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"It's a Wrap"

Susan Wood

Submitted to Cris Finn, PhD, RN, FNP in partial fulfillment as Requirement for Publication

Doctor of Nursing Practice Degree

Regis University

April 29, 2019

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Acknowledgement

I would like to express my deepest gratitude to Dr Cris Finn, Capstone Chair, who kept me grounded and focused throughout the entire Doctorate of Nursing Practice program. I would also like to thank the entire staff of DNP professors who dedicate their lives to continue to make a difference in the healthcare field. Their encouragement, constructive critiques, and ability to think outside of the box has prepared me for success as a Regis University graduate.

A heartfelt thank you to my incredibly patient husband Jim, for believing in me, supporting me, and allowing me to fulfill a dream come true. Also, thank you to my daughters Olivia Rose and Emma Grace. You are my true inspiration to always be the best and to reach for the stars.

"You're braver than you believe, stronger than you seem, and smarter than you think." (Winnie-the-Pooh).

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Executive Summary "It's a Wrap"

Problem: Do infants placed in a polyethylene wrap (NeoWrap) immediately after delivery, exhibit less hypothermia upon admission to a Neonatal Intensive Care Unit (NICU), than those who are not placed in a polyethylene wrap?

Purpose: Despite the use of current heat preservation strategies, premature infants remain vulnerable to hypothermia and associated morbidities and mortality. The simple addition of placing an infant immediately in a NeoWrap improves patient outcomes from the moment of birth and can be used as an efficient and effective intervention in preventing hypothermia in preterm infants.

Goal/Objectives: The goal of this project was to examine the utilization of the NeoWrap to decrease admission hypothermia in neonates ranging in gestational age 23 to 33 6/7 weeks born at a Colorado hospital. This project focused on admission hypothermia of preterm infants.

Plan: This was a retrospective review of placing a NeoWrap compared to not utilizing the NeoWrap and the impact on neonatal hypothermia. Dates compared were September 2016 to January 2017 not utilizing NeoWrap compared to September 2017 to January 2018 utilizing.

R**esults:** This comparison study supported the use of NeoWraps for preterm deliveries, which leads to a nominal change in admission hypothermia. The mean admission temperature increased from 98.2 to 98.282 with the use of a Neo Wrap. NeoWraps are a non-invasive and effective intervention to assist in preventing hypothermia in preterm infants.

Recommendations: Wrapping preterm infants 23 to 33 6/7 weeks gestation in a NeoWrap immediately upon delivery results I lower incidence of hypothermia. More research is required on methods to prevent hypothermia of the preterm infant.

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The little darlings! They were indeed darlings, and they were not cats, pug dogs, calves, or pigs, but babies -- babies just big enough to put in your pocket, yet strong enough to emit a shrill wail that pierced through the glass doors of their metal houses, and compelled the nurses to hurry in hot haste (Smith, 1896, p. 770). When the nurses opened the glass doors to take the clean and chubby youngsters out, with blankets over their heads to keep the dear little things from catching cold, the nurses kissed and snuggled them as if they were their very own. Those rosy babies and their attentive nurses were found at 26, Boulevard Poissonière, Paris, one of the many establishments which a philanthropic physician, Dr. Alexandre Lion, of Nice, created for the saving of infant life. The long French sign over the door may be roughly translated "The Baby Incubator Charity," and the entrance-fee of 50 centimes, which visitors were asked to pay, goes for the support of the babes inside. Since the first of the year, over 50,000 men and women passed through the little door, and marveled, not only at the cleanness and domesticity of the place, but at the astonishing results of Dr. Lion's work. From the beginning of time there was a legend that little babies are sent from Heaven. Unfortunately, however, some babies are sent before they are quite expected, and others, even though they are sent at the proper time, are too weak to fight the battle of life. In the words of the antiquated medical books, they were unable, in the early days of their existence, to resist the variations of atmospheric temperature. Frail and feeble, there was nothing left for the poor little tots to do except to die. That is to say, there *was* nothing -- for it is these weakly children whom Dr. Lion had kept alive ever since he invented his "couveuse," or incubator, in 1891 (Smith, 1896, p. 770). Fast forward 121 years, and we continue to search for optimal thermoregulation for babies.

Problem, Recognition, and Definition

Statement of Purpose

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The World Health Organization classifies neonatal hypothermia as mild 36.0-36.4C (96.8-97.5F), moderate 32-35.9C (89.6-96.6 F), and severe (<32C/89.6 F) (Cordaro, Phalen, & Zukowsky, 2012). Hypothermia plays an important role in infant mortality and morbidity, which in turn challenges providers to maintain euthermia as a critical component in the prevention of adverse outcomes associated with hypothermia.

Evaporative heat loss is a major contributor to hypothermia in premature newborns following delivery (Godfrey, Nativio, Bender, & Schlenk, 2013). The aim of this quality improvement initiative is to decrease admission hypothermia in premature infants by immediately placing the infant in a NeoWrap polyethylene product. A potential change in clinical practice to include the use of a NeoWrap was investigated utilizing retrospective data which should support the improved admission hypothermia and improve the standard of care in Neonatal Intensive Care Units.

Problem Statement

Premature and low birthweight newborns remain vulnerable to hypothermia as well as associated morbidities and mortality despite decades of searching for answers (Fawcett, 2014). The vulnerable population for this project included preterm infants born at a Colorado Neonatal Intensive Care Unit (NICU), ranging in gestational age from 23 to 33 6/7 weeks. Hypothermia is not only an infant being cold, it also leads to serious consequences including respiratory distress, hypoglycemia, and poor circulation (Gomella, 2013).

PICO

Assessment of the patient is the foundation of any nursing intervention. Zaccagnini and White (2012) state that, to practice evidence-based nursing, a properly formulated question

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regarding the patient population (P), intervention (I), comparison (C), and outcome (O) assists in formulating the research question.

Do neonates ranging in gestational age from 23 to 33 6/7 weeks who are placed in a polyethylene wrap immediately after delivery exhibit less hypothermia upon admission to the Neonatal Intensive Care Unit (NICU) than those who are not placed in a polyethylene wrap?

Problem/Population. The vulnerable population for this project includes preterm infants born at a Colorado NICU ranging in gestational age from 23 to 33 6/7 weeks. Despite decades of efforts to reduce hypothermia in premature and low birthweight infants, many remain vulnerable to hypothermia and associated morbidities and mortality.

Intervention. Interventions for this project involved wrapping infants in a non-sterile polyethylene wrap (NeoWrap) from the neck down the body, leaving only the head exposed, immediately after birth.

Comparison. Admission axillary temperatures of preterm infants 23 to 33 6/7 weeks of age delivered at a Colorado hospital from September 2016 to January 2017 were compared with the admission axillary temperatures of preterm infants 23 to 33 6/7 weeks delivered at the same facility between September 2017 and January 2018 following the introduction of polyethylene wraps.

Outcome. The results from this comparison supported the findings that polyethylene wraps used for preterm deliveries at 23to 33 6/7 weeks gestation lead to a decrease in admission hypothermia at the NICU, demonstrating that wraps are a safe and efficient intervention to assist in preventing hypothermia in preterm infants.

Resulting Question. Do neonates ranging in gestational age from 23 to 33 6/7 weeks who are placed in a polyethylene wrap immediately after delivery exhibit less hypothermia upon

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admission to the Neonatal Intensive Care Unit (NICU) than those who are not placed in a polyethylene wrap?

Significance, Scope, and Rationale

In the neonatal period, hypothermia is a serious, life-threatening condition (Cagler, Gozen, & Ince, 2014). Thermoregulation of a preterm infant, especially in the first 12 hours of life, is crucial to reduce the mortality and morbidity rates. The World Health Organization currently recommends standard infant care, including applications to reduce heat loss, such as using a radiant warmer, removing wet linens, and wrapping infants in a pre-warmed blanket. These measures fall short of keeping the body heat within normal range (Cagler, Gozen, & Ince, 2014). Continuing nursing education is one way of bridging the knowledge gap and leading us to improved patient outcomes. Even the baby steps we take can lead to change of practice.

