SKIN-TO-SKIN CONTACT AFTER BIRTH TO PROMOTE NEWBORNS’ VITAL STABILIZATION: An Evidence-Based Project

By

Stephanie Bricker, Rachel Johnson, and Caitlin Stom

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Nebraska Methodist College
Department of Nursing
Omaha, NE

Under the Direct Supervision of
Dr. Christopher J. Smallwood

Abstract
The hours immediately following birth are a crucial time for an infant to sustain life.
SKIN-TO-SKIN CONTACT AFTER BIRTH

Skin-to-skin contact (SSC) during this time provides the infant with natural thermoregulation and promotes oxygenation. The purpose of this evidence-based project is to examine the physiological effects SSC has on full-term newborns. The research was centered around the PICOT question: In full term newborns, how does direct skin-to-skin contact, compared to no skin-to-skin contact, affect the stabilization of the infant as measured by the infant’s vital signs, when practiced within the first few hours after birth? Using terms related to the PICOT question, an extensive database search was completed in Cochrane, CINAHL, and ProQuest, yielding four articles for inclusion. Each article was critically appraised to determine its statistical significance towards SSC and suggestions for nursing implications based on the findings. The research concluded SSC is a safe and effective practice. It proved to increase thermoregulation, oxygenation, and cardiovascular and respiratory stability in full-term infants. As a cost-saving method, SSC was found to maintain vitals within normal parameters more effectively than modern-day equipment. Due to current standard care practices, SSC is an underutilized method that provides better health outcomes. Future nursing implications are based on education and policy change. Nursing education should work to familiarize the community and nursing staff on the proper technique and benefits of SSC. Education should drive SSC to becoming the first choice and standard of care for infant vital sign stabilization. Suggestions for further research included stricter regulation of the data collection process, including collection tools and controlled timing intervals.

Acknowledgements

To our friends and families-- thank you for your love and support during this busy time in our final stretch of our master’s education. To Dr Smallwood-- your guidance, positivity,
SKIN-TO-SKIN CONTACT AFTER BIRTH

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Unless you try to do something beyond what you have already mastered, you will never grow.

- Ronald E. Osborn (Forbes, 2015)
# Table of Contents

- Title Page ........................................................................................................ 1
- Abstract ........................................................................................................... 2
- Acknowledgements .......................................................................................... 3
- Table of Contents ............................................................................................. 4
- Introduction ...................................................................................................... 6
  - Purpose ........................................................................................................ 6
  - Background .................................................................................................. 6
  - Theory/Model ................................................................................................ 7
- Significance ...................................................................................................... 8
- Setting ............................................................................................................. 10
- Stakeholders .................................................................................................... 11
- Cost/Benefits/Effectiveness ............................................................................ 11
- Desired Outcomes ............................................................................................ 12
- PICOT Question ............................................................................................... 12
- Search Plan Method ........................................................................................ 13
- Search Plan .................................................................................................... 13
- Database Search Strategy ................................................................................ 14
- Inclusion/Exclusion Criteria ............................................................................ 18
- Analyzing the Criteria ..................................................................................... 19
  - Levels of Hierarchy of Evidence ................................................................. 19
- Critical Appraisals ........................................................................................... 20
Current standards of care separate the mother and healthy newborn. Following
birth, healthy newborns are often transported to the nursery for assessment and routine
procedures such as bathing. Separation of the newborn from the mother disrupts the
stabilization and regulation of the healthy newborn’s vital signs. While skin-to-skin
contact has become a standard of care for preterm infants, this has not become a standard
of care for full-term or healthy newborns posing concern for further study.

Kangaroo care or skin-to-skin contact (SSC) directly following birth has
demonstrated positive effects on premature infants in stabilization and regulation. More
research must be conducted to determine if the same outcomes are found in healthy
newborns. Recognizing the benefit direct skin-to-skin contact can provide to healthy
infants in regards to the stabilization of vital signs, including pain, could revolutionize the
standard of care provided to neonates postpartum.

Purpose

The purpose of this evidence-based project is to examine the physiological effects
that skin-to-skin contact has on the full-term newborn. Scholarly literature will be
reviewed to determine how the physiological response differs for those newborns that are
separated from their mothers after birth. Studies to include evidence with regard to
stabilization of vital signs as evidenced by thermoregulation, oxygenation, and lower pain
scores will be included.

Background

The bond between a mother and child is perceived as a sacred bond beginning
with gestation. Oftentimes, only a mother is able to provide comfort and safety to their
child in vulnerable situations. Few situations leave a child as vulnerable as they are at birth. The hours immediately following birth are a crucial time for the child to thrive in the world outside of their mother’s womb. During these hours, the infant needs thermoregulation, stimulation, and oxygenation. Infants rely on their mothers for all basic needs in the early stages of life, yet healthy newborns are usually separated from their mothers in the hours following birth. Direct skin-to-skin contact, or Kangaroo Care, provides the infant with natural thermoregulation, proper positioning and stimulation to promote oxygenation, and delivers emotional support for the infant in a stressful situation.

**Theory/Model**

Philips (2013) addresses the theories on how skin to skin care (SSC) is thought to improve a newborn’s ability to transition from womb to life outside the womb by stabilizing their physical and emotional state. Phillips (2013) references the World Health Organization (WHO) when reminding of the importance of thermoregulation, and that skin-to-skin contact should be promoted, as well as encouraged within the first 24 hours after birth. The American Academy of Pediatrics also theorizes that healthy infants should be placed and should remain in direct skin-to-skin contact with their mothers immediately after delivery until the first feeding is accomplished (Phillips, 2013).

The Joint Commission Toolkit: United States Breastfeeding Committee (USBC, 2013) provides a lengthy document regarding breastfeeding. However, the document discusses theories regarding how SSC is thought to help the infant adjust to extra-uterine life in the hospital setting. The WHO initiative of 1997 provides theory and rationale to support skin-to-skin care. The initiative, “The Warm Chain” theorizes the infant will
better adjust to extraterrestrial life with the familiar sound of the mother’s heartbeat and
voice, as well as the warmth from her body heat (USBC, 2013). Studies show that the
mother’s body responds to the infant’s body temperature, aiding in thermoregulation of
the infant, thus working to prevent hypothermia.

**Significance**

The United States Breastfeeding Committee (2013) and Merewood (2014) discuss
the importance of SSC immediately after birth and how it should become the new model
of care for organizations seeking best practice. SSC directly after birth has been
associated with better newborn outcomes, including improved transition to life outside
the womb by increased ability to regulate temperature (Phillips, 2013). Phillips (2013)
references the phenomenon known as thermal synchrony in which the mother is the
natural heat or coolant that is necessary to regulate the temperature of the newborn baby.
In thermal synchrony the mother’s chest naturally increases to warm a cool baby, and
decreases to cool a warm baby.

Moore, Anderson, Bergman, and Dowswell (2012) provide an in-depth study
addressing the significance of SSC in a hospital setting. Discussion regarding the
stabilization of mother and baby is also included. This is a review of several separate
studies, some measuring different aspects of newborn care. Randomized controlled trials
were completed to analyze the significance of skin-to-skin contact versus the traditional
servo-controlled incubator. Moore et al. (2012) report clinical significance as the infants
who were placed skin-to-skin demonstrated a heart rate that was three beats per minute
slower, and a respiratory rate that was three breaths less per minute on average. Body
temperature in the newborn were noted to be less than one degree warmer in the skin-to-
SKIN-TO-SKIN CONTACT AFTER BIRTH

Skin group, with the most clinical significance being in the blood glucose level. The blood glucose level was 10.56 mg/dL higher in the skin-to-skin group revealing clinical significance. Moore et al. (2012) summarizes the study by stating that skin-to-skin contact is a safe intervention to practice and that study results indicate that early skin-to-skin contact may increase cardio-respiratory stability, thermal stability, and blood glucose levels in the full-term infant.

Phillips (2013) brings forth a study comparing newborns that were separated from their mothers with those newborns who were kept skin-to-skin with their mothers at birth. The study found that newborns that were separated had ten times the number of cries, and 40 times the number of duration of crying. Skin-to-skin contact is important as frantic crying is not good for the newborn as it impairs lung functioning, causes increased intracranial pressure, and can jeopardize the closure of the foramen ovale (Phillips, 2013).

Nimbalkar, Patel, Patel, Nimbalkar, Sethi, and Phatak (2014) references a randomized control trial that investigates the impact of early skin-to-skin contact when provided for the first 24 hours, and the effects that SSC has on hypothermia in stable newborns weighing 1800 grams or more during the first 48 hours of life. 100 neonates participated in the trial with equal participants in the intervention (SSC) group, and the control (conventional) group. Results of the study revealed that the intervention (SSC) group had a mean temperature that was significantly higher at all time intervals from 1-48 hours of life (p<0.05 for all) (Nimbalkar et al., 2014).

Episodes of hypothermia were studied within the randomized control trial. In the intervention (SSC) group only two newborns (4%) were found to have episodes of mild hypothermia within the first three hours of life, with one of the newborns having two
SKIN-TO-SKIN CONTACT AFTER BIRTH

episodes (Nimbalkar et al., 2014). In the control group, 16 newborns (32%) developed hypothermia during the first 48 hours of life. The relative risk for developing hypothermia in the control group as compared with the SSC group was 8.00 (95% CI, 1.94-32.99).

Nimbalkar et al. (2014) provides concluding evidence that newborns in the SSC group achieved rapid thermal control. This finding implies that the incidences of hypothermia as compared with those infants in the control group was greatly reduced. Significance of the study reveals that skin-to-skin contact should be aggressively promoted in term and late preterm newborns to decrease the incidence of hypothermia.

Merewood, (2014) discusses how SSC should be the new model of care based on the significance of the outcomes in the newborn. The article also provides supportive information from the WHO. Other considerations include ideas on how to discuss SSC with mothers and how it can be practiced safely in a hospital setting.

Setting

Overall, the most recent supportive SSC findings are measured in a hospital setting, from the minutes immediately following birth up to 24 hours postpartum, where nursing and other medical staff is available to measure the newborn’s outcomes. Other settings include performing SSC for breast feeding and during painful procedures, such as suctioning or needle sticks to the infant’s heels to assess blood glucose levels. Generally in SSC, the infant is placed on the chest or abdomen of the mother with their skins touching and the infant in prone position. SSC often occurs in the birthing room or in the Operation Room (OR), where the mother and infant are together.

Study participants include stabilized full-term or late preterm newborns weighing
SKIN-TO-SKIN CONTACT AFTER BIRTH

at least 1800 grams at birth. Premature newborns were not referenced in the preceding study as the study focuses on stable term newborns. Study searches were not limited to include specifically vaginal or cesarean births. Studies including both vaginal and/or cesarean births were considered to be applicable.

Stakeholders

The major stakeholders are the newborn and the parent who is providing the kangaroo care. The newborn has a need for beneficence and nonmaleficence. The welfare of the newborn should be of utmost importance when determining decisions regarding implementing kangaroo care. Decisions regarding implementing kangaroo care should be focused around the principle to “first, do no harm”. It will be important to evaluate the level of understanding with the newborn’s parents with regard to providing kangaroo care to the newborn. The newborn has a need to be physically cared for, attended to, and maintain physiologic stability (Phillips, 2013).

