2022

The Effects of Delayed Initial Bathing in Newborns

Danielle Nitzachon
University of Central Florida

THE EFFECTS OF DELAYED INITIAL BATHING IN NEWBORNS

by

DANIELLE NITZACHON

A thesis submitted in partial fulfillment of the requirements
for Honors in the Major Program in Nursing
in the College of Nursing
and in the Burnett Honors College
at the University of Central Florida
Daytona Beach, FL

Spring Term 2022

Thesis Chair: Leslee D'amato-Kubiet, Ph.D., APRN, ANP-BC

ABSTRACT

The primary goal of a newborn infant's first bath is to remove unwanted soils from the skin such as meconium and blood, while leaving residual vernix caseosa intact. Delaying a newborns' first bath has been shown to facilitate a better adjustment to extrauterine life when vernix caseosa is left unwashed. The World Health Organization recommends that bathing be delayed until 24 hours of age in a newborn (WHO, 2017), allowing time for neonatal thermoregulation, skin-to-skin contact with the mother, and glucose stability. The purpose of this literature review was to examine the impact of delaying the stressor of the first newborn bath for up to 24 hours after birth on the reduction of neonatal complications and improved health outcomes. A literature review examining the practice of delayed initial bathing and its benefits on neonatal thermoregulation, glycemic control, infection, and breastfeeding rates was conducted from various online databases. Research articles published from 2004 to 2020 that focused on the effects of delayed initial newborn bathing on neonatal health outcomes were included in this literature review for synthesis. Results from 15 studies that implemented the practice delayed initial bathing in newborns were compared for effectiveness of improving neonatal health outcomes. The studies suggest delaying the initial bath of a newborn can be effective for reducing hypothermic and hypoglycemic incidences, reducing infection rates, and improving breastfeeding rates. Although benefits of delayed bathing were found in each study evaluated, many studies were performed with varying delayed timings of the initial newborn baths or had limited findings of breastfeeding rates, indicating the need for further research.

ACKNOWLEDGEMENTS

I would like to thank my thesis chair, Dr. Leslee D'Amato-Kubiet, for her guidance and encouragement throughout developing this review and for always empowering me to achieve my goals. I would like to thank all of those who have supported me throughout the process of developing my Undergraduate Honors Thesis, as well as throughout my endeavors in nursing school. I would also like to thank my committee member, Dr. Angeline Bushy, who has guided me throughout this review. Thank you to the College of Nursing, faculty, and staff that have provided me with an experience that I will forever take with me through my career.

TABLE OF CONTENTS

INTRODUCTION

In the United States alone, 3.6 million babies are born yearly in acute care facilities and in birthing centers. In the last 5 years, the birth rate and infant mortality rate have exponentially declined. In 2020, the infant mortality rate was 5.69 deaths per thousand live births as a result of birth defects, preterm birth, and low birth rate. Infant mortality can also occur due to labor complications, sudden unexpected infant death (SUID) such as sudden infant death syndrome (SIDS), and unexpected maternal pregnancy complications (trauma, domestic violence, overdose). One of the major causes of neonatal deaths worldwide are due to infectious diseases. However, infant deaths related to infection can be prevented by preventive efforts to reduce bacterial, viral, and fungal growth and exposure to noxious agents shortly after birth. A recent method of decreasing acute infection in the newborn infant is to delay the first bath for 24-hours following birth. However, there is still debate whether the first bath should be delayed and the relationship to infant mortality.

Delaying the newborn's first bath from immediately or several hours after birth to a full 24-hours following birth has contributed to improved health and well-being in the infant. Waiting to bathe the newborn infant for 24-hours after birth can combat infection, decrease bacterial load, protect skin integrity, regulate body temperature, and encourage bonding. The protective layer of vaginal secretions remaining on the infant's skin for twenty-four hours following birth, increases the defense proteins important for building innate immunity and improves colonization of the skin with normal flora bacteria needed for fighting infection. The goal of the first bath is to cleanse the newborn's skin of dried fluids and meconium although

recent evidence suggests, the fluids present at birth and allowed to dry on the newborn infant's skin promote active healing and protective bacteria to ward off intrusion of harmful microorganisms. Delaying the first bath also allows providers time with the infant for crucial focused assessments and screenings, as well as parent education and caring for their newborn. Further research about newborn cleansing after vaginal and cesarean section births is beneficial to the care and well-being of the infant after birth.

PROBLEM

The postpartum period in a neonate is an essential time for monitoring how the infant is adjusting to life outside of their mother's uterus. The postpartum period starts after the delivery of the newborn until the mother reaches her prepregnant state, typically lasting about six to eight weeks. If the birth took place within a health facility, mothers and newborns should receive necessary postnatal care within the first twenty-four hours. This includes allowing the mother to rest, time for feeding and bonding, and infant assessments. Most of the infant screenings and assessments are done during the first bath. The impact of delaying the newborn's first bath to at least twenty-four hours postpartum must be further evaluated to understand the effects they have on overall infant health.

The effects of delayed bathing in newborns are not yet fully understood, as some individuals are skeptical in waiting the full twenty-four hours to bathe their newborn. Research demonstrates that the mother's vaginal fluids on the infant's skin acts as a protective barrier, leading to a decreased risk of developing newborn complications such as hypothermia, hypoglycemia, or bacterial invasions. Evidence suggests numerous protective and health promotion benefits of delayed bathing time in neonates when postponed to twenty-four hours after they have been born. However, further research is needed to address the effectiveness and advantages of delaying the newborn's first bath.

