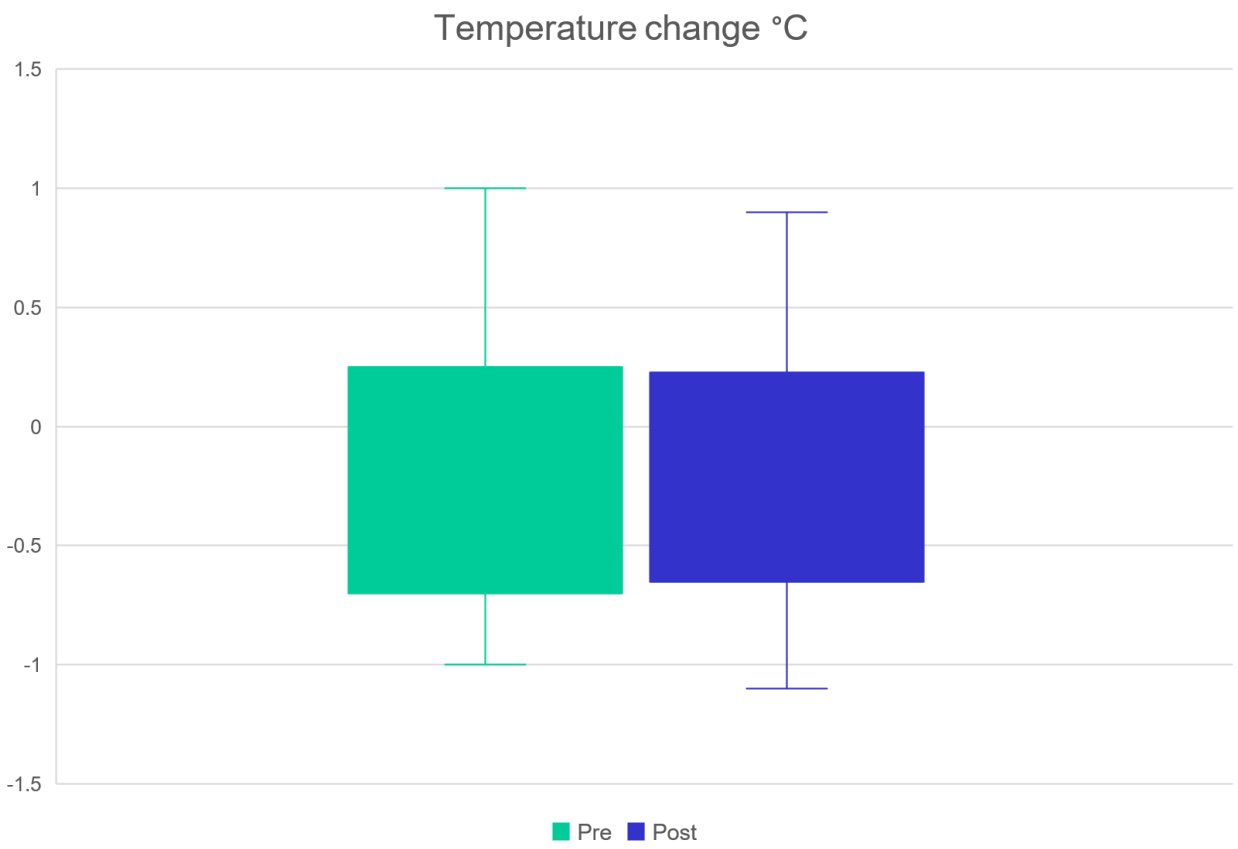

Figure 2

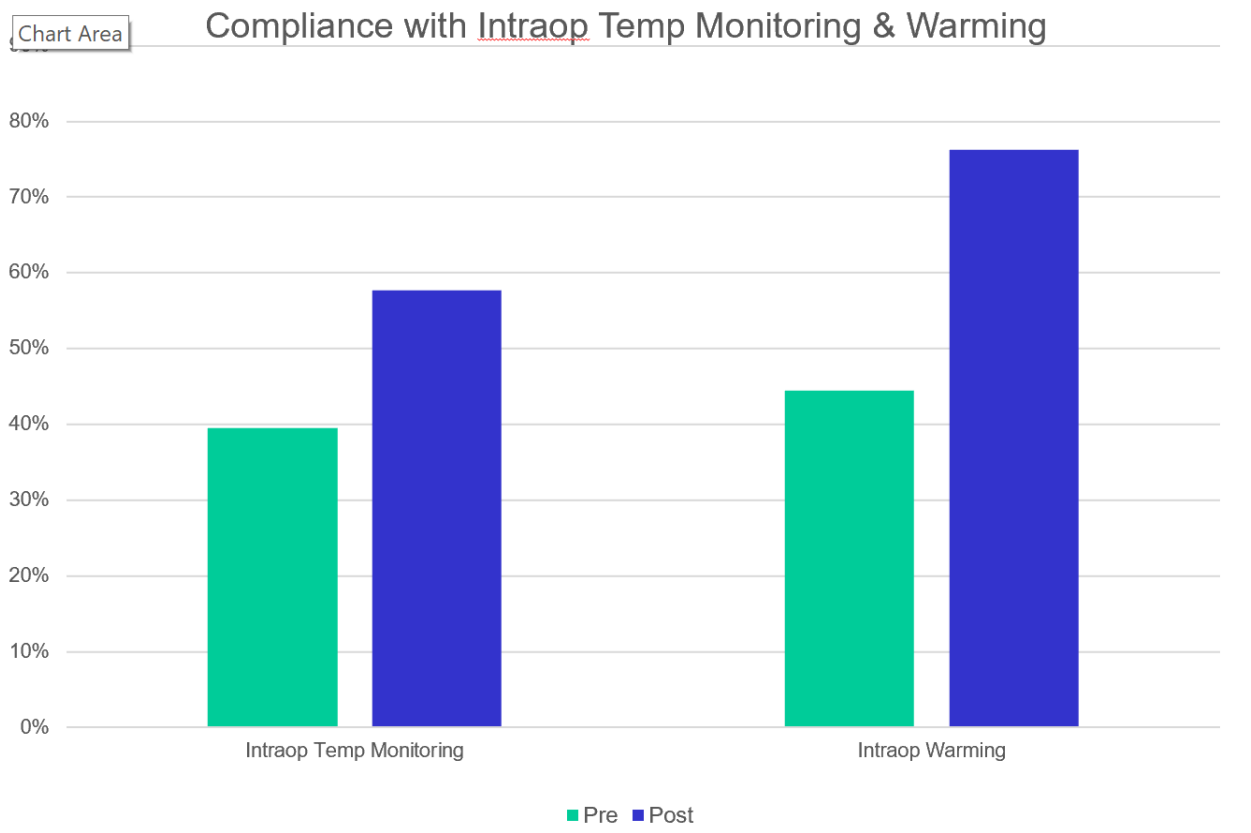
Chart Area
Compliance with Intraop Temp Monitoring & Warming
80%
70%
60%
50%
40%
30%
20%
10%
0%
Intraop Temp Monitoring
Intraop Warming
Pre
Post

MTF IRB/PI Letter of Determination

Clinical Investigation Department, Naval Medical Center Portsmouth
620 John Paul Jones Circle, Portsmouth, VA 23708 (757) 953-5939 Fax (757) 953-5298, DSN 377-5939

18 March 2019

Thomas S. Rieg, PhD
Research Director

Kersten N. Wheeler, MS
Deputy Director
Division Head,
Research Subjects Protection

June G. Brockman, BA
Division Head,
Research Resources

Joanna E. Fishback, DVM
Major, VC, USA
Division Head,
Laboratory Animal Medicine

From: Deputy, Clinical Investigation Department
To: LT Julia Camp, MC, USN

SUBJ: LETTER OF WAIVER OF IRB REVIEW FOR PROGRAM EVALUATION/QUALITY IMPROVEMENT PROJECT

1. Your project titled, "NMCP.2019.0050: Implementation of Conductive Fabric Mattress to Maintain Normothermia in Scheduled Cesarean Deliveries" does not require IRB review. Navy policy states that these types of program evaluation projects are exempt from IRB review.

2. Projects that do not require IRB approval are not eligible for Clinical Investigation Department travel funds.