Cost Benefits/Effectiveness

There are many benefits of kangaroo care including the cost effectiveness that kangaroo care provides. Cost benefits include not only financial cost benefits but physiologic cost benefits for the newborn as well. Phillips (2013) reminds that being skin to skin with the mother is the best way for a stable, full term baby to adjust to life outside the womb. Early postpartum skin-to-skin contact increases physiologic stability while often times decreasing the need for an incubator (Phillips, 2013). Kangaroo care has begun to be implemented outside of the United States with financial benefit as well as it often can reduce the need for sophisticated, often times expensive medical equipment that may not be readily available.
SKIN-TO-SKIN CONTACT AFTER BIRTH

Desired Outcomes

Implementation of uninterrupted skin-to-skin contact with the full-term newborn will begin immediately after birth. Desired outcomes include short and long-term consequences. There is good evidence that normal, term newborns that are placed skin to skin with their mothers immediately after birth make the transition from fetal to newborn life with greater respiratory, temperature, and glucose stability (Phillips, 2013). It is desired that the newborn innate system of self-regulation will be controlled to promote optimal regulation of vital signs. Baseline outcome measures will include data to indicate the benefits of kangaroo care to include blood pressure being stabilized through parasympathetic control, hypoglycemia prevention, improved respirations, and improved metabolic functions to include thermoregulation of the full-term newborn (Ludington-Hoe & Morgan, 2013).

PICOT Question

In full term newborns, how does direct skin-to-skin contact, compared to no skin-to-skin contact, affect the stabilization of the infant as measured by the infant’s vital signs, when practiced within the first few hours after birth?

Search Plan Method

Search Plan

The search plan for critical research regarding SSC began by doing a literature search in the Cumulative Index to Nursing and Allied Health Literature (CINAHL-Plus with Full Text) using a computer. CINAHL has been found to be an important tool in research, as Pilot and Beck (2012) suggest it’s database contains literature from nearly all English-language nursing journals, allied health journals, as well as information from
dissertations and books. Using a combination of terms that are identified from the PICOT question, CINAHL was searched using two Boolean operators “or” as well as “and”. Search terms related to the PICOT question are identified in Table 1. Results were limited to full text as well as articles printed after the year 2009. Remaining results were manually filtered through according to relevance to the PICOT question.

Due to limited results that pertained specifically to this topic, additional searches were performed using a combination of PICOT search terms in the Cochrane, and ProQuest databases. The words “or” and “and” were used to combine PICOT search terms to filter results that were more applicable to research on this subject. Most searches combined “I” terms with terms from other categories by using “and” in the search phrase. Typically, phrases including “or” combined more than one “I” search term do display results that included either topic. Though Melnyk and Fineout-Overholt (2011) suggest a year limit on some searches may yield inadequate results, all searches performed for this research were limited to or manually filtered through to display only results with full text and those that are from the most recent five years.

**Table 1**

**PICOT Terms**

<table>
<thead>
<tr>
<th>PICOT</th>
<th>Terms</th>
</tr>
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<tbody>
<tr>
<td>P (population)</td>
<td>Newborns, Full-term Newborns</td>
</tr>
<tr>
<td>I (intervention)</td>
<td>Skin-to-skin care, Kangaroo care, Kangaroo mother care</td>
</tr>
<tr>
<td>C (comparison)</td>
<td>no terms used</td>
</tr>
<tr>
<td>O (outcome)</td>
<td>benefits,vital signs, vital sign regulation</td>
</tr>
<tr>
<td>T (timing)</td>
<td>no terms used (suggested terms: within the first hour of delivery, after delivery, after birth, postpartum, post-delivery, perinatal)</td>
</tr>
</tbody>
</table>

**Database Search Strategy**
The literature search was guided by the PICOT terms mentioned in Table 1. Each database was searched with limiters of full text, English-language, and published within the most recent five years. Because of the limitations the “T” terms added to the search results, none of the “T” terms were used in the database searches. “P” term suggestions can be found in Table 1 for reference. Starting with the CINAHL database, the “I” terms “kangaroo care”, “skin-to-skin contact” and “kangaroo mother care” were searched using the Boolean operator “or”. This displayed 636 results. CINAHL was then searched using the “P” terms “newborns” and “full-term newborns” yielding 5,271 and 107 results respectively. Combining both “P” terms using the Boolean operator “or”, CINAHL produced 5,271 results. CINAHL was then searched using the “O” terms “vital signs” yielding 1,436 results, “vital sign regulation” yielding no results, and “benefits” yielding 74,815 results. These terms were then combined using the Boolean operator “or” which found 76,233 results.

In order to manually filter through results in a more efficient way, the “I” terms were searched separately. Using the first term “kangaroo care” in the Boolean search engine, 653 results displayed. After adding the predetermined limiters, 237 relevant articles resulted. To ensure the most relevant articles would result, the term “newborns” was added by using the Boolean operator “and” which yielded 27 articles.

CINAHL database was then searched using the term “skin-to-skin care” which yielded 112 results. Adding the word “newborn” with the Boolean operator “and” yielded 23 results. Adding the term “vital signs” with the Boolean operator “and” showed no results. That term was removed and “skin-to-skin care” was combined with the term “after birth” yielding 3 results using the Boolean operator “and”. “Benefits” was
then searched with the term “skin to skin” using the Boolean operator “and”, yielding 16 results. All of the final resulting articles were searched and filtered for content. Two articles met the inclusion criteria from the CINAHL database search.

The Cochrane database was used in a similar way, searching each of the “P”, “I”, and “O” terms individually. The “P” term search found 581 and 38 results from using each of the terms “newborns” and “full-term newborns” individually, then was combined using “or” to display 581 results total. The “I” term search had more limited results, yielding four results for the term “kangaroo care”, three results for the term “kangaroo mother care”, and 120 results for the term “skin to skin care”. Combining these terms found 121 results to be manually searched for criteria. Finally, the “O” terms were searched yielding a total of 3,242 results when combined with the term “or”. Each individual “O” term search yielded 11 results for “vital signs”, 28 results for “vital sign regulation”, and 3,236 results for the “benefits” term search.

The Cochrane database was then utilized by typing the term “skin to skin care” into the search tool yielding 120 articles. When the search was narrowed by the predetermined limiters, 92 articles remained. Several were still too broad to focus on research related to content. This search was then narrowed further by changing the search phrase to “skin to skin care and newborn”. This search yielded 14 results, some of which did not meet inclusion criteria. However, one article was found to be relevant to the PICOT questions. In order to focus on the research aspects of the newborn patient and the effects that skin-to-skin contact has with the regard to the stability of the newborn as measured by vital signs, the search “skin to skin care and newborn vital signs” was performed in the Cochrane database. This search resulted in one article related to the
The ProQuest database was also utilized in the search for information related to the PICOT terms for research. ProQuest was initially searched by also dividing the searches by using “P”, “I”, and “O” terms individually. This search found 57,223 results for “newborns”, 16,467 results for “full-term newborns”, 647 results for “kangaroo care”, 76,500 results for “skin to skin care”, 405 results for “kangaroo mother care”, 34,257 results for “vital signs”, 7,185 results for “vital sign regulation”, and 326,087 results for the term “benefits”. Combining the terms in each search using “or” found 57,223, 76,839, and 346,172 results for each of the “P”, “I”, and “O” searches respectively.

Due to the overwhelming number of document results, ProQuest was then searched by adding the predetermined limiters and combining different “P”, “I”, and “O” terms together to narrow the results to a more manageable level. “Skin to skin care” was combined with the term “newborns” by using “and” in the search tool which produced 7,078 results from the ProQuest database. This search was determined to still be too broad and the search phrase was changed to “skin to skin care and newborn vital signs”. Adding the additional limiter of peer reviewed articles, 864 articles remained. Peer-reviewed research is needed for clinicians to answer their PICOT question (Melynk & Fineout-Overholt, 2011). The search phrase was again changed to be more specific, searching for results related to “skin to skin care and newborn vital sign regulation”. Including the predetermined limiters with the addition of only scholarly articles, 381 articles remained for review. Scholarly databases, according to Melynk and Fineout-Overholt (2011), can enhance the retrieval of documents by assigning terms to each subject from a controlled vocabulary.
SKIN-TO-SKIN CONTACT AFTER BIRTH

Another ProQuest search was done with the phrase “kangaroo care and newborn vital sign regulation”. This search was performed with the same limitations, including scholarly articles. This yielded 25 articles, some of which did not pertain to the specific PICOT population. A final search was performed with the phrase “kangaroo mother care and full term newborn vital sign regulation”. This search resulted in 16 articles that were manually searched for content. Overall, none of the articles in the ProQuest database search met the inclusion criteria related to the PICOT research. A diagram related to the search flow process for all databases utilized is included as Appendix A of this document.

**Inclusion/Exclusion Criteria**

As previously stated, each search was initially limited by predetermined criteria of full text, English-language, and published within the most recent five years in order to be included for review. Including only full text documents has become increasingly easier, as many online databases have included this option as a possibility (Pilot & Beck, 2012). The articles were then selected from all searches by filtering out information that was too specific or unrelated to the population established in the PICOT question. Articles that were related to preterm infants or infants being treated in the NICU specifically were not included in the collection of research articles because it was outside the range of the population being researched. Articles that also pertain to nursing or breastfeeding were not included since the PICOT specifically focuses on vital sign information and measurements.

Alternate terms for the intervention, skin to skin care (SSC), were considered and used if the other PICOT criteria were appropriate. Many searches used the terms “mother care”, “kangaroo care”, and “co-warming”. All of these terms would be relevant to the
Outcomes for consideration included thermal care, stability, pain reduction, and crying reduction. These terms can all show information that relates to vital signs, which is the primary outcome being studied in this research. Articles specifically referencing one outcome that did not related to stabilizing the infant as evidenced by vital signs were not included as part of the criteria. One research-based article, for example, related to the effect kangaroo mother had on the stability of the newborn as measured by vital signs and arterial oxygen saturation rate compared to other conventional methods. This article met the outcome criteria and was included in the results that were relevant for research.

Analyzing the Literature

The four articles produced from the database searches were carefully reviewed for significance in relation to the PICOT question. Critical appraisal tables are used to summarize research articles to determine their value to the PICOT question and the research overall. Critical appraisal tables were utilized to determine reliability and validity of the articles found during the search process. The tables can be found in detail in Appendix B. Each article was analyzed to determine its statistical significance towards skin-to-skin care and nursing implications following the research.

Levels of Hierarchy of Evidence

Polit & Beck (2012) list the levels of research available based on the strength of evidence provided within the article. Level I, systematic reviews of RCTs or nonrandomized trials, being the strongest evidence available down to Level VII, opinions of authorities or expert committees, being the weakest. The complete levels of hierarchy of evidence are listed in Figure 1. Polit & Beck (2012) suggest “best evidence refers to
findings from research that is methodologically appropriate, rigorous, and clinically relevant for pressing clinical questions” (p.28) The critical appraisal tables and hierarchies of evidence were utilized to determine if the articles found were the best evidence available for the PICOT question. Of the articles obtained through the search, one article was a Level I a, a systematic review of RCTs, and three articles were Level II, randomized controlled trials.