Theoretical Foundations

Providing holistic care to a family during the crisis of a premature birth challenges providers to provide best practice based on the current research by identifying proper theoretical nursing models to navigate this delicate situation. Levine's middle range theory Conservation Model was utilized and adapted to assist in promoting family integrity.

Levine's Conservation Model

The nursing profession's focus is not only on the physical skills of nursing but also on the skill of dealing with patients, families, and coworkers. "Levine's original reason for writing Introduction to Clinical Nursing in 1969 was to find a way to teach the foundations of nursing that would focus on nursing itself and was organized in such a way that students would learn the skill as well as the rationale for it" (Parker, 2010, p. 84). Levine's Conservation Model focuses on the whole person and, in this study, the tiniest of persons. Outcomes are reflected by

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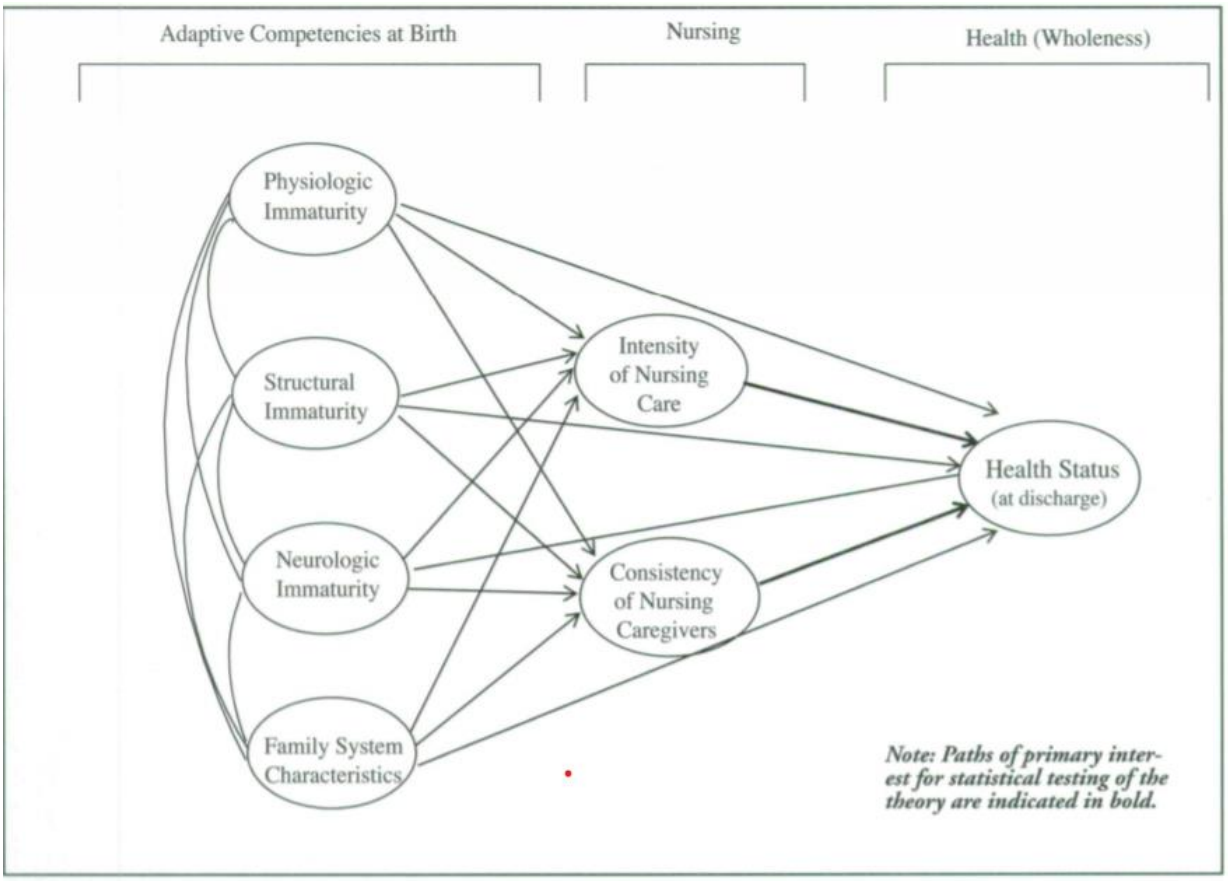
physiologic stability, growth, minimal injury, neurodevelopmental competence, and the stability of the family system with integration of the infant in the family (Mefford & Alligood, 2011). This correlates with neonatal nursing focusing on family centered care. It is important to focus not only on the physical skills of nursing, but also the skills for dealing with the patients, family, and coworkers. Nearly 50 years have passed, and we continue to bring practice and research together (Parker, 2010, p. 84).

Figure I: Levine's Conservation Model



Findings of Mefford and Alligood's (2011) theory related to preterm infant's and Levine's Conservation Model (2011) indicate that consistency of nursing caregivers is an important component of health promotion for preterm infants and suggest that neonatal nurses should emphasize and promote consistent caregiving. Neonatal nurses' ability to connect with

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infant's unique modes of communication and know the family should be better able to design and implement holistic nursing care interventions supporting adaptive efforts of the infant and family, and consequently restoring health. To advance the discipline of nursing and to improve patient outcomes, it is essential to develop a strong theory and research foundation upon which to base nursing practice. The Theory of Health Promotion for Preterm Infants based on Levine's Conservation Model of Nursing holds potential as a theoretical framework to guide neonatal nursing practice and improve the health outcomes of nursing's tiniest patients (Mefford & Alligood, 2011).

Literature Selection

An extensive, systematic review of literature was accomplished utilizing the basics of hypothermia and premature infants. The selection process began with 1,125 articles followed by narrowing the search with keywords hypothermia, prematurity, preterm infants, quality improvement, DNP Capstone, Project, NICU, NeoWrap, and polyethylene wrap. Reports, expert opinions, and cohort surveys were also utilized. Search engines utilized included Cumulative Index to Nursing and Allied Health Literature (CINAHL) 22 articles, Google Scholar four articles, Cochrane Review 11 articles, MEDLINE 17 articles, and Excerpta Medica dataBASE (EMBASE) six articles. CINAHL provided the highest return of article quantity and quality. A total of 60 articles were reviewed from these searches. The resulting systematic literature review yielded 35 quality articles. These articles were chosen for their design and content related to the PICO question.

The Seven-Tiered Levels of Evidence from Houser and Oman (2011) was the literature review tool applied for evidence-based research.

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Level 1: Evidence from at least one Randomized Control Trial (RCT) or Evidence Based Practice (EBP) guidelines based on a systematic review of RCTs (12 articles).

Level 2: Evidence from at least one RCT (7 articles).

Level 3: Evidence from controlled trials without randomizations (5 articles).

Level 4: Well-designed case-control and cohort studies (2 articles).

Level 5: Systematic reviews of descriptive and qualitative studies (3 articles).

Level 6: Single descriptive study or qualitative study (2 articles).

Level 7: Expert opinion, regulatory opinion and/or reports of expert committees (4 articles) (Houser & Oman, 2011).

The 35 journal articles were systematically reviewed and templated using the Systematic Review Evidence Table Format adapted with permission from Thompson (2011) (Attachment A). Critical appraisal of the literature included steps to include during the critiquing process which in turn led to patterns of studies, results, and changes in practices. Limitations of studies was helpful in identifying the need for this project. The literature review established that hypothermia remains a historical issue with preterm infants. Neonatal hypothermia is a multifactorial event in which a collaborative approach is preferred, and further studies are required to continue to assess the need for improved practices.

Vital informational sections relevant to this quality improvement project were the study aim/purpose and the methodology used. The studies used varying population sizes, from small single NICUs to multi-center randomized trials conducted over the span of years. Studies in destitute third world nations to our nations highly technical NICU's were each represented in the review of literature. (See Appendix A Literature Review).