PURPOSE

The purpose of this integrative literature review is to examine the benefits of delaying initial bathing in newborns for twenty-four hours. Evidence shows the improvement of newborn outcomes when bathing times are delayed to twenty-four hours and has been implemented in most healthcare facilities. Most of the research conducted analyzed the effects of breastfeeding and bonding rates when more skin-to-skin contact was implemented, an improved thermoregulation system, and bacterial decolonization. Additional research can be useful in better understanding the benefits of delayed bathing on improved neonatal health and postpartum care.

BACKGROUND

For decades, newborns delivered in hospitals or acute care facilities would be bathed immediately following birth, within the first hours of life outside the womb. Healthcare research suggests delaying the first bath of the newborn for at least twenty-four hours after birth can lead to physical and emotional benefits. After birth, the newborn is placed directly onto their mother's chest for essential skin-to-skin contact for about thirty minutes to an hour. The infant is then clothed and wiped with a warm washcloth to remove excess blood or meconium present on their skin from the birthing process, being careful not to remove any amniotic fluid or vernix caseosa. Vernix is the waxy white coating that covers and protects the skin of the fetus during the last trimester of pregnancy, and is still present on the skin after delivery. Vernix consists of proteins, water, and lipids that assist with the facilitation of intra-uterine to extra-uterine adaptation. When left on the skin, the vernix continues to act as a barrier and protects against water loss, aids with thermoregulation by retaining heat, and improves skin integrity and innate immunity. It is now standard protocol at numerous hospitals to wait to give a baby their first birth.

During the infant's first bath, a completion of newborn assessment is performed by the healthcare team, including nurses, respiratory therapists, and physicians. An initial set of vital signs is taken to ensure the infant's temperature and vital signs are within a normal range to tolerate the bathing process, since the infant is still adjusting to regulating their body temperature in the extrauterine environment. Baths are given if the neonate's temperature is 36.8 degrees Celsius or greater to prevent risk of hypothermia (Rushcel, 2018). Preventing hypothermia in the newborn avoids life-threatening complications and complications from cold exposure. The automatic reaction an infant releases to cold stress is an increase in cellular metabolism, creating

an increase in the demand for oxygen which can lead to hypoxia or cardiopulmonary failure. As hypothermia in the newborn progresses, they are at risk for developing hypoglycemia due to the increase in glucose consumption caused by accelerated metabolic demand. When exposed to excessively cold environments for a short period of time, babies are unable to produce the automatic shivering response as adults do to increase body temperature. To compensate for excessive heat loss, the infant utilizes glucose stores necessary for heat production. It is rare that newborns establish full thermoregulation immediately after delivery, rather is developed sometime within twenty-four hours or more after birth (Laptook and Jackson, 2006).

An infant's immune system is not fully actuated until after birth and has temporary, short-term immunity passed from the mother during pregnancy. During intrauterine life at 24 weeks, immunoglobulin (Ig) G maternal antibodies cross the placenta to provide the infant with the mother's antibodies to give the fetus passive immunity against diseases and infectious organisms. Passive immunity from the mother lasts approximately four weeks after birth, then the infant is responsible for building active immunity by counteracting invading antigens. Infants born earlier than 30 weeks, before the antibody transfer has taken place, have no natural immunity and are more susceptible to infection. IgA and IgM are antibodies that are released as a response to the presence of an infection. Since antigens rarely ever invade the intrauterine space, the presence of IgA or IgM antibodies at birth might indicate that the fetus has been exposed to an infection. After delivery, various microorganisms colonize the infant's skin based on the type of delivery: vaginal or cesarean section (Mardini et al., 2020). An infant who was delivered vaginally will contain bacteria that resembles the mother's vaginal flora, whereas an infant delivered by cesarean section will display bacteria similar to the mother's skin flora. Vernix in

addition to amniotic fluid acts as a protective barrier and contains antimicrobial properties against common bacterial and fungal pathogens. Leaving the vernix on the infant's skin for a delayed period assists with the facilitation of skin and gut colonization with good bacteria.

Studies have shown a newborn's most advanced sense at birth is smell, which is typically present one to two hours after the clearance of amniotic fluids from the lung fields. Olfactory receptors begin to develop starting the eighth week of pregnancy, giving the fetus exposure to the smell and components of amniotic fluid for many weeks before birth. The familiar odor of amniotic fluid is known to be important for recognition of kin, especially in breastfeeding and bonding time with the mother. During the gestational period, the fetus develops strong associations between particular scents and experiences. Preterm and full-term neonates are able to differentiate between various odors belonging to their mother's body and breastmilk (marlier & Schaal, 2005). When a mother senses her newborn, it triggers a release of the hormone oxytocin, which stimulates the flow of breast milk. The scent of the mother's milk produces an analgesic effect on the neonate. The oxytocin reflex induces a state of calmness in the mother and infant, and releases important physiological factors to promote bonding and emotional closeness between the mother and child during skin-to-skin contact time. Giving the infant a bath separates them from their mother, interfering with the natural birth process and putting the baby in the state of fight or flight. This sensitive period of proper skin-to-skin contact after birth is essential reducing the stress of the infant and improving the outcomes of breastfeeding and bonding (WHO, 2009).

METHOD

A comprehensive review of the literature was performed using research articles available from 2004 to 2020 regarding the effects of delayed bathing in newborns and the benefits on neonatal health. The focus of the review was on the effects of improved thermoregulation in the newborn, breastfeeding and bonding rates, and hypoglycemic control. Databases explored to search for articles included EBSCO host databases, Medical Literature On-Line (Medline), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and PsychInfo databases. Searches used a combination of the following terms: Newborn bathing*, hypothermia*, infant hypoglycemia*, breastfeeding*, infant bonding*, benefit*, attachment*, and mother-infant bonding*. Inclusion criteria will consist of 1) published research in English, 2) delayed bathing in newborns to at least twenty-four hours compared to immediate bathing, and 3) the effects of delayed bathing in preventing post-birth complications in the newborn. Articles that were excluded focused on specific preventative measures following birth to reduce the risk of hypothermia, hypoglycemia, and breastfeeding difficulties not in relation to delayed bathing times.