**Figure 1: Levels of Hierarchy of Evidence**

<table>
<thead>
<tr>
<th>Evidence Hierarchy</th>
<th>Level I</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. Systematic Review of RCTs</td>
</tr>
<tr>
<td></td>
<td>b. Systematic Review of nonrandomized trials</td>
</tr>
<tr>
<td>Level II</td>
<td>a. Single RCT</td>
</tr>
<tr>
<td></td>
<td>b. Single nonrandomized trial</td>
</tr>
<tr>
<td>Level III</td>
<td>Systematic review of correlational/observational studies</td>
</tr>
<tr>
<td>Level IV</td>
<td>Single correlational/observational study</td>
</tr>
<tr>
<td>Level V</td>
<td>Systematic review of descriptive/qualitative/physiologic studies</td>
</tr>
<tr>
<td>Level VI</td>
<td>Single descriptive/qualitative/physiologic study</td>
</tr>
<tr>
<td>Level VII</td>
<td>Opinions of authorities, expert committees</td>
</tr>
</tbody>
</table>

(Polit & Beck, 2012)

**Critical Appraisals**

**Article I**

Moore et al. (2012) was a Level I systematic review of randomized controlled
SKIN-TO-SKIN CONTACT AFTER BIRTH trials (RCT) involving skin-to-skin care with healthy newborn infants. The purpose of the article was to determine the effects skin-to-skin contact provided to the newborn infant in regards to overall health, behaviors, and breastfeeding. The article reviewed 34 RCTs to study the effects of skin-to-skin contact directly after birth. At least two reviewers were utilized for data extraction and to determine which studies were eligible. Results of the studies were extensively reviewed, including risk for bias, and data and tables were listed to better organize current research available on this topic.

The research found no negative effects with the use of skin-to-skin care directly after birth. In fact, Moore et al. (2012) determined skin-to-skin care had positive effects on breastfeeding and cardio-respiratory health of the infant. However, study limitations included “methodological quality, variations in intervention implementation, and outcomes” (p. 2). Some articles had high statistical rates of heterogeneity and the authors advised caution in the results. This also made data interpretations between studies and outcomes difficult. SCRIP scores (used to measure infant stability including respiratory rate, heart rate, and oxygen saturation) and blood glucose levels were statistically significantly higher in infants receiving skin-to-skin care. In one study, infants utilizing skin-to-skin care were less likely to exceed healthy parameters in temperature, heart rate, respiratory apnea, and blood glucose levels than infants utilizing standard care.

The Moore et al. (2012) article pertains to the PICOT question by addressing gaps in the use of skin-to-skin care with full-term infants. The evidence presented supports the use of skin-to-skin care for infant stabilization and thermoregulation. The article suggested areas for nursing care improvement utilizing skin-to-skin care more frequently. However, the article also addresses areas where more research is needed for the future.
George, Philips, Mallory, Holmquistova, Hare, Allen, Higgins, and Shapiro (2015) is a Level II nonrandomized clinical trial that utilizes SSC to determine its effectiveness at rewarming newborns after their first bath. This study allowed participants to choose to rewarm their newborns by either SSC or by standard practice, which is to rewarm infants in a radiant warmer. The purposes of this study were to “determine if (a) the mothers at the study hospital would choose to warm their newborns skin-to-skin after the first bath and (b) if mother-newborn skin-to-skin contact was as effective as radiant warming in rewarming newborns after their first bath” (George et al., 2015, p. 204).

Inclusion and exclusion criteria were clearly defined. Due to the large amount of mothers choosing SSC over the radiant warmer, this study was redirected to determine if SSC was an effective method of rewarming, rather than comparing the two methods (George et al., 2015). Study methods and procedures on gathering temperature data from SSC or radiant warmer participants were clearly explained. The study setting was also defined as being designed as a “real-life” setting in which the authors wanted to see results as they would if this were a standard practice offered in the hospital in which the study took place. Validity of this study is maintained and allows for real settings in which the original study was changed in order to support the choices of the mothers to practice SSC over radiant warming.

This study found that mothers overwhelmingly choose SSC over radiant warming, when given the option prior to their infant’s first bath. It also shows that newborns can successfully be rewarmed by using SSC in place of the radiant warmer if the infant is accurately positioned on the mother, which requires follow up by nursing staff members.
SKIN-TO-SKIN CONTACT AFTER BIRTH

Nursing implications also show that nurses need to be trained regarding SSC and offer diligent follow up to ensure it is practiced safely and effectively. Data supporting these findings are found throughout the literature of this article, as well as in tables and figures throughout.

The George et al. (2015) research study relates to the PICOT question by showing how SSC can be as effective as methods that don’t use SSC in rewarming infants. Rewarming infants is critical in helping newborns regulate their temperatures outside the womb. From this study, SSC was found to be effective in regulating body temperature, an important vital sign. SSC in this case was also practiced after the first bath, which according to George et al. (2015) happens within four to 12 hours after delivery. This article addresses all parts of the PICOT question using one vital sign, temperature.

**Article III**

Dehghani, Movahed, Dehghani, and Nasiriani (2015) is a Level II randomized controlled trial (RCT) of skin-to-skin care (kangaroo care) versus conventional method with study results reflected in means of effect on vital signs, and arterial oxygen saturation rates in newborns who were hospitalized in a neonatal intensive care unit. The purpose of this study was to determine the impact of the Kangaroo Mother Care method on vital signs and arterial oxygen saturation of newborns compared to the incubator care method. The research was a double-blind study in which neonates were divided into two groups by utilization of the random number table.

Inclusion and exclusion criteria are clearly discussed within the article as well as ethical considerations and limitations of the study are discussed. Methods of data collection were discussed as well as discussion was conducted with regard to
implementation of the study results into the clinical setting. Statistical analysis tables are provided within the article to provide clarity into research. Validity of the study is maintained and relates to the ongoing need to study the benefits of skin-to-skin care in comparison to the conventional incubator method. The researchers base the study as a starting point for training of nursing staff in regard to the skin-to-skin care technique with suggestions of developing this in hospitals and prenatal clinics to enhance performance outcomes.

The research found that cardiac and respiratory status is clinically in a reasonable range during Kangaroo Mother Care, and more stability is seen in comparison to incubator care. Reference is also made to clinical trial studies to show skin-to-skin care to be effective in cardiac-respiratory parametric stability. Further reliability of the study reveals skin-to-skin contact to be effective in the improvement and stabilization of newborns with reference made to applicability of training this method to mothers.

The article by Dehghani et al. (2015) pertains to the PICOT question by addressing the impact that skin-to-skin care has on the newborn in comparison to no skin-to-skin contact such as the traditional incubator method. The evidence from the research clearly promotes skin-to-skin care with reference made to improvement of process outcomes. Depiction of areas of further research are also discussed with regard to study of skin-to-skin care and the resulting effect on multiple variables such as weight gain, period time of hospitalization, feeding rates, and vital signs.

Article IV

Nimbalkar et al. (2014) is a Level II randomized controlled trial (RCT) studying the effect that early skin-to-skin contact has on the incidence of hypothermia following a
normal delivery. The focus of this particular study was on those neonates weighing more than 1800 grams. The purpose of the study was to evaluate the effect of early skin-to-skin contact for the first 24 hours on the incidence of hypothermia in newborns. The research was completed by means of a superiority randomized controlled trial with the randomization being completed via web based software and selection cards that were sealed in opaque envelopes.

Inclusion and exclusion criteria were clearly discussed within the article, as well as ethical considerations and limitations. Methods of data collection are clearly described and illustrate measurement at different intervals during the study. Validity of the study is further revealed within the data collection as the data was collected using a repeated measures design, with collection of data at multiple times from the two groups. The article depicted that both the control and intervention group received the same initial care in the delivery room for a few minutes after delivery prior to the intervention group receiving skin-to-skin care and the control group receiving conventional care.

Data analysis was revealed by means of descriptive statistics with statistical analysis tables being provided within the article to provide the reader a clear method for reviewing the research. Research implications hold a focus on infants being born in lower and lower-middle income countries without the availability of an incubator or radiant warmer. The article by Nimbalkar et al. (2014) pertains to the PICOT question by addressing the benefits that skin-to-skin care has on the newborn in comparison to conventional care methods. Further research may be necessary to focus on limitations that the study addressed such as necessity of completing a community-based study with a focus on local beliefs and behaviors such as early bathing and delayed drying/wrapping.
The article contributes research regarding skin-to-skin care. The article also reminds of the importance of expanding the research to include newborns born via cesarean section. Nimbalkar et al. (2014) illustrates validity within the research for provision of adoption of this practice for future care of the newborn.

**Synthesis Discussion of Evidence**

When considering SSC in any delivery room, the challenge remains to change standard practice to allow mothers and babies the opportunity to be skin-to-skin after birth rather than completing nursing tasks that can be safely delayed. Critical analysis of literature and evidence related to the PICOT question: *In full term newborns, how does direct skin-to-skin contact, compared to no skin-to-skin contact, affect the stabilization of the infant as measured by the infant’s vital signs, when practiced within the first few hours after birth?* suggested positive correlations between SSC and the stabilization of the newborn. Articles supported the use of SSC to regulate and stabilize infant temperature, cardiovascular response, and respiratory rate. Though supporting articles with evidence directly relating to the PICOT question are limited, several sources suggest positive outcomes from SSC in general without the limitations of timing and stabilization of vital signs. The analysis relating to the PICOT question can support the implementation of SSC and stimulate further education and research on how SSC can help the overall health of the newborn and mother.

**New Understanding Generated by the Evidence**

In regards to the PICOT question, it is understood in this research that SSC is a safe and effective practice. According to George et al. (2015) mothers were found to overwhelmingly choose SSC over standard practice when given the choice in the delivery
SKIN-TO-SKIN CONTACT AFTER BIRTH

This finding was surprising as it is typically not the standard practice, but shows that parents trust that SSC can offer more benefits than harm to their infants. SSC has also been found to increase oxygen saturation, as suggested by research from Dehghani et al. (2015). Furthermore, Dehghani et al. (2015) and Nimbalkar et al. (2014) found that early SSC improved body temperature regulation. Other similar study findings were indicated by Dehghani et al. (2015) and Moore et al. (2012), in which SSC showed to improve cardiovascular and respiratory stability in newborns.

Limitations

There are syntheses of limitations in these studies that are applicable to the outcomes that relate to the PICOT question. When considering the limitations during the research process alone, there are several to discuss. SSC can be a practice for all newborns, though our research narrowed results to only full-term newborns. Additionally, results were considered only from mothers having vaginal births in a hospital setting. Timing was also narrowed to being practiced within the first few hours after birth, though many studies suggested long term benefits of continued SSC practices. Many other studies offered support in SSC practice for breastfeeding and maternal bonding, though studies specifically focused on these results were not included as the objective of the PICOT question was to find evidence of SSC in relation to newborn stability as measured by vital signs.