Review of Evidence

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Background

Chism (2013) noted that historically, society's needs affect the development of healthcare. The 1970s saw the need for increased primary care providers in underserved and impoverished areas (Fastman, Howell, Holzman, & Kleinman, 2014). Nurse practitioners responded with high-quality healthcare, leading to improved health for this vulnerable population. Nearly 50 years later, Zaccagnini (2018) argued that our nation's health care and healthcare delivery systems need a drastic change if they are to provide the public with quality healthcare. It is our responsibility to advocate vulnerable patients. With the enhancement of clinical, leadership, research, economic, and organizational skills, attaining this goal by seeking opportunities to incorporate current evidence into daily clinical practice would benefit preterm infants. Houser and Oman (2011) state that the opportunity to integrate evidence to practice leads to resolving issues by reviewing the evidence. Evidence-based practice encourages clinicians to better articulate change into practice efficiently. Nurse-sensitive outcomes manifest in the form of delivery room management, team effort, and improved communication with team members. Patient-sensitive information were in the form of improved admission hypothermia data, decreasing multi-system organ involvement, and improving patient outcomes.

Organizational impact includes decreased patient days, improved patient outcomes, and patient/family satisfaction. The education of health professionals on the most current evidence should influence patient and organizational productivity while at the same time maintaining the family unit.

Systematic Review of Literature

Articles that reflected information regarding hypothermia, prematurity, and occlusive wraps were reviewed. The articles were chosen for their relevance to this quality improvement

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project. The findings demonstrated the feasibility of conducting a study focused on hypothermia in preterm infants in the delivery room. The review of literature also reinforced the necessity of continuing to search for the safest, most cost effective and most efficient care of infants in the first moments of life. Keywords included but were not limited to the following: heat loss, hypothermia, preterm, newborn, body temperature, vinyl isolation bag, polyethylene wraps, gestational age neonatal intensive care, transition, resuscitation, quality indicators, practice improvement, cold stress, and environmental temperature.

The themes added here. What did the lit review yield? Be sure you include all the articles you reference in the reference paper not related to theory, or stats.

Project Plan and Evaluation

Market/Risk Analysis

Evaporative heat loss is a major contributor to hypothermia in a premature newborn following delivery (Godfrey, Nativio, Bender, & Schlenk, 2013). The aim of this quality improvement initiative was to improve admission hypothermia in premature infants by immediately placing the infant in a NeoWrap polyethylene product. A change in clinical practice included the use of a NeoWrap, based on retrospective data collection, that would result in improved admission hypothermia at a Colorado hospital and become a standard of care in this NICU.

Project Strengths, Weaknesses, Opportunities, and Threats

Premature infants are born without adaptive mechanisms required for survival outside of the womb (Cordaro, Phalen, & Zukowsky, 2012). These fragile infants require special interventions initiated before delivery. Interventions currently in use include hats, prewarmed blankets, increasing delivery and operating room temperatures, radiant warmers, and skin-to-skin

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contact with the mother as soon as possible (Caglar, Gozen, & Ince, 2014). Regardless of these actions, premature infants remain at risk for hypothermia and complications associated with hypothermia (Cordaro et al., 2012). Implementing current evidence-based practice research regarding admission hypothermia recommend including a simple and inexpensive polyethylene wrap that may prove to be an efficient tool in the delivery room to assist in obtaining normothermia in preterm infants (McCall, Alderdice, Halliday, Johnston, & Vohra, 2014).

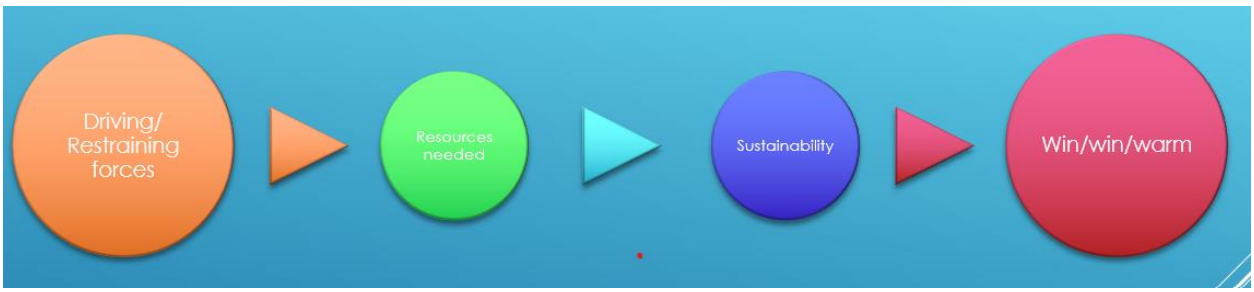
McCall et al. (2014) noted that admission hypothermia to the Neonatal Intensive Care Unit (NICU) is not always a complication of prematurity but is at times the result of inattentiveness on the part of healthcare providers. This is a warning for providers to continue to ask why the care we are currently providing is insufficient for premature infants. (Appendix B, SWOT).

Feasibility/Risks/Unintended Consequences

The driving forces for this project involve every preterm infant delivered at the chosen Colorado hospital. Only a single resource was required for this study, a NeoWrap. Sustainability for this project is strong, requiring a par level of NeoWraps to be available for use in the NICU.

The feasibility of this quality improvement project evaluated the effect upon every preterm infant delivered at this Colorado hospital. There was no safety risk identified or unintended consequences with the use of a NeoWrap. This was a win/win/warm project.

Figure II: Feasibility



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Stakeholders and Project Team

The primary stakeholders started with the preterm infants delivered at this Colorado hospital, families, healthcare facility, healthcare providers, and the community. The project team included Susan Wood, Neonatal Nurse Practitioner (NNP) as the primary researcher, LeeAnn Blaskowsky, NNP Preceptor, and Dr Cris Fin, Family Nurse Practitioner (FNP), Regis University Capstone Chair.

Cost/Benefit Analysis

A NeoWrap is a medical grade polyethylene occlusive wrap clinically proven to effectively reduce postnatal temperature decline and evaporative heat loss in very low birth weight and premature infants (McCall et al., 2014). The cost of each NeoWrap is $2.75 or $27.50 for a box of 10 or $60.50 for a box of 25 (Cordaro, Phalen, & Zukowsky, 2012). Each infant only uses one wrap. The par level is ordered based on delivery service of the healthcare facility. The Colorado hospital where the study was conducted has a contracted vendor for supplies. The cost of the NeoWrap at this particular healthcare facility included this cost in the bundled admission charge for the NICU. Additional costs of bedside training of application and use of the NeoWrap was conducted on the job or even at the bedside during an admission. Fisher and Paykel manufacture the specific NeoWrap used in this project (Fisher & Paykel Healthcare, 2019). According to the National Institute of Health, the average cost of preterm births in the United States is $26.2 billion per year (Behrman & Butler, 2007).

Mission

Empower neonatal care providers with the most recent evidence-based practice guidelines, education, skill set, and commitment to excellence in providing preterm infants a normothermic environment from the moment of birth.

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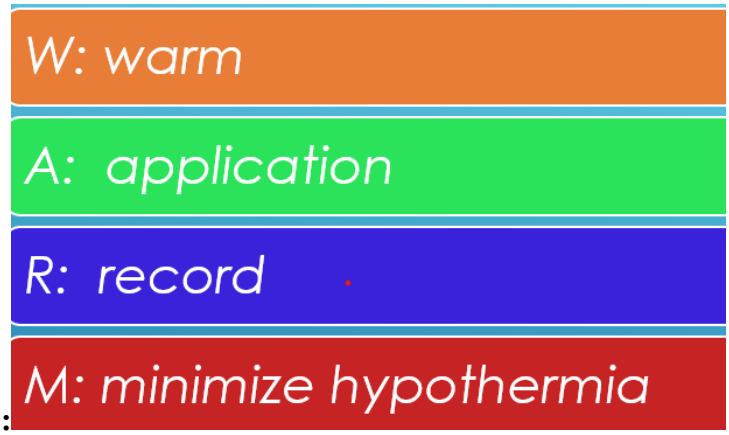
Figure III: Vision

Vision



Decrease or potentially eliminate admission hypothermia in premature infants with consistent, precise, and collaborative use of NeoWraps in the delivery.