The data was compiled into tables that synthesized the benefits of delayed bathing in newborns and was tabled based on the information obtained (see appendix A). Data provided the evidence for the effects of delayed bathing in newborns and its benefits on neonatal health in regard to the thermoregulation system of the infant, hypoglycemic control, mother-infant bonding, and breastfeeding rates.

RESULTS

Fifteen studies related to delayed bathing in newborns and its effects on neonatal health were included in this literature review. Of the fifteen studies reviewed, eleven studies proved to be effective and four proved to be inconclusive. The studies suggest delaying the initial bath of a newborn can be effective in improving neonatal outcomes following birth. Many of the studies included reduced incidences of neonatal hypothermia, hypoglycemia, and bacterial invasions in addition to higher exclusive breastfeeding rates, indicating that more skin-to-skin contact between the mother and baby can be associated with improved latching. The effectiveness of delayed bathing on improved neonatal outcomes is of value, but not yet fully implemented as standard practice. Additionally, many studies focused on only full-term, healthy newborns or had varying delayed birthing times, ranging between 12 to 24 hours.

Hypothermia

Neonatal hypothermia is defined as an abnormal thermal state in which the newborn's body temperature falls below the desired temperature of 36.5 °C (97.7 °F). The WHO defines the stages of neonatal hypothermia by cold stress or mild hypothermia from 36.0 to 36.4 °C, moderate from 32.0 to 35.9 °C, and severe hypothermia less than 32.0 °C (WHO, 1997). During the newborn's transition to extrauterine life, self-thermoregulation begins to occur when there are adequate energy stores, insulation, muscle tone, and hypothalamic function. When exposed to cold stress, neonates have a limited capacity to thermoregulate and are prone to decreased core temperature (Balest, 2021). Preterm infants are at a greater risk of hypothermia due to decreased subcutaneous fat and a larger surface area in

relation to their weight. The majority of evidence supports that the risk of neonatal hypothermia is decreased when delayed bathing is implemented.

In one study, data was collected from 900 term newborns (≥37 weeks' gestation) records born within nine different facilities (50 before implementation and 50 after implementation at each of the nine hospitals) to compare the effects of delayed bathing until 24 hours of age on temperature data (Anderson, 2020). Of the 50 newborns who received standard bathing processes (sponge bath at 2-4 hours of life), 9% (n=39) had a temperature of less than 36.5 °C (97.7 °F). Of the 50 newborns who received a bath after 24 hours of age, only 1% (n=4) of newborns had a temperate of less than 36.5 °C (97.7 °F) (Anderson, 2020). Another study evaluated the effectiveness of parent-performed, delayed bathing on newborn temperatures before and after the practice change was implemented (Brogan and Rapkin, 2017). Of the 142 newborns who received a sponge bath 2-4 hours after birth, 42 newborns had a temperature of less than 36.5 °C (97.7 °F). In comparison, of the 140 newborns who received a delayed immersion bath 24 hours after birth, 27 newborns were hypothermic (Brogan and Rapkin, 2017).

Another study focused on the effects of delayed newborn bathing for 24 hours on temperature stability through a prospective chart review of 330 newborns before and after implementation (Chamberlain et al., 2019). A paired sample t-test indicated that the number of cold-stress infants after their first bath significantly decreased after implementation of the delayed bathing time (M = 0.93, SD = 0.253) when compared to pre-implementation (M = 0.87, SD = 0.334). Although the majority of studies have shown

significant beneficial effects of delayed bathing on neonatal hypothermia rates, further research is needed to compare the effects to preterm infants since they are at an increased risk of developing hypothermia.

Hypoglycemia

Neonatal hypoglycemia is the most common metabolic problem in newborns and is defined as a plasma glucose reading of less than 300 mg/dL during the first 24 hours of life and anything less than 45 mg/dL after 24 hours of life. Newborns at risk for developing hypoglycemia include those that are large for gestational age, small for gestational age, and maternal gestational diabetes and are required to have regular blood glucose measurements. Heat production in the newborn is restricted due to the limited amount of brown fat and glycogen stores available, which are quickly utilized if the infant becomes hypothermic (Bailey and Rose, 2000). Delaying newborn bathing to after 24 hours of birth has shown a statistically significant decrease in blood sugar check below 45 mg/dL compared to no delay in the first bath.

In one study, a total of 1,225 healthy newborns (34 0/7 weeks and older) who were bathed before 24 hours (n = 680) were compared to newborns who were bathed after 24 hours (n = 545) to examine the incidences of hypothermia and hypoglycemia (Warren et al., 2020). When both bathing groups were compared, delaying the bath newborn's bath until 24 hours showed a decreased incidence of hypothermia (p = .03) (Warren et al., 2020). Another study focused on the effects of delayed newborn bathing for 24 hours on glucose stability through a prospective chart review of 330 newborns before and after implementation (Chamberlain et al., 2019). Paired-sample t-test scores showed a statistically significant decrease in the in

hypoglycemic readings post-intervention (M = 0.76, SD = 1.20) when compared to pre-intervention (M = 3.79, SD = 4.74) (Chamberlain et al., 2019).