Looking at the articles specifically, George et al. (2015) suggested that limitations related to study findings were due to a lack in the ability to directly compare the two study groups when measuring body temperature, as mothers were offered the choice of using SSC or a radiant warmer to rewarm their infants. The majority of mothers chose
SKIN-TO-SKIN CONTACT AFTER BIRTH

SSC in this study altering the study to measure the effectiveness of SSC rather than compare methods. Moore et al. (2012) also suggests that results can be limiting as the meta-analysis performed did not have a standard regulation of the tools used to measure various outcomes. Additionally, limitations from study findings were a result from gathering information during evening or quiet hours rather than during the morning shift when the unit was at its busiest (Dehghani et al., 2015).

Implications

SSC has proved to be an effective method in stabilizing newborns after birth, as well as support patient preference in changing standard practice (George et al., 2015). Because SSC is typically not the standard practice in most hospital settings, labor and delivery units should consider changing policies or performing their own research to support their patients to improve outcomes. Nursing care also needs to be addressed to educate nurses regarding hesitations as a result from the delay of typical newborn care after birth. Much of the resistance from nursing staff during change processes is a result of a lack in knowledge (Roussel, 2013).

Implications can also be made in regards to improving unit costs, which benefits patients and the organization. Offering SSC in place of radiant warmers can save on equipment costs in relation to frequent use and wearing of equipment, as SSC has no cost to implement. Changes offering practices that are simpler, lower in cost, and more convenient to the patient are key to economic survival of organizations (Kelly, 2012).

Costs will also be reduced to operate warming equipment as well as costs to use devices to measures infant vital signs. Though infant vitals need to be monitored on a regular basis, all four of the studies suggested quicker vital stability of the newborn in
some area. These findings allow for reduction of continuous monitoring of newborns and suggest that these infants are less likely to need alternative treatments to reach acceptable levels of body regulation.

**Future Recommendations for Nursing Research**

Several suggestions have been made to improve research findings in future studies. The review by Moore et al. (2012) suggests that more description in research reports will help determine how data was collected and offer a better understanding of the patient’s environment. Suggestions were also made in relation to regulation of tools used to gather patient readings, as well as allow for the same protocol for timing intervals for those measurements. This suggestion can also help explain the variations that were found in the timing of measurements in the Dehghani et al. (2015) study. As they described, some measurements taken at the 30 minute interval often varied to actually being taken between 20 minutes to 40 minutes after bath, depending on when the nurse was available to measure the infant’s temperature.

Based on the findings from the George et al. (2015) article, future research can also identify if standard nursing practices need to be questioned or changed in order to support parent preference. Being that most mothers choose SSC over radiant warming in their research, George et al. (2015) suggests further studies to determine if patient preference is being met in other communities as well. The findings in the Nimbalkar et al. (2014) article would also support this change in practice standards, as they found that SSC was linked to rapid thermal control and maintenance of thermal regulation in newborns.

**Future Recommendations for Nursing Education**
Throughout this research, evidence has shown that there are many benefits of SSC, including those that are related to the PICOT question. Future nursing education can aid in the familiarization of SSC to the nursing community as early as nursing schooling or nurse education courses. Dehghani et al. (2015) suggests training should be available to nursing staff and medical team members regarding the technique that will be implemented within the organization. This can also provide an opportunity for continuing education courses for licensed nursing staff members.

Nursing education should also extend to prenatal care, as families can be familiarized with SSC practices that may be implemented in many surrounding organizations. Adding information regarding SSC in prenatal clinics will improve mothers’ knowledge on this topic, which can, in-turn, improve practice processes (Dehghani et al., 2015). Families interested in SSC after delivery should be encouraged to include this practice in their birthing plans, and share that information with their medical providers (Moore et al., 2012). Early discussion of SSC can help open the lines of communication among clinic staff, medical teams, and families to achieve optimal outcomes.

**Future Recommendations for Nursing Administration**

Nurse administrators should pay particular attention to the findings related to this research when offering evidence-based practice. Many organizations base their core procedures and implementation processes around evidence and factual findings from research. Based on the positive response to SSC by families in the research performed by George et al. (2015), nursing administrators should encourage patient input and satisfaction rates when considering the inclusion of SSC as a standard practice.
Nurse administrators should also encourage further research regarding SSC and possible long-term effects (Dehghani et al., 2015). Though this does not directly relate to the timing of the PICOT question in this study, there can be measurable long-term benefits in relation to infant stability as a result of continued and repeated SSC practices. When solely considering findings relating to this PICOT question specifically, administrators should seriously contemplate the suggestion by Moore et al. (2012) regarding the development and incorporation of SSC practice into routine care.

**Future Recommendations for Nursing Practice**

Recommendations for future practice are to develop and incorporate SSC into standard nursing practices on labor and delivery units (Moore et al., 2012). Dehghani et al. (2015) also recommends extensive training for staff members in order to gain support and dedication to SSC practices. Nursing staff members should be encouraged to gather data and evidence needed to support the revision of standard nursing practices that currently exclude the implementation of SSC after delivery (George et al., 2015).

Based on the findings of this research, it is evident that nurse educators, nursing students, and nursing staff should be educated on SSC practices. Nimbalkar et al. (2014) found that even in areas where resources are abundant, SSC may still be the better alternative due to positive outcomes to both mothers and babies. In an environment where technology and medical advances are always changing the way patients are cared for, practices that are safe and simple should not be forgotten.

**Conclusion**

There is a vast amount of research pertaining to SSC and its benefit to preterm infants. However, the purpose of this research study was to determine the results SSC had
SKIN-TO-SKIN CONTACT AFTER BIRTH

on full-term infant vital regulation. Though the studies suggested further research must be conducted, SSC proved to have no negative effects in the regulation of newborn vital signs. In fact, studies supported the use of SSC in maintaining normal parameters of vital signs over modern technological methods, such as radiant warmers. Furthermore, SSC provides the infant and mother with a more holistic form of care, supporting infant psychological stabilization while maintaining vital regulation. SSC is becoming the preferred method of care after delivery for most mothers. Therefore, it is important for nurses to understand SSC research, become educated on the methods of practice, and begin implementing SSC as the standard of care for all full-term newborns.

References


SKIN-TO-SKIN CONTACT AFTER BIRTH


Appendix A

Search Flow Diagram
SKIN-TO-SKIN CONTACT AFTER BIRTH

Search Flow Diagram

In full term newborns, how does skin-to-skin contact, compared to no skin-to-skin contact, affect the stability of the newborn as measured by the infant's vital signs, when practiced within the first few hours after birth?

Databases Searched: CINHAL, COCHRANE, and PROQUEST

Population: Newborns (63,075)
            Full-Term Newborns (16,612)

Interventions: Kangaroo Care (1,304)
               Kangaroo Mother Care (520)
               Skin to Skin Care (76,701)

Outcomes: Vital Signs (35,704)
          Vital Sign Regulation (7,213)
          Benefits (404,138)

Combined Together Using "Or": 63,075
Combined Together Using "Or": 77,671
Combined Together Using "And"
Combined Together Using "And"

Manual Search for relevance pertaining to the PICOT question.
Limiters: 2009, English, Full-Text, Higher Levels of Evidence
Exclusion Criteria: Preterm/NICU, breastfeeding

Final Number Resulted: 4
Appendix B

Critical Appraisal Tables
Article I: Critical Appraisal of a Systematic Review

Citation:

Purpose: The review was completed to assess the effects skin-to-skin (SSC) contact has on the health and behaviors of the infant, as well as the success of breastfeeding.


<table>
<thead>
<tr>
<th>Critique topic</th>
<th>Severity of flaw</th>
<th>Comments on strengths and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem</td>
<td></td>
<td>Problem statement is clearly listed. Research problem is related to the harmful effects of infant-mother separation directly after birth and asks if infant skin-to-skin contact (SSC) with their mothers would reduce the harmful effects. Clear definitions of concepts and variables were identified. The integration approach was clearly identified, reviewing only Randomized Controlled Trials (RCT). The approach is adequate and appropriate for the purpose of the research.</td>
</tr>
<tr>
<td>Search strategy</td>
<td></td>
<td>The search strategy is clearly and extensively reviewed within the document. Search includes electronic and hand searches. Each article was hand reviewed for inclusion criteria and the criteria is appropriate. Searches were completed at different times, including quarterly and weekly. Databases searched are clearly listed and are appropriate for the research question. Key words, interventions, and outcomes were identified and comprehensive. Adequate efforts were listed to identify studies relevant to the purpose of the review. No flow diagram was provided to summarize search methods and results.</td>
</tr>
<tr>
<td>Sample</td>
<td></td>
<td>Inclusion and exclusion criteria for choosing studies that pertained to this review is clearly identified within the methods section and in Appendix 2. Only RCTs were used that compared skin-to-skin (SSC) contact to normal hospital care and 34 studies were reviewed. Only mothers and healthy term or late preterm newborns were considered. SSC occurred within 24 hours post-partum. Samples were divided into categories based on interventions used, however due to limited studies available, SSC was researched as a whole. No language restrictions were given. Studies not included were clearly listed along with rationale for their exclusion. Limitations were clearly identified within the article.</td>
</tr>
<tr>
<td>Quality Appraisal</td>
<td>Quality of the studies is provided through risk of bias and their methods to determine quality of the articles was adequately listed. The <em>Cochrane Handbook for Systematic Reviews of Intervention</em> was used to determine quality and risk of bias of the studies. Quality was also clearly listed within the study limitations and outcome variables sections of the review. Two reviewers completed the quality assessments. Disagreements were settled by discussion or by using a third reviewer. Characteristics of the studies and the specific risk of bias was clearly listed in separate tables for each study. The information was appropriately used to select the studies for use. Studies excluded were listed in a table along with the reason for their exclusion.</td>
<td></td>
</tr>
<tr>
<td>Data extraction</td>
<td>Two people were used to extract data. If needed, a third person was consulted. Data was reviewed with a software program to assess for accuracy. Characteristics of included studies adequately listed sample information, interventions used, and their outcomes. Each study used had a correlating table identifying the characteristics of the study including sample information. Reviewers attempted to contact the original authors for data that remained indistinct.</td>
<td></td>
</tr>
<tr>
<td>Data analysis: overall</td>
<td>Data synthesis was adequately identified within the article. The analysis of data was thorough and credible, identifying areas of sensitivity and heterogeneity. Tables, figures, and text were all used to efficiently recapitulate the review’s findings.</td>
<td></td>
</tr>
<tr>
<td>Data analysis: quantitative</td>
<td>Fixed-effect meta-analysis was used to combine data from studies using similar interventions and populations. Random-effects meta-analysis was used when treatment effects differed. The decision to use both types of meta-analysis was explained and seemed sufficient. Effect size was adequately computed for each study and sufficiently stated within the review. Heterogeneity effects were considered using a software program to assess interactions. One study contributing to high levels of heterogeneity was removed from the analysis. Subgroup analysis and effect size was computed for each outcome. Publication bias was assessed within the review, data was assessed for asymmetry and analyzed further if needed. However, visual examination was only completed for one primary outcome of the review.</td>
<td></td>
</tr>
<tr>
<td>Data analysis: qualitative</td>
<td>Not applicable for this review.</td>
<td></td>
</tr>
<tr>
<td>Conclusions</td>
<td>The review provides extensive discussions on each outcome, assessing for quality, quantity, and consistency of the evidence in relation to the purpose of the research. Limitations of the analysis were clearly stated and reviewed. The authors discuss implications for practice on each outcome reviewed within the studies. Implications for further research were also clearly identified and adequately discussed within the review.</td>
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</tr>
</tbody>
</table>
Overall Comments:

Though SSC is the standard of care in other countries, the United States has not adopted this form of practice into maternal care just yet. There are many implications stating the positive effects SSC can have if used in the immediate hours after birth, as shown by this review. Mother-infant separation is known to cause unwanted stress on both parties and the review of research proves the positive effects SSC can have on cardio-respiratory stability and temperature regulation. Current research finds no undesirable effects were discovered in the use of SSC. However, further research must be completed to provide an overwhelming amount of evidence to support SSC and change the standard of care. The authors of this review have indicated areas of SSC that can be implemented into nursing practice. They also identify areas for SSC research to continue and expand on its effects on mother and infant outcomes. With further research, standards of care and practice guidelines regarding SSC may change, allowing mothers and infants to remain together in the immediate hours following birth.
Article II: Critical Appraisal of Quantitative Research


**Study purpose or research questions:** Evaluate methods of rewarming after bath

**Level of evidence:** Single nonrandomized trial, Level II (Pilot & Beck, 2012)

**Study validity:**

<table>
<thead>
<tr>
<th>Validity analysis criteria</th>
<th>Mark an x if very serious concerns</th>
<th>Your comments re major strengths and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem and purpose statements</td>
<td></td>
<td><strong>Problem:</strong> The problem is not specifically addressed, though clearly described through the introduction of the research. <strong>Purpose:</strong> The purposes of this study was clearly defined and were to determine if (a) the mothers at the study hospital would choose to warm their newborns skin-to-skin after the first bath, and (b) if mother-newborn skin-to-skin contact was as effective as radiant warming in rewarming newborns after their first bath.</td>
</tr>
<tr>
<td>Theoretical base from lit review and conceptual framework and concept definitions</td>
<td>Literature review supports the research being done, and concept definitions are clearly defined through the literature. Conceptual framework was created through this research, as the researchers describe a lack inconclusive best practices for rewarming.</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>A pragmatic, non randomized control trial was used in which mothers chose skin-to-skin rewarming over radiant warming after the first bath. Skin-to-skin was considered the</td>
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</table>
experimental intervention, compared to radiant warmers as the control group.

The design of this study to compare groups was described as being redirected to only comparisons, due to an overwhelming response of mothers choosing skin-to-skin over radiant warmers. Critical data were still obtained and addressed.

Ethical issues

No ethical issues were specified for this study. Study parameters were changed, however, due to an overwhelming response to mothers choosing skin-to-skin for rewarming. Study focus was changed to allow mothers to choose as they would get to in “real life scenarios” rather than make specified amounts of mothers use radiant warmers without an alternate option. Approval from IRB as minimal risk study.

Sample and setting

**Inclusions:** Inclusion criteria are clearly defined to include all English speaking mothers, for whom pregnancy, labor, and delivery resulted in a normal vaginal delivery and a healthy newborn, defined as average weight for gestational age and not requiring any special care, were eligible for this study.

**Exclusions:** Exclusion criteria were defined as births requiring cesarean section, forceps, or vacuum deliveries were excluded. Newborns that were below the 10th percentile or above the 90th percentile for gestation age were also excluded. Infants that were at risk for sepsis, required resuscitation, or were admitted to neonatal intensive care were excluded.

**Setting:** This study took place in a large, urban teaching hospital in the southeast, serving a largely African American and White population. There are 39 postpartum beds that are staffed by 60 registered nurses and 20 certified nursing
Selection/Recruitment: (Nonrandom)
Recruitment happened in two ways:
1. During the prenatal period, mothers were recruited from childbirth and breastfeeding classes and physician offices.
2. During the postpartum period, mothers were recruited once they were in their postpartum rooms. Flyers describing the study were posted in each room and nurses caring for them notified a research team member if a mother expressed interest in participating.

Size of n: Intervention group (skin-to-skin group) \( n = 96 \)
Control group (radiant warmer) \( n = 4 \)

<table>
<thead>
<tr>
<th>Measurement tools</th>
<th>Axillary thermometers were used to measure new born temperature at specified increments, recorded in Celsius. Room temperature for participants thirty minutes after bath.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data collection</td>
<td>New born temperatures were taken immediately prior to the bath (T1), 30 minutes after the bath (T2), and 60 minutes after bath (T3). Data collection process is clearly described.</td>
</tr>
<tr>
<td>Procedures</td>
<td>Pre-test, intervention, post-test (two post-test measurements)</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Descriptive and inferential statistical analysis. Construct validity obtained from examining results through collected data, and comparing them between the intervals and demographic data. Pearson’s r correlation, scatter plots.</td>
</tr>
<tr>
<td>Findings (discussion of results) and Interpretation of findings: conclusions of what is true, implications of conclusions</td>
<td>Findings are easy to read on the scatter plots. Statistical information clearly described and easy to follow. Clear discussion of study findings and limitations to the study. Limitations were appropriate for the study and consistent with findings. Implications for nursing are defined.</td>
</tr>
<tr>
<td>Recommendations based on implications</td>
<td>Recommendations are appropriate according to the findings.</td>
</tr>
<tr>
<td>Presentation</td>
<td>Presentation of the article was organized, each</td>
</tr>
</tbody>
</table>
section clearly defined. Each section discussed information appropriate for the described section. Written in a manner that was easy to read and staff nurses could understand their implied roles in the study.

**Credentials of the researcher**

S. George, MSN, APRN, RNC-OB, WHNP-BC, clinical nurse specialist. K. Phillips, RNC, MSN, unit nurse educator. S. Mallory, RN, BSN, nurse clinician Education levels and expertise clearly define researchers credible for the study and recommendations.

**Assessment of validity of findings.**

The study appears to be valid and contributes to on-going nursing understanding of the study of skin-to-skin care. Provides adequate procedural information for other nurses/units to implement the same type of study on a voluntary basis. Contributes to the on-going support of the implementation of skin-to-skin care as a standard practice.

**Study Reliability:**

Temperatures were all statistically significantly lower at T3 than at T1.

Expected significant correlations were found with temperatures at T2 and T3. Birth weight, estimated gestational age, and mother’s race were significantly associated with infant temperature, birth weight retained as the primary predictor in predicting which infants would have low temperatures.

Clinical significance is found in showing that all but 5 of the infants were able to maintain temperature without the use of the warmer. With further research, each case in which the newborn could not be rewarmed using skin-to-skin contact and was placed under the radiant warmer, there were procedural issues with the skin-to-skin contact initiated. The skin-to-skin contact was not effective because of improper placement of the newborn, or failure to appropriately cover the newborn. Half of the newborns initially placed under the radiant warmer had to be passively cooled because of higher body temperatures. These findings indicate that in most cases, newborns can successfully be rewarmed without the use of radiant warmers in a safer
Applicability:

Due to the sample sizes of the control and intervention groups, further studies can be done in which nurses can observe more cases to compare the two groups. This study found importance in letting the mother’s choose, which allows for a real-life situation. Other studies can also be done to show if similar results are found in which a significantly larger amount of mothers choose skin-to-skin rewarming over radiant warmers.

Overall Comments on validity and reliability:

The findings appear to be valid and consistent with the study. Further studies need to be done to compare groups to determine if mothers will consistently choose skin-to-skin care over radiant warming. Allowing skin-to-skin rewarming can have significant financial implications, saving the hospital and patients costs of using rewarming devices when they aren’t needed as skin-to-skin rewarming is a cost-free practice.

Article III: Critical Appraisal of Quantitative Research


Study purpose or research questions: The purpose of the study was to determine the impact of the Kangaroo Mother Care method on vital signs and arterial oxygen saturation of newborns compared to the incubator care method.

Level of evidence: Randomized Controlled Trial, Level II (Polit & Beck, 2012)

Study validity:

<table>
<thead>
<tr>
<th>Validity analysis criteria</th>
<th>Severity of flaw</th>
<th>Comments on strengths and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem and purpose statements</td>
<td></td>
<td>The problem statement is clear and articulates the need for further research to dictate significant</td>
</tr>
<tr>
<td>Theoretical base from lit review and conceptual framework and concept definitions</td>
<td>Literature review supports the research being completed. Conceptual framework is present throughout the review as the researchers pose trials of validity to pose a clear connection of skin-to-skin care and conceptual framework provided throughout.</td>
<td></td>
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<tr>
<td>---</td>
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<td></td>
</tr>
<tr>
<td>Design</td>
<td>Randomized clinical trial study, double-blind study that is appropriate for the research question.</td>
<td></td>
</tr>
<tr>
<td>Ethical issues</td>
<td>Study references that infants due to age and statistical analyst were not informed from groups. Research was posed in the Ethics Committee of the Shaheed Sadoughi University of Yazd City and registered in IRCT138901223679N1. Additional ethical issues included obtaining written consent from the newborn mothers and physician coordination.</td>
<td></td>
</tr>
</tbody>
</table>
| Sample and setting  
· Inclusion and exclusion criteria  
· Selection method (random selection or assignment, convenience  
· Size of n | Inclusion, and exclusion criteria is clearly indicated within the Materials and Methods section of the article. Study inclusion criteria included consent and mental and physical ability of the mothers for performing KMC, the physicians allowance, weighing more than 1800 g for the newborn, gestational age of 32 weeks and above, no abnormalities or problems of the nervous, cardiovascular, or respiratory systems in the newborn, no clinical instability and infections, no surgery performed on the newborn, exacerbated crying newborn, and not being NPO. Any newborn not meeting the above listed criteria was excluded from the study.  
Setting: Neonatal intensive care unit in Iran.  

The article reveals that in the study the sample size was determined by considering a test power of 80%, and significance level of 5 % and (s=4, d=3), which
was based on previous studies. Neonates were divided into two groups: case group (27 subjects) of KMC, and the control group (26 subjects) of conventional incubator care. Subjects were divided using the random number table.

Size of n= 53 neonates

### Measurement tools

The 22,004 data scope passport monitoring system was used to measure pulse and respiration. Pulse oximetry was used to measure the arterial oxygen saturation rate, and a mercury thermometer was used to measure the temperature (auxiliary approach for 3 minutes).

Reliability of the instrument was maintained during research by utilizing the same pulse oximetry device and monitoring system for all newborns in the same situation.

Calibration of the monitoring device was performed routinely by the ward, and validity of the pulse oximetry device and the monitor system was confirmed and upheld by citing the manufacturer and the brand standards.

Simultaneous observation and recording method by two researchers were used for the reliability of temperature measurements \((r= 0.087)\).

### Data collection

Pre-test, training and implementation, and post-test completed.