Goals/Objectives

The primary goal for this quality improvement project focused on admission hypothermia of preterm infants and the potential quality improvement measures involved with a NeoWrap. Improving temperature regulation in preterm infants requires healthcare professionals to attain/acquire education in the appropriate use of a NeoWrap, review of pathophysiology related to hypothermia, and support in maintaining education and a quality improvement tracking system. A concerted effort approach included staff awareness, education of hypothermia in the preterm infant, and additional use of a polyethylene wrap (NeoWrap) immediately following delivery of infants 23 to 33 6/7 weeks gestation delivered at a Colorado hospital.

Short term goals accomplished with continued and consistent use of NeoWrap included a change in practice to utilize a Neo Wrap for infants 23 to 33 6/7 weeks gestation immediately

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following delivery that decreased hypothermia in neonates ranging in ages 23 to 33 6/7 weeks gestation, and a decrease in multisystem organ complications related to admission hypothermia.

Long-term goals related with this hypothermia quality improvement project involved ongoing education to new orientees and staff, stressing the importance of thermoregulation and complications related to hypothermia in the preterm infant, ongoing chart reviews to identify admission hypothermia, continued literature reviews on hypothermia of preterm infants, and reviews of new products available for thermoregulation use with preterm infants.

Communicating information gathered to administration and collaborating with practitioners and sister facilities within the healthcare system while proposing a journal club with sister facilities to present unit challenges such as admission hypothermia will positively impact healthcare professionals at multiple healthcare locations. Presentation of findings were offered at Unit Based Practice Council (UBPC), Neonatal Nurse Practitioner (NNP) meetings, staff meetings, annual skills review, and nursing students completing their NICU clinicals.

Logic Model

Resource steps utilized to accomplish this quality improvement project on hypothermia of the preterm infant included the following:

- Support of-nursing staff, NNPs, and Medical Director to address challenges of admission hypothermia in the NICU
- Clarify process with Regis Advisor and DNP mentor
- Present Capstone Project to Medical Director and UBPC committee
- Letter of permission to access client information from Baby Steps Program, Mednax, from Medical Director
- Identify current knowledge gaps regarding hypothermia and cascading effects of the preterm

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infant

- Compare internal data from Centura Healthcare system regarding admission hypothermia
- Identify differing practice of use of Neo Wrap vs non NeoWrap facilities within the same healthcare system
- Contact facilities management to assess cost of Neo Wrap currently in central supply chain at sister facility
- IRB Approval

Activities required to accomplish the goal of decreased admission hypothermia include the following:

- Review/research adverse events that are complicated by admission hypothermia in preterm infants with a systematic literature review
- Assess system feasibility, improved patient outcomes, and potential adjustment in admission hypothermia protocol
- Implementation of quality improvement project at LAH with use of NeoWrap with infants 23 to 33 6/7 weeks gestation immediately following delivery
- Present research to unit educator and update on process of Capstone Project
- Present evidence-based protocol to Unit Based Practice Council (UBPC), Medical Director, and collaborating practitioners for potential review of hypothermia protocols
- Conduct education for nursing staff regarding protocol and admission hypothermia
- Nursing/admitting staff will appropriately and consistently use NeoWraps for preterm deliveries 23 to 33 6/7 weeks gestation

Advanced nursing practice outcome measures included nursing staff who appropriately and consistently use NeoWraps for preterm deliveries 23 to 33 6/7 weeks gestation, documentation of

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admission hypothermia, a decrease of complications related to admission hypothermia, and a continued team approach to education and the use of NeoWrap to new members of the NICU team (Appendix C).

Research Design

The primary objective of this quality improvement project was to compare admission temperatures in infants ranging in gestational age from 23 to 33 6/7 weeks. Admission temperatures of pre- and post- use of polyethylene wraps immediately following delivery were documented. After Institutional Review Board's (IRB) approval from Centura (Appendix D) and Regis University (Appendix E), (see Appendix F and G for Letter of Intent and Response to Letter of Intent), retrospective data was used to compare admission data in the Mednax computer system associated with the Pediatrix Medical Group.

Population

The vulnerable population for this project included preterm infants born at a Colorado, NICU ranging in gestational age from 23 to 33 6/7 weeks. The sample size for this quality improvement project was based on the number of deliveries at this Colorado hospital for the time frame of September 2016 to January 2017 (19 neonates) compared to deliveries from September 2017 to January 2018 (11 neonates). Data was collected after IRB approval was obtained. This population was chosen when admission hypothermia was consistently noted upon admission to the NICU.

Setting

The setting for this research was conducted in a 14-bed NICU in Colorado with a full-service Birth Center which provides obstetrical, gynecological, and neonatal services. This sample population and setting seemed ideal as we tracked deliveries prior to the implementation

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of using NeoWraps as well as after the education and implementation of the NeoWraps.

Methodology

This was a retrospective comparison of prior wrap utilization to wrap utilization in neonate admission temperatures based at a Colorado NICU. Documentation of admission temperatures were recorded for preterm infants ranging gestational age from 23 to 33 6/7 weeks. Comparison of data collected for the period September 2016 to January 2017 without using the NeoWrap was made with that for the period September 2017 to January 2018 with using the NeoWrap. The non-NeoWrap group contained 19 preterm infants, while the group using the NeoWrap contained 11 preterm infants.

The primary purpose of this Capstone Project was to improve NICU admission temperatures of premature infants born at 23 to 33 6/7 weeks gestation by wrapping them immediately after delivery in a polyethylene wrap (NeoWrap) from the neck down, evaluate and implement current NICU protocol regarding temperature regulation, and establish a collaborative change in clinical practice for thermoregulation of the preterm infant as indicated.

This project focused on admission hypothermia of preterm infants and the potential quality improvement managed with a NeoWrap. In order to improve temperature regulation in preterm infants, healthcare professionals required education in the appropriate use of the NeoWrap, a review of pathophysiology related to hypothermia, and support in maintaining education and a quality improvement tracking system. A concerted effort approach included staff awareness, education of hypothermia in the preterm infant, and additional use of a polyethylene wrap (NeoWrap) immediately following delivery of infants 23 to 33 6/7 weeks gestation delivered at a Colorado NICU.

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Primary outcome measurement of the axillary temperature was routinely taken during the admission process to the NICU. The axillary temperature was measured with a Covidien Filac 3000 digital thermometer. Infants were either skin to skin (NeoWrap to skin) with mom or under a radiant warmer and wrapped in a NeoWrap. The findings were then entered into the electronic medical record and transferred to the Baby Steps (Mednax) admission note.

Retrospective data obtained from neonatal admissions in the NICU via Mednax Baby Steps computer program was extrapolated and included infants 23 to 33 6/7 weeks gestation admitted to the NICU from September 2016 to January 2017. Admission temperatures were then compared with admission temperatures of infants delivered from September 2017 to January 2018 at LAH ranging in gestational age of 23 to 33 6/7 weeks.

This small-scale project aimed to determine admission temperature variabilities when using a NeoWrap immediately after delivery of 23 to 33 6/7 weeks gestation infants to not using a NeoWrap. Numbers obtained per preterm deliveries during the specified time range.

Quality improvement methods have been used in the business world for many years (Zaccagnini & White, 2017). The earliest quality improvement tools were developed during World War II and continue to be used in healthcare quality improvement today. Shewhart (2017) first developed the PDCA cycle as a methodology for quality improvement. PDCA consists of the following steps:

1. Plan
    - Collect data
    - Analyze data
    - Plan the intervention
2. Do

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- Develop and test potential solutions

3. Check
    - Measure efficacy of solutions
    - Analyze outcomes for needed adjustments to solutions
4. Act
    - Modify the plan as needed (Zaccagnini & White, 2017).