In another study, blood glucose results were obtained from 1135 newborns' medical records to explore the rates of neonatal hypoglycemia as an outcome after the implementation of delaying their first bath until at least 12 hours of life (Mclnerney, 2015). Newborns in Sample A (no delayed bath) had an 8.5% incidence of hypoglycemia whereas in Sample B (delayed bath), there was a 3.5% occurrence of hypoglycemia (Mclnerney, 2015). Of the 176 high-risk infants in Sample A (no delayed bath), 27.8% had an initial hypoglycemic measurement. Of the 142 high-risk infants in Sample B (delayed bath), 14% had hypoglycemia on the initial tests. This study shows that delaying the initial bath of a newborn has the potential of decreasing hypoglycemia rates by 50% in high-risk infants, similarly to low-risk infants (Mclnerney, 2015). Although the results suggest that delaying the initial bath of the newborn until 24 hours of age can be effective in reducing the risk of a hypoglycemic event, further research can be useful in determining its effectiveness in pre-term infants.

Exclusive Breastfeeding

Breastfeeding is the clinical gold standard for infant feeding and nutrition, which provides numerous benefits for both babies and mothers. Babies who are breastfed have a lower risk of developing ear infections, type 1 diabetes, asthma, and sudden infant death syndrome (SIDS) (CDC, 2021). Some benefits for mothers include a decreased risk of ovarian and premenopausal breast cancer, decrease in postpartum blood loss, hypertension, and postpartum weight loss (AHRQ, 2018). Studies have found that some components of the mother's amniotic

fluid act as a signal for breastfeeding initiation by guiding the newborn to the mother's breast. Early separation of the mother and baby can interrupt skin-to-skin care and bonding time, which may impede breastfeeding initiation and frequency of feedings, which is why delayed initial bathing of the newborn to at least 24 hours has been recommended.

One study evaluated the effects of delayed bathing to 12 hours postpartum on breastfeeding outcomes in 1,205 38-week newborns (Suchy et al., 2017). Of the 322 newborns who received a bath before 12 hours, 68% of infants were exclusively breastfed. Of the 486 newborns who received a bath after 12 hours, 71% of infants were exclusively breastfed (Suchy et al., 2017). These results showed that the implementation of delayed bathing did not significantly change the exclusive breastfeeding rates. A retrospective chart review was done to examine exclusive breastfeeding rates after the implementation of delaying the newborn bath until 12 hours after birth in 996 mother-newborn couplets (DiCioccio et al., 2019). After implementation of the delaying bathing, there was an increase from 59.8% to 68.2% in the couplets who had exclusive breastfeeding (DiCioccio et al., 2019).

Another study implemented delaying the newborn's initial bath to 12 hours postpartum with 1,463 mother-infant couplets that were split into three cohorts (Long et al., 2020). Of the 565 couplets before implementation of delayed bathing, 74.1% had exclusive breastfeeding in comparison to 70.1% of the 468 that received a bath after 12 hours (Long et al., 2020). Delaying the first newborn bath may be a factor that can influence the rates of exclusive breastfeeding however, there were minimal significant results. Although further research is needed to evaluate the effectiveness of delayed bathing on exclusive breastfeeding rates, education and

recommendation of delayed bathing should continue to be encouraged to mothers and families due to the other potential benefits.

Skin Colonization

Vernix is known as the waxy white coating that covers and protects the skin of the fetus during the last trimester of pregnancy, which is still present on the newborn's skin as a white biofilm after birth. Leaving residual vernix unwashed and intact after delivery has been shown to have protective benefits such as improved skin barrier function, skin nourishment, protection against infection, and innate immunity. A study done by Visscher et al. in 2005 analyzed the distribution of vernix caseosa in neonatal adaptation. The results showed increased skin hydration and significantly lower skin pH and erythema (Visscher et al., 2005).

A prospective randomized study was conducted in one hospital to find the most appropriate timing for the newborn's first bath by comparing neonatal outcomes after bathing at 2, 6, and 24 hours of age (Mardini et al., 2020). One of these factors included looking for the presence of vernix caseosa on each baby's skin at different bathing times and then noted the baby's file as positive (presence of vernix) or negative (absence of vernix). Based on the findings, of the 51 newborns who received a bath at 2 hours, 49% were positive. Of the 51 newborns that received a bath at 6 hours, 37.3% of newborns had vernix present. Lastly, out of the 23 newborns who received a bath at 24 hours, 26.1% of newborns were positive (Mardini et al., 2020). Data was very limited for this subject, but research has shown that retention of vernix caseosa in newborn infants has effects on thermal stability and improved skin integrity. Further research is needed to determine the effects of vernix retention on reduced infection rates.

DISCUSSION

Studies examined in this thesis offer insight to the effects of delayed initial bathing on improved neonatal outcomes. Research findings showed benefits such as reduced risk of neonatal hypothermia and hypoglycemia in addition to improved skin integrity and breastfeeding initiation when delayed bathing was implemented, however, results were often mixed. Although many of the studies presented with limitations and mixed results, the majority of the studies revealed positive benefits in neonates after the implementation of delayed initial bathing.

The timing of a newborn's first bath has changed over the last few years as more institutions are implementing the practice of delayed bathing. Although there is currently a range of recommendations for when the first bath should be given, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) recommends that the newborn's first bath should be given once they have achieved thermal and cardiorespiratory stability. The World Health Organization states that bathing should be delayed to after 24 hours of birth (WHO, 2017). This practice is contraindicated in the case that an infant is born to a HIV positive mother, in which the bath should be given as soon as possible after birth to prevent transmission and infection (New, 2019).

Although many of the studies had limitations, this literature review provides information on the potential benefits of improving neonatal outcomes when vernix is left unwashed for 24 hours. The studies demonstrate positive effects on improving hypothermia and hypoglycemia rates, as well as improved skin integrity. When newborns experience cold stress due to environmental factors, an increase in metabolic rate is necessary to generate warmth. This often

results in hypothermia and hypoglycemia, as excess glucose stores are being utilized to warm the newborns. According to Mclnerney (2015) findings, results show that delaying the initial bath of a newborn can potentially decrease hypoglycemia rates by 50% in both high and low-risk infants. The majority of studies in this literature review showed the benefits of delayed bathing in healthy newborns born at normal gestational age and weight but failed to show the benefits when compared to the exclusion criteria of infants who require a higher level of care.