Vital signs and arterial oxygen saturation rate of newborns in both groups were recorded 5 minutes before the start of the care process.

Mothers instructed before procedure.

Changes in pulse, respiration, temperature, and arterial oxygen saturation rate were controlled and recorded during the care process, at 30 minutes after starting the procedure, and at the end of the caring process.

### Procedures

Pre-test, intervention, post-test

### Data analysis

Data was encoded and analyzed using the SPSS version 15 software (IBM corporation).

The independent samples t-test was used to compare the means of vital signs and arterial oxygen saturation rates between the two groups.

The repeated measure test was used to test the means differences in consecutive days due to
<table>
<thead>
<tr>
<th>Findings (discussion of results) and Interpretation of findings: conclusions of what is true, implications of conclusions</th>
<th>Statistical analysis tables were provided and were clear, and easy to read. Limitations to the study were discussed and included the study being completed on the most crowded ward in the morning shift, so the study was conducted in the evening shift and the quiet hours. Findings of the study are tied to the conceptual framework, and implications for nursing staff and mothers are easily identified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendations based on implications</td>
<td>Recommendations are appropriate based on implications. Recommendations include nurses training the skin-to-skin method to mothers.</td>
</tr>
<tr>
<td>Presentation</td>
<td>Research article was well organized with sections labeled for ease of understanding. Article well written in a manner that is easy to understand by the reader.</td>
</tr>
<tr>
<td>Credentials of the researcher</td>
<td>Researchers associated with the Department of Nursing, Nursing and Midwifery School at the Shaheed Sadoughi University of Medical Sciences and Health Services. Researchers associated acknowledgements to the nursing staff, NICU head nurse, and neonatologist for the help provided with the research.</td>
</tr>
<tr>
<td>Assessment of validity of findings.</td>
<td>This study appears to be valid and contributes to the ongoing study of the benefits of skin-to-skin care in comparison to the conventional incubator method. Additional aspects to contribute to validity include a starting point for training of nursing staff in regard to the skin-to-skin care technique to be developed in hospitals and prenatal clinics to enhance performance.</td>
</tr>
</tbody>
</table>

**Study Reliability:**

Results of the study showed that there were no significant differences between the means of gestational age, birth weight, and sex in the two groups of newborns.

The comparison of temperature means during the first 3 days between the two groups showed a statistically significant difference using the statistical repeated measure test (P= 0.000), so that the average temperature in the case group has increased in comparison to the control group.

Comparison of the average heart rate, and respiratory rate per minute in the 1st-3rd days showed that there is no significant difference between the two groups (P= 0.541, P= 0.586).
What is the clinical significance of the results?

Clinical significance is demonstrated throughout the literature review. Results reveal that skin-to-skin care leads to temperature stability, or its increase in the normal range. Research reveals that placing the newborn skin-to-skin with mother will prevent the heat loss. Increasing temperatures is helpful in improving treatment outcomes. Prevention of heat loss is important to decrease physiological, metabolic, and homeostatic problems.

Results of the research suggest that the cardiac and respiratory status is clinically in a reasonable range during Kangaroo Mother Care, and more stability is seen in comparison to incubator care. Clinical significance is also evident in reference to clinical trial studies that show Kangaroo Mother Care to be effective in cardiac-respiratory parametric stability.

Applicability:

Results of the study reveal applicability; in that evidence reveals that Kangaroo Mother Care can contribute to increasing the temperature Results of the and arterial oxygen saturation rate; as well as increases the cardiovascular and respiratory stability in newborns. This study is applicable for utilization of training of nursing and midwifery staff. The research should be applied to assist hospitals in developing the care process. The study also indicates that the procedure could be performed for the underweight newborns and lower gestational age under certain circumstances.

Overall Comments on validity and reliability:

The findings of the study appear to be valid and reliable. Further research may need to be conducted to study the long-term impact of skin-to-skin care with regard to multiple variables such as weight gain, period time of hospitalization, feeding rates, and vital signs. Reliability of the study reveals that skin-to-skin contact is effective in the improvement and stabilization of vital signs of newborns, and nurses can train this method to mothers.
Article IV: Critical Appraisal of Quantitative Research form


Study purpose or research questions: The purpose of this study was to evaluate the effect of early skin-to-skin contact for the first 24 hours on the incidence of hypothermia in newborns.

Level of evidence: Randomized Controlled Trial, Level II (Polit & Beck, 2012)

Study validity:

<table>
<thead>
<tr>
<th>Validity analysis criteria</th>
<th>Severity of flaw</th>
<th>Comments on strengths and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem and purpose statements</td>
<td></td>
<td>The problem statement is clear and is identified within the introduction of the article. The problem statement indicates that the incidence of hypothermia in newborns is around 40%, and that there is a need for a low-cost intervention that can reduce the incidence of hypothermia. The purpose statement is also well articulated within the introduction of the article and serves to illustrate that the purpose of the research is to evaluate the effect of early skin-to-skin contact for the first 24 hours on the incidence of hypothermia in newborns.</td>
</tr>
<tr>
<td>Theoretical base from lit review and conceptual framework and concept definitions</td>
<td></td>
<td>Literature review supports the research being completed, and concept definitions are clearly supported throughout the article. A conceptual framework was created throughout this research as the researchers describe the results of early SSC on the newborn and the achievement and maintenance of rapid thermal control.</td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td>Superiority Randomized Control Trial Randomization was done based on web based</td>
</tr>
</tbody>
</table>
**Ethical issues**

No ethical issues identified. The study was approved by the Human Research Ethics committee of H.M. Patel Centre for Medical Care and Education, Karamsad. Informed consent obtained from each newborn’s mother prior to being included in the study.

**Sample and setting**

- Inclusion and exclusion criteria
- Selection method (random selection or assignment, convenience)
- Size of n

Inclusion, and exclusion criteria is clearly indicated with the Study population section of the article. Inclusion criteria included newborns with a birth weight of 1800 g or more and delivered vaginally. Exclusion criteria included newborns delivered by cesarean section, newborns needing resuscitation measures, or those newborns detected to have any congenital malformation at birth.

The article reveals that in the study the sample size was determined by the statistic of hypothermia being roughly 40% in the hospital being studied. An absolute drop of 25% in the incidence was considered clinically important. Alpha (type 1 error) at 5% was considered, and it was determined that 47 neonates were required in each group to achieve a power of 80%. Dropouts were not expected because of the study design. 100 participants were recruited in the study (50 per group).

Setting: Maternity ward of Shree Krishna Hospital, attached to Pramukhswami Medical College, Karamsad from Anand district of Gujarat, North India. The study took place over a period of 10 months, from June 2012 to March 2013.

Size of n= 100 neonates

**Measurement tools**

Axillary temperature was recorded with a Smart Care-Digital Thermometer (SCT01), and pulse rate was monitored by pulse oximeter of L&T medical (Model-L&T/STELLAR). Temperature of maternity ward was recorded with room temperature monitor at 12-hour interval at

| Software and selection cards were sealed in opaque envelopes. Study design is appropriate for research question. | No ethical issues identified. The study was approved by the Human Research Ethics committee of H.M. Patel Centre for Medical Care and Education, Karamsad. Informed consent obtained from each newborn’s mother prior to being included in the study. | Inclusion, and exclusion criteria is clearly indicated with the Study population section of the article. Inclusion criteria included newborns with a birth weight of 1800 g or more and delivered vaginally. Exclusion criteria included newborns delivered by cesarean section, newborns needing resuscitation measures, or those newborns detected to have any congenital malformation at birth. The article reveals that in the study the sample size was determined by the statistic of hypothermia being roughly 40% in the hospital being studied. An absolute drop of 25% in the incidence was considered clinically important. Alpha (type 1 error) at 5% was considered, and it was determined that 47 neonates were required in each group to achieve a power of 80%. Dropouts were not expected because of the study design. 100 participants were recruited in the study (50 per group). Setting: Maternity ward of Shree Krishna Hospital, attached to Pramukhswami Medical College, Karamsad from Anand district of Gujarat, North India. The study took place over a period of 10 months, from June 2012 to March 2013. Size of n= 100 neonates | Axillary temperature was recorded with a Smart Care-Digital Thermometer (SCT01), and pulse rate was monitored by pulse oximeter of L&T medical (Model-L&T/STELLAR). Temperature of maternity ward was recorded with room temperature monitor at 12-hour interval at |
noon and midnight when the temperature differences were the highest. Article did not elude to validity or reliability of the testing instruments.

**Data collection**

Process of data collection is clearly described and shows measurements at different intervals. Data was collected using a repeated measures design, which involved collecting data at multiple times from the two groups. Intervention and Control group both received initial care in the delivery room for a few minutes after delivery under the radiant warmer.

**Intervention group:** Newborns were provided SSC beginning 30 minutes to 1 hour after birth from their mother for the first 24 hours with minimal interruption. Conventional care other than SSC was provided for the next 24 hours of life.

**Control group:** Newborns were kept with their mother and received conventional care other than SSC for the first 48 hours.

Temperature and heart rate were recorded at 30 minutes, 1, 2, 3, 4, 5, 6, 12, 24, and at 48 hours of life in both groups.

**Procedures**

Pre-test, intervention, post-test

**Data analysis**

Descriptive statistics was used to depict the characteristics of the study population. The difference in the mean temperature between the two groups at different time points was assessed using Independent Samples t-Test. The overall trend in the mean temperatures of the two groups was portrayed using a line diagram.

Relative risk (RR) was used to estimate the effect of skin-to-skin contact on the incidence of hypothermia. \( \chi^2 \) test was used to assess the association between the incidence of hypothermia and season.

Data was entered using Microsoft Excel 2010 and imported to SPSS 14 for analysis after validation and cleaning.

**Findings (discussion of results) and Interpretation of findings : conclusions of**

Statistical analysis tables were provided and were clear, and easy to read.

Limitations to the study include the study being hospital based, and generalizable to the context of
SKIN-TO-SKIN CONTACT AFTER BIRTH

what is true, implications of conclusions

low-resource countries. Implications to the limitations would necessitate a community-based study with focus on local beliefs and behaviors (early bathing, delayed drying/wrapping). Findings of the study are tied to the conceptual framework, and implications for nursing staff and mothers are easily identified. Implications focus on infants being born in lower and lower middle income countries without the availability of an incubator or radiant warmer.

Recommendations based on implications

Recommendations are appropriate based on implications. Recommendations include aggressive promotion of early SSC in term and late pre-term newborns to reduce the incidence of hypothermia.

Presentation

Research article was well written and displayed in an organized manner. Sections within the article were well displayed for ease of reviewing the research material.

Credentials of the researcher

Researchers associated with the Department of Pediatrics at Pramukhswami Medical College in Karamsad, Anand India. Researcher S.M. Nimbalkar is the Professor of the Department of Pediatrics.

Assessment of validity of findings.

This study appears to be valid and contributes to the ongoing study of the benefits of skin-to-skin care in comparison to the conventional care. Additional aspects to contribute to validity include provision of statistics to illustrate relative risk of hypothermia based on implementations. Contributes to the ongoing support for skin-to-skin care as a standard practice.