Statistical tests performed included the t- test, the Likert -type scale, and univariate analysis. Univariate analysis is used when examining the characteristics of only a single variable, which, in this Capstone project, is the NeoWrap (Terry, 2008). When comparing the performance of the two groups to determine if a difference exists, a t-test was utilized (Polit, 2010).

Polit (2010) defines power analysis as the procedure for estimating either the sample size needed to minimize the risk of a Type II error or the power of a statistical test, that is, its likelihood of committing a Type II error. Power analysis involves four components: 1) significance of criteria, 2) power, 3) population effect size, and 4) sample size.

Interpreting quantitative evidence includes the following steps (Zaccagnini & White, 2017):

1. Examining the results from data.
2. Exploring the significance of findings.
3. Identifying study limitations.
4. Forming conclusions.
5. Generalizing the findings.
6. Considering the implications for nursing.
7. Suggesting further studies.

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In addition to above, Zaccagnini and White (2017) note three questions to ask when appraising quantitative data: 1) Is the study valid? 2) Is the study reliable? and 3) Is the study applicable in the identified case?

Protection of Human Subjects

This was a retrospective review of health records, so all data was de-identified, and no patient names were utilized. The Internal Review Board (IRB) level is exempt with approval (Appendix D and E) received in November 2018. Codes compared were gestational age and admission temperatures. All data was stored on a password protected computer in a private home office. The Collaborative Institutional Training Initiative (CITI) was successfully completed by the researcher and Capstone Chair (Appendix H and I). Approval letter from the health care facility by the Medical Director of the NICU was received prior to the study's initiation (Appendix D).

Data Collection

Primary outcome measurement of the axillary temperature routinely taken during the admission process to the NICU. The axillary temperature was measured with a Covidien Filac 3000 digital thermometer. Infants would be either skin to skin (NeoWrap to skin) with mom or under a radiant warmer and wrapped in a NeoWrap. The findings were then entered into the electronic medical record and transferred to the Baby Steps (Mednax) admission note. Fisher and Paykel manufacture the specific NeoWrap used in this project (Fisher & Paykel Healthcare, Year).

The timeline for the study was initiated in May 2017 with the start of the DNP program at Regis University. IRB application and submission were made in August 2018 and approval received in November 2018. Data collection started immediately and continued through

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December 2018. Data analysis, retrospective health care records access, and statistical test run continued until March 2019. Oral defense of Capstone was successfully completed in April 2019. The final written project was submitted in April 2019, with the final submission to the library for publication due in August 2019 (Appendix J).

Data Analysis

The goal of this project was to decrease admission hypothermia in neonates ranging in gestational age 23 to 33 6/7 weeks born at a Colorado hospital, based on the implementation of a NeoWrap. The primary focus of the project was admission hypothermia of preterm infants and the potential quality improvement by implementing the use of a NeoWrap.

Findings

The level of measurement involving temperatures was incremental and considered as interval data, while the comparison had two categories of temperatures: with NeoWrap and without NeoWraps. Field (2018) notes that if the difference between the samples collected for t-test is larger than expected based on two standard errors then one of two things has happened:

1. There is no effect but sample means from our population fluctuate a lot and we happen to have collected two samples that produce very different means
2. The two samples come from different populations, which is why they have different means and this difference is, therefore, indicative of a genuine difference between the samples. In other words, the null hypothesis is unlikely (Field, 2018).

Based on the level of data collection, an Independent *T*-Test and Levene's Test for Equality of Variances was performed for this project. Polit (2010) states that a *t* test for comparing group means is appropriate when the participants in the two groups are neither the same people nor connected to one another in a systematic way (Polit, 2010). Levine's test for equality of

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variances were utilized as a statistical test to test the null hypothesis that the variances of groups being compared are equal in the population (Polit, 2010). The NeoWrap was the independent variable and the admission temperature was the dependent variable.

Reliability and Validity

The reliability of this quality improvement project was concrete because it compared the same data on each patient (admission temperature) using the same instrument. The validity was scientifically sound, with the constant variable in the form of a NeoWrap. This vulnerable population would benefit immensely by improving thermoregulation during the delivery and resuscitation process. A strengths, weaknesses, opportunities, and threats (SWOT) analysis was used as a guideline for this project (Appendix B).

A Cronbach's Alpha test for reliability was run with the research data but was inconclusive. Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items (University of Virginia Library, 2019). The reliability of any given measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach's alpha is one way of measuring the strength of that consistency. Cronbach's alpha is computed by correlating the score for each scale item with the total score for each observation (usually individual survey respondents or test takers), and then comparing that to the variance for all individual item scores (University of Virginia Library, 2019).

Levene's Test for Equality of Variances the equal variances assumed was utilized. The p-value of .788 demonstrates that the changes in mean admission temperatures was statistically not significant.

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Table I: Levene's Test for Equality of Variances

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
TEMP	Equal variances assumed	.048	.828	-.271	28	.788	-.0818	.3019	-.7002	.5365
	Equal variances not assumed			-.260	18.457	.798	-.0818	.3150	-.7423	.5787

usa

Descriptive Statistics

Pearson's correlation table showed the following significant findings:

1. 0.714 temperature no wrap vs mean blood pressure no wrap
2. 0.653 heart rate with wrap vs respiratory rate no wrap
3. 0.626 respiratory rate with wrap vs gestational age no wrap

The first example of temperature no wrap vs mean blood pressure (0.714) could indicate that an infant without a wrap has a higher mean blood pressure upon admission to the NICU. This could potentially lead to complications such as intraventricular hemorrhage, unstable hemodynamics, and end organ dysfunction. Next, a 0.653 heart rate with wrap vs respiratory rate no wrap could possibly indicate that an infant with the wrap has a more stable heart rate than an infant without a wrap could be having complications of respiratory distress related to hypothermia. Finally, example 3 indicates (0.626) that an infant with a wrap has a higher respiratory rate when related to gestational age without a wrap. (See Appendix K).

Discussion

Premature infants are born without adaptive mechanisms required for survival outside of the womb. These fragile infants require special interventions that are initiated before delivery. Currently, highly skilled neonatal teams including nurses, respiratory therapists, nurse

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practitioners, and physicians provide necessary equipment and supplies in the NICU and delivery rooms in preparation for managing thermoregulation requirements. Interventions currently in use include hats, prewarmed blankets, increasing delivery and operating room temperatures, radiant warmers, and skin-to-skin contact with the mother as soon as possible. Regardless of these actions, premature infants remain at risk for hypothermia and complications associated with hypothermia (Cordaro, Phalen, & Zukowsky, 2012). Implementing current evidence-based practice research regarding admission hypothermia that recommends including a simple and inexpensive polyethylene wrap proved to be an efficient tool in the delivery room to assist in obtaining normothermia in preterm infants.

Nurse-sensitive outcomes would manifest in the form of delivery room management, team effort, and improved communication with team members. Patient-sensitive information would be applied in the form of improved admission hypothermia data, decreasing multi-system organ involvement, and improving patient outcomes. Organizational impact would include decreased patient days, improved patient outcome, and patient/family satisfaction. The education of health professionals on the most up-to-date evidence would influence patient and organizational productivity while at the same time maintaining the family unit in an extremely stressful environment.

The independent groups *t*-test analysis included 19 infants in the non NeoWrap group with a mean admission temperature to the NICU as 98.2 degrees Fahrenheit, a standard deviation of 0.7498 and a standard error mean of 0.1720. Eleven infants in the with NeoWrap group *T*-test analysis results showed the mean scores of admission temperature in the with NeoWrap groups mean admission temperature was 98.282 (slight increase), standard deviation of 0.8750, and a standard error mean of 0.2638. The independent *t*- test showed a slight mean increase of

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admission temperatures with the NeoWrap, although not statistically significant. However, clinical findings are significant for each preterm infant placed in a NeoWrap.