In another study that focused on breastfeeding exclusivity in newborns after implementation of delayed bathing until 12 hours after birth, there was a slight increase from 59.8% to 68.2% in the 996 mother-baby couplets who demonstrated exclusive breastfeeding (DiCioccio et al., 2019). Further research is needed for rigorous evaluation of prolonged timing the newborn bath until 24 hours in relation to exclusive breastfeeding in the hospital and at discharge. Studies found only implemented delaying the newborn bath until 12 hours after birth, and there was very limited research on how delaying the newborn bath for 24 hours is correlated with exclusive breastfeeding.

In conclusion, there should be further studies on the preferred timing of newborns' initial bath after birth. Waiting the full 24 hours or longer until giving a newborn their first bath has become more prevalent in hospitals and birthing facilities and has been shown to improve neonatal outcomes. If possible, mothers should take part in bathing their newborn for the first time, which offers a time for teaching opportunities for both nurses and parents.

Limitations

This literature review contained several limitations. A few of the studies utilized infant health records, which may have variance in the way it was documented and obtained through staff. Some articles examined for this literature review showed that the delay of the initial bath did correlate with improved neonatal outcomes but span a variety of bathing times. Based on the inclusion criteria, a number of studies focused on either low-risk neonates that were born healthy and full term or preterm infants who were high-risk, while others included both low-risk and at-risk or high-risk neonates.

One limitation of this literature review includes that some of the studies were conducted at only one facility so generalizability among the population is limited. Some articles examined for this literature review also span a variety of populations, therefore not all findings can be generalized to U.S. newborns with delayed bathing times. It is unknown if different methods of bathing, such as immersion or sponge bath, influence the results.

The implementation of delayed bathing times in newborns ranged from 2 to 24 hours. The prospective randomized study that was conducted in one hospital to find the most appropriate timing for the newborn's first bath compared neonatal outcomes after bathing at 2, 6, and 24 hours of age (Mardini et al., 2020). Many of the studies evaluating the effectiveness of delayed bathing on breastfeeding exclusivity rates waited 12 hours after birth. It is difficult to generalize any conclusions from those who had variation in implemented delayed bathing times, however it does hold significance.

Implications for Nursing

Whether in the hospital or birthing facility, the practice of delayed bathing of neonates up to 24 hours after birth should be implemented as a standardized protocol due to the potential of preventing neonatal complications and improving transition to outside of the womb. Parents and families should be educated on the effects of delaying their newborns' initial bath and the importance of promoting skin-to-skin contact with the mother. Although there is no set time for when the bath should occur, the minimum time recommended falls between six to eight hours after birth and extends to 24 hours or more. Continuing research guidelines for infant bathing is imperative since there is a wide variation in newborn care practices. Further research is needed to understand the effects of delayed bathing on breastfeeding initiation and exclusive breastfeeding rates at discharge in addition to the recommendation of waiting until the newborn reaches 24 hours old before receiving a bath.

Appendix A

Table of Evidence

Author(s) Year Location	Study Design & Purpose	Sample Size & Screening Measures	Results	Delayed bathing effectiveness 1=useful 2=inconclusive 3=not useful a. hypothermia b. hypoglycemia c. exclusive breastfeeding d. skin colonization
Jeanette Anderson 2020	Organization-wide evidence-based practice initiative using preimplementation and postimplementation data Implement an organization-wide evidence-based practice change to parent-performed, delayed immersion newborn bathing	A military health system consisting of four medical centers and five community hospitals provided the context for this project. The health system averages 4,000 births each year. Data were collected for 50 newborns before and 50 newborns after the process change	With standard bathing processes (sponge bath at 2 to 4 hours of life), 9% (n 1⁄4 39) of newborns had a temperature of less than 97.7 degrees F (36.5 degrees C) after the bath. After the EBP change, 1% (n 1⁄4 4) of newborns had a temperature of less than 97.7 degrees F (36.5 degrees C) after the bath. There was a	1, a Delaying newborns' first bath was associated with a significant decrease in the number of newborns who had hypothermic temperature readings immediately after the bath. It is important to understand that this intervention is cost-effective and is involved with minimal cost and multiple benefits.

	across nine facilities at a military health care system.	(100 newborns in total) at each facility. The team compared pre- and postimplementation temperature data at the remaining nine U.S. Air Force facilities with inpatient obstetric for a total of 900 records reviewed.	statistically significant association between the method/timing of the bath and postbathing hypothermia ($p < .001$).	
Bergstrom et al. 2007 Uganda	Randomized case-controlled study Elucidate the impact of bathing on the prevalence of hypothermia among newborn babies exposed to the skin-to-skin care technique before and after bathing.	Non-asphyxiated newborns after vaginal delivery (*n*=249) in a Ugandan referral hospital were consecutively enrolled and randomized either to bathing at 60 min postpartum (*n*=126) or no bathing (*n*=123). All mothers practiced skin-to-	Bathing of newborns in the first hour after delivery resulted in a significantly increased prevalence of hypothermia, defined as temperature <36.5°C, at 70 and at 90 min postpartum despite the use of warmed water and the	1, a This study demonstrated that bathing the newborn in warmed water induces significant hypothermia even if appropriate thermal protection, including immediate drying at birth and STS contact with the mother, is maintained.

		skin care of their newborns. This study was approved by the St Francis Hospital Nsambya's research ethics committee.	application of the STS method.	
Brogan and Rapkin 2017	Data was collected retrospectively from electronic health records for all newborns, regardless of gestational age, before and after the implementation of delayed immersion baths to compare its effect on newborn temperatures.	Newborn baths were delayed until 24 hours of life and the temperatures were obtained before and after the bath was given.	Data from newborns had sponge baths 2 to 4 hours after birth (n = 142) were compared with data from newborns who had delayed immersion baths after 24 hours of life (n = 140). Of the 142 newborns pre-implementation, 70% of newborns (n=100) were normothermic and 30% (n=42) were hypothermic. Of the 140 newborns who received a delayed immersion bath, 81%	1, a These results were consistent findings from various research studies investigating delayed baths and newborn bathing, with decreased newborn hypothermia. The intervention is cost-effective and benefits optimize newborn outcomes.