Study Reliability:

The intervention group provided an average (s.d.) of 16.98 (0.28) h of SSC over the first 24-hour period. The mean temperature was found to be significantly high in the SSC group at all time intervals starting from 1 to 48 hours (P<0.05 for all).

In the SSC group only two newborns (4%) had mild hypothermia within the first 3 hours of life.

In the Control group 16 newborns (32%) developed hypothermia (temperature < 36.5 degrees Celsius) during the first 48 hours of life.
SKIN-TO-Skin CONTACT AFTER BIRTH

What is the clinical significance of the results?

Clinical significance is demonstrated throughout the literature review. The relative risk of developing hypothermia in the control group as compared with the SSC group was 8.00 (95% CI 1.94-32.99). Research reveals that newborns in the SSC group achieved rapid thermal control as compared with the Control group. Early SSC for 24 hours after birth is noted to decrease the incidence of hypothermia for the initial 48 hours of life.

Applicability:

Results of the study reveal applicability in that evidence reveals that early skin-to-skin care can decrease the incidence of hypothermia for the first 48 hours after birth. This study is applicable for use in countries with low resources, but also applies to provision of care in hospitals throughout the world. Research on skin-to-skin care reveals a method of maintaining thermal regulation of the newborn.

Promotion of skin-to-skin care should include not only areas of limited resources but also all facilities assisting with delivery of the newborn, as skin-to-skin care may be a better alternative due to possible neurodevelopmental benefits.

Overall Comments on validity and reliability:

The findings of the study appear to be valid and reliable. Further studies may need to be completed to study the impact of seasonal variations in countries of low resources. Other areas of study importance would be those newborns born via cesarean section. While much research has been completed regarding Skin-to-Skin care, the United States has not adopted this as a standard maternal practice for delivery. Current research illustrates validity for provision of adoption of this practice for future care of the newborn.
Appendix C

Matrix Table of Critical Appraisals
<table>
<thead>
<tr>
<th>Author, Year, Title, Level of Evidence</th>
<th>Purpose</th>
<th>Data Collection Methods (sample size, selection method, main inclusion criteria)</th>
<th>Measurement Tools (reliability, validity, trustworthiness)</th>
<th>Results</th>
<th>Applicability to PICOT question</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article Citation: George, S., Phillips, K., Mallory, S., Holmqvistova, I., Hare, R., Allen, S., ... Shapiro, S. E. (2015). A pragmatic descriptive study of rewarming the newborn after the first bath. Journal of Obstetric, Gynecologic, &amp; Neonatal Nursing, 44(2), 203-209. <a href="http://dx.doi.org/10.1111/j.1552-6909.2015.012556">http://dx.doi.org/10.1111/j.1552-6909.2015.012556</a></td>
<td>The purpose was clear and concise. Defined to determine if (a) mothers would choose to warm their newborns skin-to-skin after the first bath, and (b) if the skin-to-skin contact was as effective as radiant warming in rewarming newborns after their first bath.</td>
<td>Sample size of intervention (skin-to-skin) group was n=96. Control (radiant warmer) group was n=4. Selection method was defined as non-random, terms of recruitment defined. Mothers were allowed to choose which method of rewarming they wanted to use. Study terms changed because of unexpected choice for skin-to-skin care. Main inclusion criteria clearly defined as English speaking mothers, normal vaginal delivery, healthy newborns at average weight and length, not requiring special care.</td>
<td>Measurement tools and increments were reliable. Axillary temperatures were taken in increments prior to bath (T1), 30 minutes after the bath (T2), and 60 minutes after bath (T3). Standard nursing procedures were used to monitor the newborn offering trustworthiness of method and measurement tools used for temperature. Study initially designed to be a pragmatic nonrandom trial to compare methods. This was changed as 96 of 100 participants chose SSC over radiant warming.</td>
<td>Findings were easy to read. Statistical information clearly described and easy to follow. Discussion of findings and limitations are defined. Study allowed for nursing implications to revise warming procedures. Findings indicate that skin-to-skin warming is a safe alternative to the radiant warmer.</td>
<td>Study applies to the PICOT question by addressing the use of skin-to-skin care with methods not using skin-to-skin care to maintain the temperature vital sign. The study also applies to the timing within a few hours after birth as the first bath is typically within the first few hours after delivery. Article applies to the PICOT question by examining newborn infants that are healthy and require no additional or advanced treatments. All newborns were born from a normal vaginal delivery.</td>
<td>This study provides evidence that skin-to-skin care can be used as an effective way to warm/rewarm an infant. This study also provides evidence that mothers, when given the choice, will choose skin-to-skin rewarming over other method. The study suggests the findings were limiting because the mothers overwhelmingly chose skin-to-skin rewarming over the radiant warmer, changing the overall study design from comparing the two methods to testing skin-to-skin warming as a valid alternative. This study indicated that when given the choice, mothers were more likely to choose skin-to-skin care over other practices to rewarm their newborn indicating that standard practices should be taken into question to give parents a choice. This study addresses vital signs, but does not give full evidence in supporting SSC to stabilize all newborn vital signs. Further research must be done to indicate how SSC relates to other vital signs.</td>
</tr>
<tr>
<td>Author, Year, Title, Level of Evidence</td>
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<tr>
<td>Article Citation: Nimbal kar, S.M., Patel, V.K., Patel, D.V., Nimbal kar, A.S., Sethi, A., &amp; Phatak, A. (2014). Effect of early skin-to-skin contact following normal delivery on incidence of hypothermia in newborns.</td>
<td>Purpose clearly identified as to evaluate the effect of early skin-to-skin contact for the first 24 hours on the incidence of hypothermia in newborns.</td>
<td>Sample size for this study was defined as n=100 50 participants per group. Participants were selected by informed consent of mothers who had newborns that fit the inclusion criteria. Randomization was achieved by using web based software and selection cards sealed in opaque envelopes. Main inclusion criteria indicated as newborns weighing 1800g or more and a vaginal birth.</td>
<td>Article did not include specifics on validity or reliability of the testing instruments. Measurements were taken with a Smart Care-Digital Thermometer and pulse rate monitored by L&amp;T medical. Repeated measures used to monitor temperature and pulse at intervals of 30 minutes, 1, 2, 3, 4, 5, 6, 12, 24 and 48 hours after birth.</td>
<td>Statistical analysis tables were provided and easy to follow. Limitations were included and defined as being hospital based and located in low-resource countries. Findings tied to conceptual framework and implications for nursing staff are defined. Results of the study reveal that early skin-to-skin care can decrease incidence of hypothermia for the first 48 hours after birth. Results show the mean temperature in the SSC group was higher compared to the control group at all time intervals. Descriptive statistics were used indicate characteristics of the population. t-Test, line diagrams, and relative risk were also indicated.</td>
<td>This study applies to the research by addressing skin-to-skin care use for maintaining body temperature. This study uses skin-to-skin care as an alternative warming method and contributes to the ongoing research of skin-to-skin care as a standard practice. This study applies to the timing of the picot question by addressing skin to skin care methods used during the first 48 hours after birth.</td>
<td>This study should be repeated in other countries or areas to indicate methods as effective for standard use. Skin-to-skin care is found to be a safe alternative, though the ongoing benefits should be researched further. The ideas and aspects behind skin-to-skin care should not only be studied for short term benefits on vital signs, but psychological and emotional effects as well. This study is effective in training nursing staff members to use alternative methods to standard warming practices that are safe and cost efficient. Study did not indicate how SSC affected or changed infant pulse, though pulse was measured throughout the trial. Study could be repeated or results could be searched to indicate if SSC had any effect on infant heart rate. After looking at the indications for this study, SSC can eventually be established as the standard of care practiced on a regular basis. Further studies need to be done to determine the same outcomes for newborns that are of early or late gestation or born from varying delivery types.</td>
</tr>
<tr>
<td>Level of Evidence: Randomized Controlled Trial Level II (Pilot &amp; Beck, 2012)</td>
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<td>Article Citation:</td>
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</tr>
<tr>
<td>Dehghani, K., Movahed, Z.P.,</td>
<td>The purpose of the study was to determine the impact of the Kangaroo Mother Care method on vital signs and arterial oxygen saturation of newborns compared to the incubator care method.</td>
<td>The 22,004 data scope passport monitoring system was used to measure pulse and respiration. Neonates were divided into two groups: case group (27 subjects) of KMC, and the control group (26 subjects) of conventional incubator care. Subjects were divided using the random number table. Inclusion, and exclusion criteria is clearly indicated. Study inclusion criteria included consent and mental and physical ability of the mothers for performing KMC, the physicians allowance, weighing more than 1800 g for the newborn, gestational age of 32 weeks and above, no abnormalities or problems of the nervous, cardiovascular, or respiratory systems in the newborn, no clinical instability and infections, no surgery performed on the newborn, exacerbated crying newborn, and not being NPO.</td>
<td>Sample size of 53 neonate Neonate were divided into two groups: case group (27 subjects) of KMC, and the control group (26 subjects) of conventional incubator care.</td>
<td>Results of the study showed that there were no significant differences between the means of gestational age, birth weight, and sex in the two groups of newborns. The comparison of temperature means during the first 3 days between the two groups showed a statistically significant difference using the statistical repeated measure test (P= 0.000), so that the average temperature in the case group has increased in comparison to the control group. Comparison of the average heart rate, and respiratory rate per minute in the 1st-3rd days showed that there is no significant difference between the two groups (P= 0.541, P= 0.586).</td>
<td>Results reveal that skin-to-skin care leads to temperature stability, or its increase in the normal range, which helps to define the PICOT terms. Research reveals that placing the newborn skin-to-skin with mother will prevent the heat loss, showing that skin-to-skin is effective in regulating temperature. Increasing temperatures is helpful in improving treatment outcomes. Prevention of heat loss is important to decrease physiological metabolic, and homeostatic problems.</td>
<td>Results of the research suggest that the cardiac and respiratory status is clinically in a reasonable range during Kangaroo Mother Care, and more stability is seen in comparison to incubator care. Clinical significance is also evident in reference to clinical trial studies that show Kangaroo Mother Care to be effective in cardiac-respiratory parametric stability. Results of the study reveal applicability; in that evidence reveals that Kangaroo Mother Care can contribute to increasing the temperature. Cardiovascular and respiratory stability is increased in newborns during skin-to-skin care. This study is applicable for utilization of training of nursing and midwifery staff. The research should be applied to assist hospitals in developing the care process. The study also indicates that the procedure could be performed for the underweight newborns and lower gestational age.</td>
</tr>
</tbody>
</table>

**Level of Evidence:** Randomized Controlled Trial, Level II (Polit & Beck, 2012)
**SKIN-TO-SKIN CONTACT AFTER BIRTH**

Observation and recording method by two researchers were used for the reliability of temperature measurements ($r = 0.087$).

Saturation rates in the 1st-3rd days showed statistically significant differences between the two groups ($P = 0.000$).

Clinical significance is demonstrated throughout the literature review.

Results reveal that skin-to-skin care leads to temperature stability, or its increase in the normal range.

Research reveals that placing the newborn skin-to-skin with mother will prevent the heat loss.