Table II: Independent *t* Test

Group Statistics

	NWWW	N	Mean	Std. Deviation	Std. Error Mean
TEMP	0	19	98.200	.7498	.1720
	1	11	98.282	.8750	.2638

Limitations

Limitations for this quality improvement project included data collection at a single healthcare facility, low delivery rate (150-200 babies/month), limited study time, and limited time for education of qualified healthcare team members.

Variables identified for this quality improvement study included NeoWrap as the independent variable and admission temperature upon NICU admission as the dependent variable. Extraneous deviations to the study included conduction, convection, evaporation, and radiation as forms of heat loss potentials for preterm infants. Additional variables to heat loss include weight of infant, subcutaneous fat stores of infant, fetal status during labor, single vs multiple gestation, resuscitation efforts, human error in transfer of admission temperature and axillary temperatures, covering of the infant's head, and maternal health status.

Recommendations

Advanced nursing practice outcome measures included nursing staff that appropriately and consistently used NeoWraps for preterm deliveries at 23 to 33 6/7 weeks gestation, documentation of admission hypothermia, a decrease of complications related to admission hypothermia, and a continued team approach to education and the use of NeoWrap to new members of the NICU team.

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Continuing education with new orientees and staff regarding the importance of thermoregulation and complications from hypothermia in the preterm infant would be a crucial element of changing current practice. Documentation of admission temperatures in the NICU is necessary to continue the research process and identify effectiveness of utilizing a NeoWrap immediately after delivery of a preterm infant. A journal club with current evidence-based practice and problem-solving resolutions within the healthcare system would be a positive environment for continued education along with education at monthly and quarterly staff meetings.

In addition, I would recommend continuing this study. Retrospective data could be effortlessly obtained for longer time spans while collecting current and ongoing data. I could also look at conducting a longitudinal research project using additional variables such as multiple temperatures taken at 15-minute intervals, documentation of room temperature, and weight of the infant. I would include additional facilities with larger patient population and lower gestational age census. I would encourage additional healthcare givers to assist in the process of instituting the NeoWrap to the NICU.

Implications for Practice

Hypothermia has been a challenge with preterm infants for centuries. Despite the use of current heat preservation strategies, premature infants remain vulnerable to hypothermia and associated morbidities and mortality. The use of an occlusive skin wrap has been studied since the late 1960s as a method for heat loss prevention in infants at birth (Cordaro et al., 2012). The simple act of placing an infant immediately in a NeoWrap for improved patient outcomes from the moment of birth seems a small miracle that something simple is reflected in this small-scale quality improvement project and could potentially make a dramatic difference in tiny human

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outcomes. McBride (2011) states, “If you are going to have a vision, it may as well be for excellence.”

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Appendix A: Systematic Review of the Literature

Article/Journal	*Newborn & Infant Nursing Review* Challenges of minimizing heat loss at birth: a narrative overview of evidence based thermal care interventions	*U.S. National Library of Medicine* Warming mattress versus polyethylene wrapping to prevent hypothermia in preterm newborns
Author/Year	McCall, E. Aldendace, F., Halliday, H., Johnston, L., & Vohra, S. 2014	Dannaway, D., Simon, P.L., & Esocobedo, M. 2009
Database/Keywords	Heat loss Hypothermia Birth Thermal care interventions	Hypothermia Prevention ELGANs (Extremely low gestational age neonates) Polyethylene wrap Sodium acetate transport mattress
Research Design	Systematic reviews Randomized/quasi-randomized controlled trials	Allocation: Randomized Intervention Mode: single group assignment Masking: none (open label)
Level of Evidence		
Study Aim/Purpose	Assess effectiveness of interventions to prevent hypothermia in preterm and low birth weight infants.	Maintaining mean axillary temperatures, during NICU resuscitation upon admission to the NICU, to not differ between VLBW babies who are occlusively wrapped and VLB babies who are placed on thermal warming blankets.
Population/Sample size Criteria/Power	Varied with study Table 1-393 Table 2-1739 Table 3-3714	36 neonates ranging 24-28 weeks gestation <1250 grams
Methods/Study Appraisal Synthesis Methods	Electronic data bases Cochrane Review DARE EMBASE CINAHL ZETOC MEDLINE	Interventional: Infa Therm blanket vs Neo Wrap polyethylene wrap
Study tool/instrument validity/reliability	Temperature	Admission temperatures to NICU

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Primary Outcome Measures/Results	Temperature Normothermia	Admission temperatures
Conclusions/Implications	Basic thermal are regulations should be revisited Thermal care strategies Low cost options	Blankets temperature/Standard Deviation 36.5 (0.67) Wrap temperature/Standard Deviation 36.1 (0.66) Total 36.3(0.66)
Strengths/Limitations	Hypothermia is not a complication of prematurity; it is a consequence of healthcare provider inattentiveness.	Technical difficulties with polyethylene wrap (variations of use, heat loss during pulse oximeter adjustment)
Funding Source	None noted	None noted
Comments	Future research to include long term neurodevelopmental problems Keep infants warm/avoid harm	Difficult study to follow Good graphs Reported errors in study Exclusions noted

STUDENT NAME: Susan Wood Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), Evidence-based practice: An implementation guide for healthcare organizations (p. 155). Sudbury, MA: Jones and Bartlett.]

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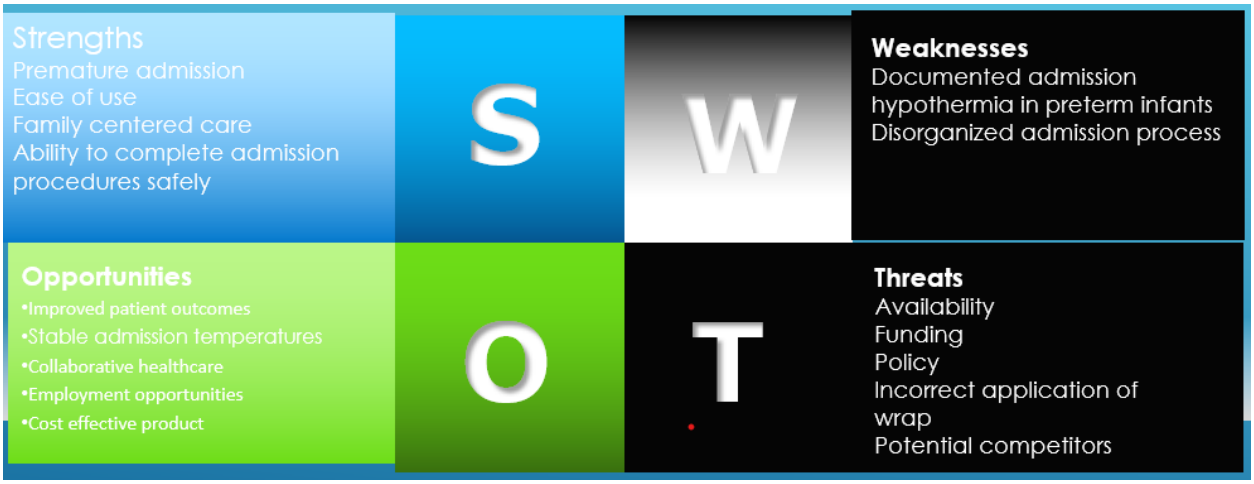
Appendix B: SWOT