			(113) were normothermic and 19% (27) were hypothermic.	
Chamberlain et al. 2018 Illinois	Pre-post quasi-experimental retrospective chart review. Determined impact delayed newborn bathing for 24 hours has on exclusive breastfeeding rates, temperature and glucose stability, and percentage of weight loss.	n=330 charts Hospital A=16 charts/month Hospital B=8 charts/month Hospital C=4 charts/month This study took place in the Midwestern health system with three hospitals that has a combined average delivery rate of 2100 births.	Post-intervention there was a significant decrease in the number of blood glucose level checks ($p = .002$) and the amount of blood glucose levels equal or below 45 ($p = .001$). There was a trend in decreased weight loss post-intervention but was not significant ($p = .227$). Cold stress significantly decreased ($p < .001$) post-intervention. Exclusive breastfeeding rates did not change.	1, a, b This study demonstrated that delaying an infant's bath until 24 hours after birth seems to have a positive impact on the infant's temperature regulation as well as glucose stability but showed minimal or no change with exclusive breastfeeding rates.
Horn et al. 2014 Germany	Randomized controlled trial	40 participants were scheduled for elective cesarean	Without active warming from the beginning of the	1, a

	Purpose of this study was to evaluate whether newborns develop hypothermia during intraoperative bonding while positioned on their mother's chests and investigate the effects of active cutaneous warming of the mothers and babies during a 20-minute intraoperative bonding period.	delivery under spinal anesthesia. Mothers and their newborns were randomized to receive either passive insulation or forced-air skin-surface warming during the surgical procedure and bonding period.	surgical procedure until the end of bonding time, the mean neonatal core temperature decreased to 35.9 degrees Celsius. 81% of newborns became hypothermic.	Results have showed that active forced air warming of mothers and newborns immediately after cesarean delivery reduces the incidence of infant and maternal hypothermia and maternal shivering and increases maternal comfort.
Joanne Kuller 2014 California	Qualitative ethnographic study Evaluates the literature based on the function of skin as a protective barrier in the neonate	Combines own research and other research articles. Studies throughout the article were based on observation of either antimicrobial	The goal of the infant's first bath should be to remove unwanted soil such as blood and meconium and to leave residual vernix intact.	1, d Meticulous care of the skin is important in maintaining good hygiene and a healthy skin barrier but should not alter the skin's own resident flora and microbial defense.

		properties or routine bathing	The retention of vernix on newborn skin has been shown to assist with the development of skin integrity and antimicrobial properties. If a baby has their diaper area wiped with diaper changed, they do not need bathing more than 2-3 days/week.	
Long et al. 2020 California	Retrospective design Determine if changing the timing of the initial newborn bath would have an impact on exclusive breastfeeding	Infant couplets prepractice change (cohort A) were compared with two postchange cohorts (B & C) which were from the first 5 months and second 5 months. There were 1,463 mother-infant couplets included	Breastfeeding exclusivity rates were 74.1% for cohort A, 70.7% for cohort B, and 79.4% for cohort C. There was a significant higher ($p<.001$) mean infant age in hours at time of bath for both cohort B (m=13.84, SD [4.17]) and cohort C (m=14.39, SD [5.36])	2, c There were no significant increases in the exclusive breastfeeding rates in both the first postimplementation delayed bath cohort (70.1%, $p = .207$) and the second "sustainability" cohort (79.4%, $p=.060$). Further research and randomized trials are needed for a rigorous evaluation of timing of the newborn bath and possible linking to exclusive breastfeeding in the hospital and beyond.

	during hospitalization.	in these three cohorts. (A: n=564; B: n=468; C: n=431).	when compared with preimplementation, showing that the desired practice change has occurred.	
Mardini et al. 2020 Lebanon	Prospective randomized study Goal of this study was to try to find the most appropriate time for the newborn's first bath.	N=125 neonates This study was conducted in the maternity department of the Notre-Dame des Secours University Hospital Center from July until September 2017 after approval of the hospital's ethics committee. Newborns were divided randomly by dice roll into three groups. Group 1 included newborns taking their first bath at 2 h of age, Groups 2 and 3 were formed by	Fifty-one children took their bath at 2 h, whereas 51 and 23 children took their bath at 6 and 24 h. Results showed a higher percentage and correlation between the mother-baby skin-to-skin contact and the newborn's bath timing, where those who had their bath at 2 hours after birth did not have as much skin-to-skin contact with their mothers directly after birth than those who had a delayed bathing time (65.2% vs 33.3%; p=0.01).	1, a A significant association was seen when delaying the newborn's first bath until 24 h of life including benefits of reducing hypothermia and vigorous crying, benefit from the vernix caseosa on the skin and adequate time of skin-to-skin contact and mother participation in her child's bathing.