Increasing temperatures is helpful in improving treatment outcomes. Prevention of heat loss is important to decrease physiological metabolic, and homeostatic problems.

Age under certain circumstances.

Reliability of the study reveals that skin-to-skin contact is effective in the improvement and stabilization of vital signs of newborns, and nurses can train this method to mothers.

The study results can be used to support the PICOT question. The PICOT question asks if SSC can improve infant stability; as evidenced by vital signs. Vital signs include heart rate, respiratory rate, and temperature, as well as pain (as evidenced by infant crying). The study proved significant results were found in improving cardio-respiratory stability by using SSC.

SSC was only found to be favored toward infant stability whether statistically significant or not. There were no negative aspects found from implementing early SSC into practice. Therefore, SSC is safe to implement into common practice, allowing more research to be completed.

Results of the study reveal that implementation of skin-to-skin contact may be beneficial to newborns in all settings to include expansion of research into settings such as pre-term newborns.

<table>
<thead>
<tr>
<th>Author, Year, Title, Level of Evidence</th>
<th>Purpose</th>
<th>Data Collection Methods (sample size, selection)</th>
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</tr>
</thead>
</table>

**Table:**
SKIN-TO-Skin CONTACT AFTER BIRTH


Level of Evidence: Systematic review of Randomized Controlled Trials, Level I (Polit & Beck, 2012).

The review was completed to assess the effects skin-to-skin (SSC) contact has on the health and behaviors of the infant, as well as the success of breastfeeding.

Thirty-four randomized controlled trials were included involving 2177 participants (mother-infant dyads).

Inclusion and exclusion criteria for choosing studies that pertained to this review is clearly identified within the methods section and in Appendix 2.

Only RCTs were used that compared skin-to-skin (SSC) contact to normal hospital care and 34 studies were reviewed.

Only mothers and healthy term or late preterm newborns were considered.

SSC occurred within 24 hours post-partum. Samples were divided into categories based on interventions used, however due to limited studies available, SSC was researched as a whole.

0 of the 34 studies met all inclusion criteria.

The methods, main inclusion criteria:

<table>
<thead>
<tr>
<th>method, main inclusion criteria</th>
<th>Hand and electronic searches were completed</th>
<th>Late preterm infants had better cardio-respiratory stability with early SSC (one trial; 31 participants) (MD 2.88, 95% CI 0.53 to 5.23).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Databases searched: Cochrane, Medline, &amp; EMBASE</td>
<td>Blood glucose 75 to 90 minutes following the birth was significantly higher in SSC infants (two trials, 94 infants) (MD 10.56 mg/dL, 95% CI 8.40 to 12.72).</td>
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<tr>
<td>Hand searches of 30 journals and major conferences were completed</td>
<td>In 2 studies regarding thermoregulation of the infant, results of the SSC group were better than the control group (RR 0.40, 95% CI 0.19 to 0.61, and RR 0.50, 95% CI 0.17 to 0.83 respectively)</td>
<td></td>
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<tr>
<td>Each article was hand reviewed for inclusion criteria and the criteria is appropriate.</td>
<td>However, in another study regarding newborn temperatures, control group temperatures were slightly better (RR -0.10, 95% -0.24 to 0.04). Although at other time points, reported results found the intervention group had better thermoregulation and because of this, the reviewers had difficulty interpreting the results of</td>
<td></td>
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<tr>
<td>Searches were completed at different times, including quarterly and weekly.</td>
<td>The study results can be used to support the PICOT question. The PICOT questions asks if SSC can improve infant stability as evidenced by vital signs. Vital signs include heart rate, respiratory rate, and temperature, as well as pain (as evidenced by infant crying). The study proved significant results were found in improving cardio-respiratory stability by using SSC. SSC also provided statistically significant results in infant thermoregulation after the removal of one particular study that was skewing the results. The article also recognizes one study (Bergman, 2004) and its significance in SSC improving infant stability based on 5 vital sign parameters. SSC infants were more likely to stay within healthy parameters than infants in the control group. The study also proved SSC reduced infant crying within two time periods studied. Though there was some instances of high heterogeneity and issues regarding study blindness, many of the primary outcomes of the study support the</td>
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</table>

The study reviewed was a Level I: Systematic Review of Randomized Controlled Trials, making this the highest level of evidence in support of our PICOT question. Even with the wide variety of outcomes and high heterogeneity, SSC was only found to favor infant stability whether statistically significant or not. There were no negative aspects found from implementing early SSC into practice. Therefore, SSC is safe to implement into common practice, allowing more research to be completed in the future.

Because this study reviewed 34 RCTs, some of the information in this article was the same as other articles reviewed. However, none of the other articles reviewed for this research were included in the 34 RCTs for this study.

Many of the results in the study offer extreme favor in the support of SSC and infant breastfeeding, but that was not the purpose of our PICOT question.

The use of early SSC may become part of clinical practice largely due to its effects on breastfeeding and its effects on infant stability relating to vital signs will be further researched from its increased use.
SKIN-TO-SKIN CONTACT AFTER BIRTH

of the methodological quality criteria.

Total sample sizes in the studies ranged from 8 to 204 mother-infant dyads.

Diverse populations were studied including: Canada, Chile, Germany, Guatemala, Iran, Israel, Italy, Japan, Nepal, Poland, Russia, South Africa, Spain, Sweden, Taiwan, Thailand, the United Kingdom, and the United States.

30 of the studies reviewed only healthy full-term infants.

4 studies used healthy late pre-term infants that were assigned to regular infant nurseries.

No language restrictions were given.

Studies not included were clearly listed along with rationale for their exclusion.

Limitations were clearly and their outcomes.

Each study used had a correlating table identifying the characteristics of the study including sample information.

Reviewers attempted to contact the original authors for data that remained indistinct.

Fixed-effect meta-analysis was used to combine data from studies using similar interventions and populations.

Random-effects meta-analysis was used when treatment effects differed. The decision to use both types of meta-analysis was explained and seemed sufficient.

Effect size was adequately computed for each study and sufficiently stated within the review.

Heterogeneity effects were considered using a software program to assess interactions. One study contributing to high levels of heterogeneity was removed from the analysis.

Subgroup analysis and effect size was computed for each outcome.

Publication bias was assessed within the review, data was assessed for asymmetry and analyzed further if needed.

SSC infants had a lower mean heart rate than the control group although the evidence was not statistically significant and there was high heterogeneity placed with this outcome. (MD -3.05 beats per minute (BPM), 95% CI -7.84 to 1.75; 183 infants; (heterogeneity: $T^2 = 15.26, P = 0.0005, I^2 87\%$)

SCC was found to improve infant respiratory rate but was not found to be statistically significant (MD -3.12 RPM, 95% CI -6.61 to 0.37; 215 infants) (heterogeneity $T^2 = 9.24, P = 0.004, I^2 = 77\%$)

Most of the heterogeneity was found to be caused by the results from the Villalon 1993 study. Results varied considerably for the time points used in this study. Sensitivity analysis was used where results for this study were excluded. Infant heart rate and respiratory rate of the SSC group results with the exclusion of the Villalon 1993 study were

PICOT question at hand. However, more research must be done to help improve the studies heterogeneity and regulate control and intervention groups more appropriately. The study offers suggestions for nursing practice that support the PICOT question as well. For instance the use of early SSC in improving SCRIP scores, which relates to infant stability. Implications for further research involved the use of fewer outcomes, which caused the biggest issue with finding research related to this study. The study suggests using SCRIP scores as a form of infant stability measurement in the future of this research.

Though most of the articles, similar to this review, support the PICOT questions, the one thing that is clear from the results is the need for further research to be conducted. The results do call for practice change to support early SSC, but more research must be conducted to make the call for practice change more absolute.
identified within the article. found to be statistically significant with no indication of heterogeneity between studies (heart rate MD -5.77, 95% CI -7.46 to -4.11; respiratory rate MD -4.76, 95% CI -6.12 to 3.41) (Analysis 1.33; Analysis 1.34).

The Bergman 2004 studied compared the number of infants in SSC and control groups whom did not exceed parameters discussed below. The five parameters were infant skin temperature less than 35.5 °C on two consecutive occasions, heart rate less than 100 or more than 180 BPM on two consecutive occasions, apnea more than 20 seconds, oxygen saturation less than 87% on two consecutive occasions, blood glucose less than 2.6 mmol/L and FIO2 up to 0.6 with continuous positive airways pressure (CPAP) up to 5 cm of water pressure. 15 of the 18 SSC and one of the 13 control infants did not exceed parameters (RR10.83, 95% CI 1.63 to 72.02). Hypothermia, hypoglycemia, and respiratory problems were...
the primary reasons for medical intervention seen in the control group.

Infant crying in the SSC was found to be statistically significantly less than in the control group infants in 2 different time periods studied (RR 12.86, 95% CI 1.91 to 86.44) (MD -8.01 minutes, 95% CI -8.98 to -7.04)

Appendix D

Query Letter
Dear Virginia Henderson International Nursing Library,

Our evidence-based practice research team would like to submit our Capstone project for publication within The Henderson e-Repository. The full title of the proposed project is “Skin-to-Skin Contact after Birth to promote Newborns’ Vital Stabilization: An Evidence-Based Project”. The purpose of this project is to examine the physiological effects that skin-to-skin contact has on the full-term newborn, with regard to determining how the physiological response differs for those newborns that are separated from their mothers after birth.

This research supports the mission of the Sigma Theta Tau International (STTI) and the Virginia Henderson International Nursing Library by advancing health and promoting nursing excellence through nursing research and evidence-based practice. Nurses working in the postpartum setting are tasked with ensuring that the newborn maintains physiologic stability while adjusting to life outside of the womb. While Skin-to-skin contact has become a standard of care for preterm infants, this has not become a standard of care for full-term or healthy newborns posing concern for further research as evidenced by our Capstone project. Recognizing the benefit direct skin-to-skin contact can provide to healthy infants in regards to the stabilization of vital signs, including pain, could revolutionize the standard of care provided to neonates postpartum.

The purpose of our PICOT question for our Masters of Science in Nursing Capstone Evidence-Based project was: In full term newborns, how does direct skin-to-skin contact, compared to no skin-to-skin contact, affect the stabilization of the infant as measured by the infant’s vital signs, when practiced within the first few hours after birth? A literature review was completed utilizing multiple research databases to evaluate the physiological response of skin-to-skin contact after birth. Final articles chosen for inclusion within our research were limited to predetermined criteria of full text, English-language, and those that were published within the most recent 5 years. Articles including data that were too specific or those unrelated to the population established by the PICOT question were filtered out. This research is important to nurses, as there has not been much research involving skin-to-skin contact and the benefits to the full-term neonate.

Our group is looking for a target submission date of November 20, 2015. We aspire to provide validity for the provision of adoption of this practice for future care of the newborn. Thank you for your consideration of our project. We look forward to hearing from you.

Sincerely,

Stephanie Bricker, BSN, RN: Stephanie.Bricker@MethodistCollege.edu
Rachel Johnson, RN: Rachel.Johnson@MethodistCollege.edu