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Appendix C: Logic Model

RESOURCES	ACTIVITIES	OUTPUTS	SHORT & LONG-TERM OUTCOMES	IMPACT
In order to accomplish our set of activities we will need the following:	*In order to address our problem or asset we will accomplish the following activities:*	*We expect that once accomplished these activities will produce the following evidence of service delivery:*	*We expect that if accomplished these activities will lead to the following changes in 1-3 then 4-6 years:*	*We expect that if accomplished these activities will lead to the following changes in 7-10 years:*
Support of-nursing staff, NNP's, and Medical Director to address challenges of admission hypothermia in the Littleton Adventist Hospital (LAH) NICU Clarify process with Regis Advisor and DNP mentor Present Capstone Project to Medical Director and UBPC committee Letter of permission to access client information from Baby Steps Program, Mednax, from Medical Director Identify current knowledge gaps regarding hypothermia and	Review/research adverse events that are complicated by admission hypothermia in preterm infants with a systematic literature review Assess system feasibility, improved patient outcomes, and potential adjustment in admission hypothermia protocol Implementation of Pilot Study at LAH with use of NeoWrap with infants 23-33 6/7 weeks gestation immediately following delivery Present research to unit educator and update on process of Capstone Project	Nursing/admitting staff will appropriately and consistently use NeoWraps for preterm deliveries 23-33 6/7 weeks gestation Documented admission hypothermia will decrease along with complications related to admission hypothermia Continued team approach to education and use of Neo Wrap to new members of the NICU team	Change in practice to include use of Neo Wrap for infants 23-33 6/7 weeks gestation immediately following delivery Decreased hypothermia in neonates admitted to LAH ranging in ages 23-33 6/7 weeks gestation Decrease in multisystem organ complications relating to admission hypothermia Ongoing education to new orientees and staff of the importance of thermoregulation and complications related to hypothermia in the preterm infant	Ongoing education to new orientees and staff of the importance of thermoregulation and complications from hypothermia in the preterm infant Ongoing documentation of admission temperatures in NICU Continue journal club with current evidence-based practice and problem-solving resolutions within healthcare system

Evaluation Logic Model Guide, W.K. Kellogg Foundation, Page 54

cascading effects of the preterm infant Compare internal data from Centura Healthcare system regarding admission hypothermia Identify differing practice of use of Neo Wrap vs non Neo Wrap facilities within same healthcare system Contact facilities management to assess cost of Neo Wrap currently in central supply chain at sister facility IRB Approval	Present evidence-based protocol to Unit Based Practice Council, Medical Director, and collaborating practitioners for potential review of hypothermia protocols Conduct education for nursing staff regarding protocol and admission hypothermia		Continued chart reviews to identify admission hypothermia Ongoing literature reviews on hypothermia of preterm infants Ongoing review of new products available for thermoregulation use with preterm infants Communicate information gathered to administration, collaborating practitioners, and sister facilities within healthcare system Potential initiation of a journal club with sister facilities to present unit challenges such as admission hypothermia Poster or Podium presentation of findings in regional or national professional forum	

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Appendix D: Centura Letter of Support

October 6th, 2017

To Whom It May Concern:

I am writing to document that Susan Wood, NNP has permission to access the BabySteps charting software for the purposes of collecting admit temperature data in association with the DNP degree program.

The above permission is sufficient for an internal educational project. However, if the project will be published at some point in the future, full Institutional Review Board will be needed from Centura and/or Mednax Services, Inc.

If you have any further questions, please don't hesitate to ask. My email is todd_west@mednax.com.

Sincerely,

Todd West, MD

Practice Medical Director

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Appendix E: Regis University IRB

REGIS UNIVERSITY

REGIS.EDU

Institutional Review Board

DATE:	November 12, 2018
TO:	Susan Wood
FROM:	Regis University Human Subjects IRB
PROJECT TITLE:	[1314922-3] "It's a Wrap"
SUBMISSION TYPE:	Amendment/Modification
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	November 12, 2018
REVIEW CATEGORY:	Exemption category # *(4)*

Thank you for your submission of Amendment/Modification materials for this project. The Regis University Human Subjects IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations 45.CFR46.101(b).

The IRB reviewer approved the study as category 4 instead of category 1 which was marked.

The IRB reviewer also noted to be careful and avoid biased benefits (assumptions that the intervention is of benefit prior to study) – 'small miracle'

3. Do we have a support letter on file from the institution where the study is taking place?

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University Human Subjects IRB's records.

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Appendix F: Letter of Intent

DNP Project Letter of Intent

To: Therese Flynn, NNP

From: Susan Wood

Subject: Research Study

Date: June 26, 2018

I am writing to obtain permission to conduct a retrospective quality improvement research study in your facility with the purpose of decreasing admisssion hypothermia in preterm infants by the use of a polyethelyne wrap (Neo Wrap) applied immediately after delivery of the infant. This study will be done to fullfill requirments for completion of the Doctor of Nursing Practice degree at Regis University, Denver, CO. The following information will review the study:

This project will employ a Population-Intervention-Comparative-Outcome (PICO) format for development of the research question to be investigated:

Population: 23-33 6/7 weeks gestational age infants Neonatal Intensive Care Unit (NICU)

Intervention: Application of NeoWrap immediately after delivery

Comparative: Comparing admission temperatures, heart rate, respiratory rate, blood pressure and glucose, of infants 23- 33 6/7 weeks placed in Neo Wrap vs non NeoWrap infants. Dates of comparison September 2016-January 2017 vs September 2017 to January 2018.

Outcome: Neo Wraps would be a safe and cost effective intervention to assist in preventing admission hypothermia in preterm infants delivered at Littleton Adventist Hospital.

Research Question: In neonates ranging in gestational age 23-33 6/7 weeks, do patients who are placed in a polyethylene wrap immediately after delivery, exhibit less hypothermia upon admission to the NICU, than those patients who were not placed in a polyethylene wrap?

Project Significance: Decrease admission hypothermia and the cascade of multi-organ dysfunction associated with hypothermia in the preterm infant.

Type of Study: Retrospective quality improvement project

Participant Requirement: preterm infant delivery 23- 33 6/7 weeks born at Littleton Adventist Hospital

Risks, Cost, and Benefits: No risk to the infant identified. Cost of Neo Wrap $2.25. Benefits could lead to shortened NICU stay by avoiding complications related to admission hypothermia.

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Project Goals and Objectives:

The main goal of this project is to decrease admission hypothermia in preterm infants delivered at Littleton Adventist Hospital, Littleton, CO.

Objectives:

1. Decrease admission hypothermia in preterm infants 23-33 6/7 weeks gestation.

Permission is requested to conduct this research study at Littleton Adventist Hospital, 7700 S Broadway, Littleton, CO., Neonatal Intensive Care Unit.

I have included a template for the brief site approval letter that is required on letterhead from you.

Thank you for your assistance with completing my DNP Project.

Sincerely,

Susan Wood, NNP

DNP Student

References:

Cordaro, T., Phalen, A. G., & Zukowsky, K. (2012). Hypothermia and occlusive skin wrap in the low birth weight premature infant: an evidentiary review. *Newborn & Infant Nursing Reviews, 12*(2), 78-85.

Godfrey, K. Nativio, D. G., Bender, C.V., & Schlenk, E. A. (2013). Occlusive bags to prevent hypothermia in premature infants. *Advances in Neonatal Care, 13*(5), 311-316.

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Appendix G: Response Letter of Intent

Littleton Adventist Hospital
Centura Health.

7700 S. Broadway
Littleton, CO 80122
303.730.8900 Phone
mylittletonhospital.org

Letter of Agreement

June 28, 2018

To Regis University Institutional Review Board (IRB)

I am familiar with Susan Wood's research project entitled "It's a Wrap." I understand Littleton Adventist Hospital's involvement to be retrospective data collection from the Mednax computer system. Admission temperatures of neonates between 23 weeks to 33-6/7 weeks gestation admitted from October 2016 to January 2017 are compared to infants of the same gestational ages admitted from October 2107 to January 2018. No patient identifiers will be utilized.

I understand this research will be carried out following sound ethical principles and that participant involvement in this research project is strictly voluntary and provides confidentiality of research data as described in the proposal.

Therefore, as a representative of Littleton Hospital, I agree that Susan Wood's research project may be conducted at our agency/institution.