		newborns taking their first bath at 6 and 24 h of age respectively.		
Lavender et al. 2009	Randomized clinical controlled trial Efforts to measure heat loss from newborn during bathing as assessed by changes in aural temperatures, which were taken before, during, and following bathing.	N=111 (Full-term newborns born vaginally) The experimental treatment was the parent bathing the newborn under nursing supervision at the bedside in the first few hours of birth, where the standard treatment was the nurse bathing the newborn in an admission nursery.	There was no significant difference in temperature change between newborns bathed by a nurse and those bathed by a parent (F=0.595, df=1, p=.442). A return to normal thermal ranges takes approximately an hour.	3, c Based on the results, heat loss experienced by newborns during bathing is significant and is not associated with who bathes the newborn or where the bath takes place but on when the baby's thermoregulation system is able to stabilize itself.
Taheri et al. 2007 Iran	Randomized comparative study The aim of this study was to compare the	100 healthy newborns at a newborn nursery of a charity hospital in	Rectal temperatures as measured at four different times did not differ significantly between infants bathed within 1-2 h of	3, a This study examined the thermal stability of newborns in response to early bathing.

	thermal effect of bathing on healthy newborn within 1-2 h of life versus 4-6 h after birth.	Tehran were studied. Newborns assigned to the experimental group were bathed within 1-2 hours of life and those assigned to the control group were bathed within 4-6 hours after birth. Inclusion criteria: healthy term (≥ 37 wk) newborn over 2500 grams with rectal temperature > 36.5 °C, APGAR score > 7 in 1 and 5 min after birth and lack of manifestations of any diseases like sepsis or respiratory distress syndrome.	birth and those bathed 4-6 h after birth. There were no significant differences between the groups in types of gender, birth weight, gestational age, parity, delivery route, interval time between rupture of membranes and delivery, APGAR scores at 1 and 5 min of age.	Results show that healthy full-term newborns with rectal temperature > 36.5°C can be bathed within 1-2 hours of birth without any risk of hypothermia, but needs further research to validate this conclusion due to potential risk factors.

Warren et al. 2019	Pre-post implementation, retrospective, cohort study Examined whether delaying the newborn bath by 24 hours increases the prevalence of breastfeeding initiation, and its effects on incidences of hypothermia and hypoglycemia.	Healthy newborns (n=1,225) born at 34 0/7 weeks or more gestation who were admitted to the mother-baby unit. Newborns bathed before 24 hrs (n=680) Newborns bathed after 24 hrs (n=545) This study took place at provincial children's hospital with an average of 2,500 birth per year. Ethical approval was obtained from Memorial University's Health	Delayed bathing was associated with decreased incidence of hypothermia and hypoglycemia (p=.007 and p=.003, respectively). Although the results showed no difference in breastfeeding initiation between groups, the odds of exclusive breastfeeding at discharge were 33% greater in the postimplementation group than the preimplementation group.	1, a, b, c This study suggests increased prevalence of exclusive breastfeeding rates at discharge and a decreased incidence of hypothermia and hypoglycemia in healthy newborns at late, preterm, and term gestations.

		Research Ethics Authority and Eastern Health's Research Proposal Approvals Committee.		
Srivastava et al. 2014 India	Randomized control trial Study was undertaken to evaluate the effects of early skin-to-skin contact, in term babies with their mothers, on success of breastfeeding and neonatal well-being.	The baseline parameters including maternal age and parity, baby's sex and birth weight were comparable between the study and control groups. A total of 298 mother and baby dyads (n = 298), who delivered during the study period and met the inclusion criterion, were enrolled to participate in the randomized control trial.	SSC contributed to better sucking competence, lesser weight loss at discharge, and better temperature gain in the immediate post-partum period.	2, a, c Early skin to skin contact was a helpful intervention to improve the baby's sucking competence, maternal satisfaction, and temperature and weight patterns.