3. You will still need to obtain publication approval for the project which is required for all works presented or published outside of NMCP.

4. I remain available and may be reached at (757)953-5939.

Kersten Wheeler
K. N. WHEELER

PAO Clearance for archiving final reports to “USU Archives”

DNP Project Completion Verification Form

Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT
Completion Verification Form

The DNP Project titled: Implementation of a Conductive Fabric Warming Mattress to Maintain Normothermia in Cesarean Deliveries was completed at Navy Medical Center Portsmouth by the following student(s):

(type student name)	*(signature)*	*(date)*
Melissa Bokan, BSN, LCDR, USN	[redacted]	March 19, 2020
Julia Camp, BSN, LT USN		March 19, 2020
Kelly Nagle, BSN, LT, USN		March 19, 2020

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report.

Verified by:

(type name)	*(signature)*	*(date)*
Lauren Suszan, DNP, LCDR, USN	[redacted]	March 19, 2020 Senior Mentor & Phase II Site Director
Michael Rucker, DNP, LCDR, USN		March 19, 2020 Team Mentor

For RNA Students only - add the following additional signature for final verification of project completion:

Kennett Radford, PhD, CDR, USN [redacted]
RNA Project Director *(type name)* *(Signature)* *(Date)*

Form Version: 26 Aug 2017