Sincerely,

Therese Flynn

Therese Flynn, RN, BSN, MSN
Neonatal Nurse Practitioner Supervisor
720-528-0911

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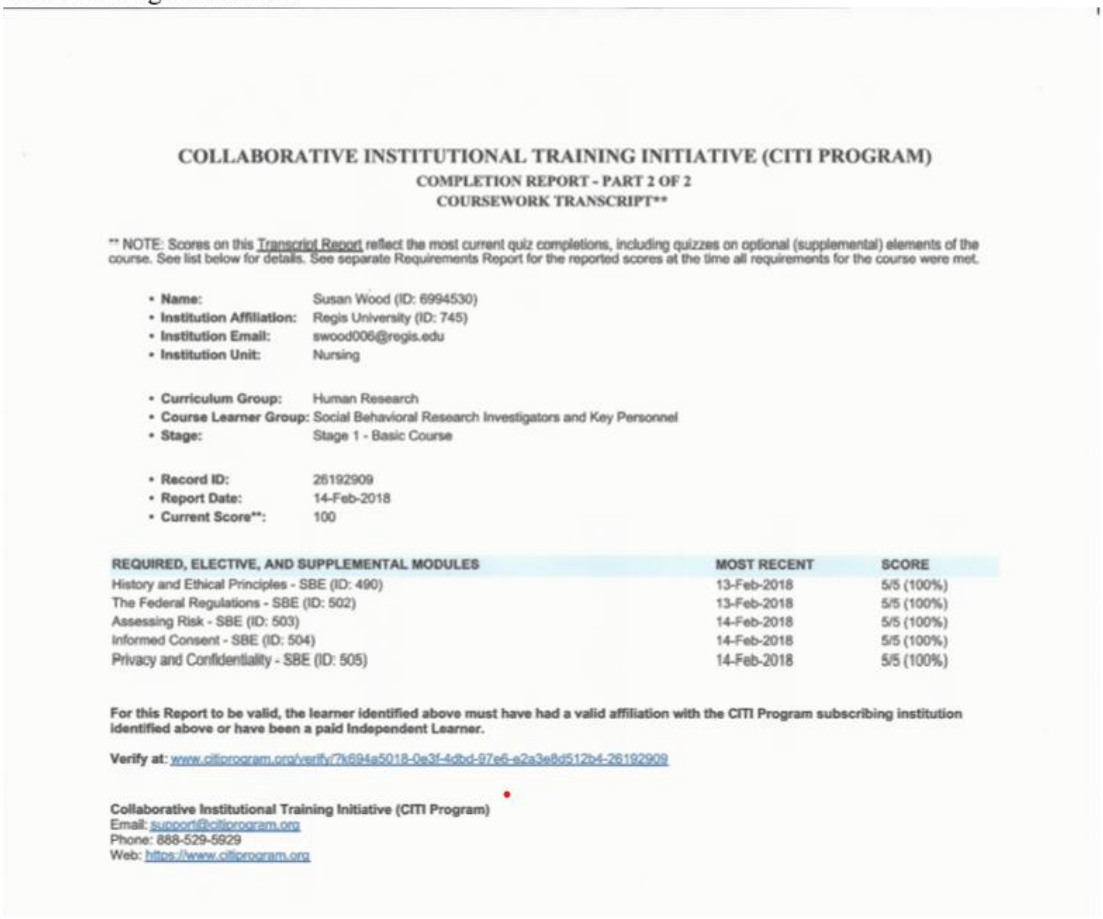
Appendix H: CITI Certification Wood

CITI Training Certificates



COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Susan Wood (ID: 6994530)
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Email:** swood006@regis.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators and Key Personnel
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 26192909
- **Report Date:** 14-Feb-2018
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
History and Ethical Principles - SBE (ID: 490)	13-Feb-2018	5/5 (100%)
The Federal Regulations - SBE (ID: 502)	13-Feb-2018	5/5 (100%)
Assessing Risk - SBE (ID: 503)	14-Feb-2018	5/5 (100%)
Informed Consent - SBE (ID: 504)	14-Feb-2018	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	14-Feb-2018	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k694a5018-0e3f-4dbd-97e6-e2a3e8d512b4-26192909

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

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Appendix I: CITI Certification Finn

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Christine Finn (ID: 237192)
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Email:** cfinn@regis.edu
- **Institution Unit:** nursing
- **Phone:** 719-661-6750

- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators and Key Personnel
- **Stage:** Stage 2 - Refresher Course

- **Record ID:** 24605500
- **Completion Date:** 15-Sep-2017
- **Expiration Date:** 14-Sep-2020
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
SBE Refresher 1 - Instructions (ID: 943)	15-Sep-2017	No Quiz
SBE Refresher 1 – History and Ethical Principles (ID: 936)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Federal Regulations for Protecting Research Subjects (ID: 937)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Informed Consent (ID: 938)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Defining Research with Human Subjects (ID: 15029)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Privacy and Confidentiality (ID: 15035)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Assessing Risk (ID: 15034)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research with Prisoners (ID: 939)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research with Children (ID: 15036)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research in Educational Settings (ID: 940)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – International Research (ID: 15028)	15-Sep-2017	2/2 (100%)
Biomed Refresher 1 - Instructions (ID: 960)	15-Sep-2017	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Christine Finn (ID: 237192)
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Email:** cfinn@regis.edu
- **Institution Unit:** nursing
- **Phone:** 719-661-6750

- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators and Key Personnel
- **Stage:** Stage 2 - Refresher Course

- **Record ID:** 24605500
- **Report Date:** 09-Jan-2019
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
SBE Refresher 1 – History and Ethical Principles (ID: 936)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 - Instructions (ID: 943)	15-Sep-2017	No Quiz
Biomed Refresher 1 - Instructions (ID: 960)	15-Sep-2017	No Quiz
SBE Refresher 1 – Federal Regulations for Protecting Research Subjects (ID: 937)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Informed Consent (ID: 938)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research with Prisoners (ID: 939)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research in Educational Settings (ID: 940)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – International Research (ID: 15028)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Defining Research with Human Subjects (ID: 15029)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Assessing Risk (ID: 15034)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Privacy and Confidentiality (ID: 15035)	15-Sep-2017	2/2 (100%)
SBE Refresher 1 – Research with Children (ID: 15036)	15-Sep-2017	2/2 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?ka01e9f18-50c0-4f62-94a4-9867c18eb665-24605500

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Appendix J: Time Line

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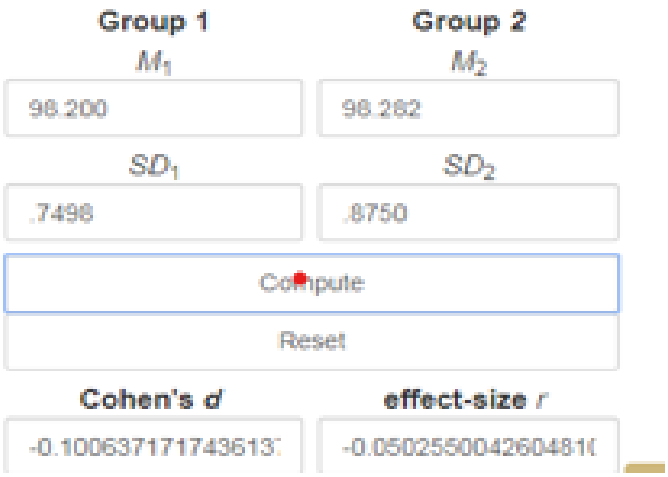
Appendix K: Statistical Graphs



T-Test

[DataSet1] C:\Users\ckruschk\Desktop\Susan Wood\Susan Wood Input Independent T-Test.sav

Group Statistics

	NWWW	N	Mean	Std. Deviation	Std. Error Mean
TEMP	0	19	98.200	.7498	.1720
	1	11	98.282	.8750	.2638

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
TEMP	Equal variances assumed	.048	.828	-.271	28	.788	-.0818	.3019	-.7002	.5365
	Equal variances not assumed			-.260	18.457	.798	-.0818	.3150	-.7423	.5787

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