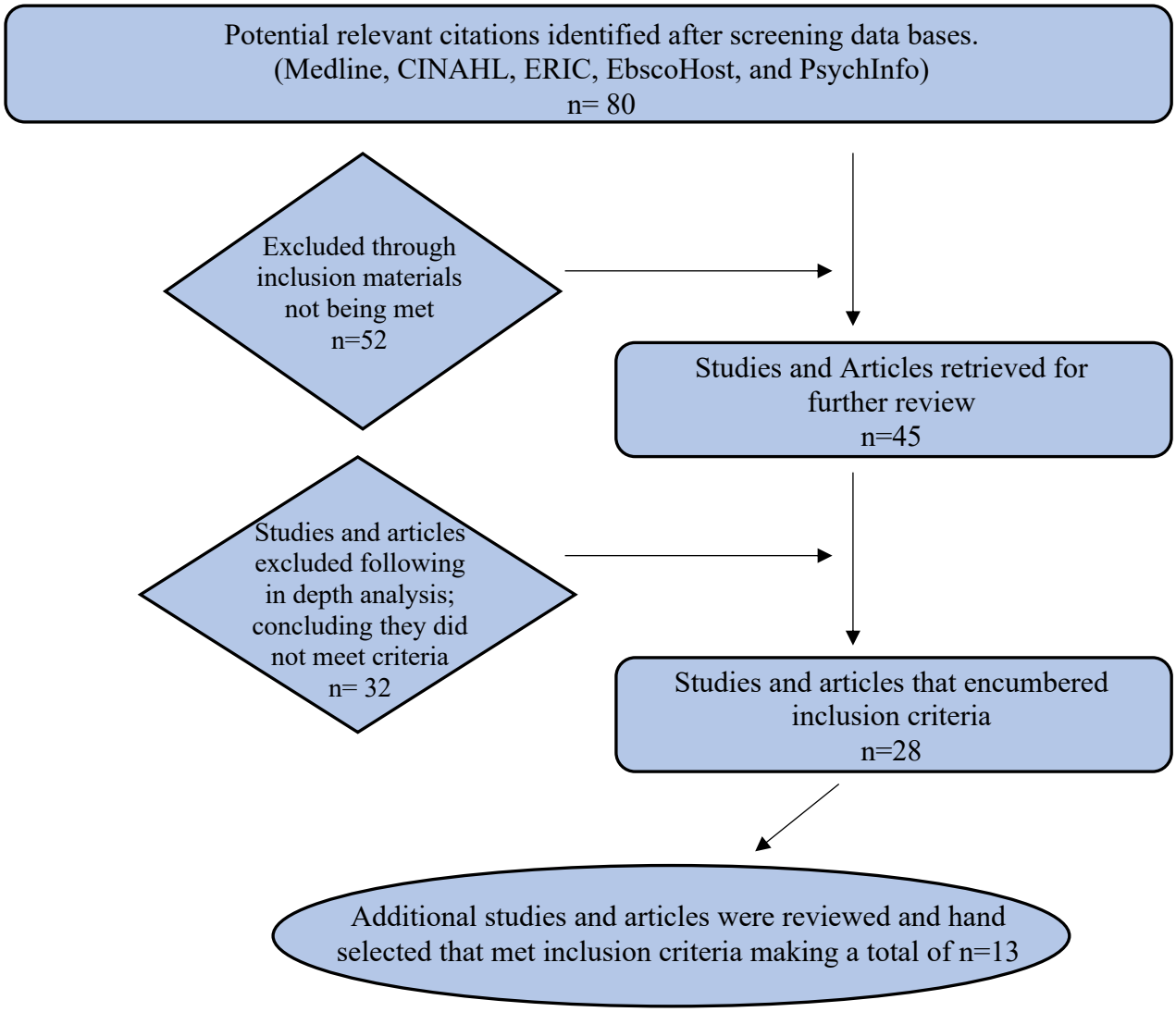
		This study was approved by the Hospital's Ethics committee.		
Safari et al. 2018 Iraq	Quasi-experimental study Study was conducted in order to assess the effects of skin-to-skin contact on initiation of breastfeeding, newborn temperature, and duration of the third stage of labor.	108 healthy women and their neonates were evaluated at the Hawler maternity teaching hospital of Erbil, Iraq. Data was collected through structured interviews and the LATCH scale to document breastfeeding sessions.	The mean age of the mothers in the SSC and routine care groups were 26.29 ± 6.13 (M ± SD) and 26.02 ± 5.94 (M ± SD) respectively. Based on the LATCH scores, 48% of mothers who received SSC and 46% with routine care had successful breastfeeding.	1, a, c Neonatal hypothermia is an important contributing factor to neonatal mortality and morbidity in both developed and developing countries. In this study, there was limited data on exclusive breastfeeding and its duration. It is still beneficial to educate mothers and midwives of the importance of skin-to-skin contact.
Gozen et al. 2019 Istanbul	Comparative analysis Study was designed as an experimental study to describe	Population consisted of term newborns at a Medical Faculty Hospital in Istanbul. The	It was determined that the 10th-minute body temperatures of the infants with the first bathing time 48 hours	3, a, d Postponing of the first bathing time of newborns to 48 hours after birth was effective in preserving the body temperature of the infant. This also helped improve

	the effect of the first bathing time on the body temperature and skin moisture of a newborn after birth.	sample group was randomly divided into two groups according to different bathing times. The first group (39 infants) was given a bath 24 hours after birth, and the second group (34 infants) was given a bath 48 hours after birth.	after birth were significantly higher compared with the infants with the first bath time 24 hours after birth ($Z = -2.654$; $p = .008$).	moisture, which may improve skin integrity and aid with skin development.
Ruschel et al. 2018 Brazil	Cross-sectional study Purpose of this study was to analyze the occurrence of hypothermia in neonates before and after bathing in the first hours of life.	n=149 newborns Axillary temperature of newborns was taken before and after bathing at an Obstetric Center.	Results showed the prevalence of neonatal hypothermia in 40.3% of the cases, which is a significant association ($p<0.001$) between the occurrence of neonatal hypothermia at all axillary assessments.	1, a The first bath can be postponed to favor the adaptation of the neonate to the extrauterine environment, preventing the occurrence of neonatal hypothermia.
Suchy et al. 2018 California	Evidence-based practice project	This study was performed after the hospital protocol	Of 1,205 38-week healthy newborns, 322 were born	3, a, c

	Evaluated the effects of changing timing of initial newborn baths on infant temperatures and breastfeeding status.	for initial bathing procedures was updated to immersion baths, 12 hours postpartum. The evaluation included three seven-week periods (2016-2017) and three measures: adherence, temperature stabilization, and exclusive breastfeeding.	preimplementation (Pre), 486 after (Post), and 397 during maintenance (M). Adherence to bath timing increased and was maintained: 28 percent Pre; 83 percent Post; 85 percent M. Almost 100 percent of newborns had stable temperatures. Breastfeeding exclusivity rates did not change.	Changing initial bath time for healthy newborns helped maintain thermoregulation but had no effect on exclusive breastfeeding rates. Nurses who were observed in this study quickly changed the practice and maintained adherence over time.

Appendix B

Figure 1



Key Search Terms: newborn bathing; delayed bathing; hypoglycemia; hypothermia

Limiters: English Language, Peer Reviewed, Published 2004-2020

References

Anderson, J. (2021). An Organization-Wide Initiative to Implement Parent-Performed, Delayed Immersion Bathing. *Nursing for Women's Health*, *25*(1), 63-70.

Bailey, J., & Rose, P. (2000). Temperature measurement in the preterm infant: a literature review. *JOURNAL OF NEONATAL NURSING-LONDON-*, *6*, 28-32.

Benefits associated with moms who breastfeed. AHRQ. (n.d.). Retrieved April 6, 2022, from https://www.ahrq.gov/data/infographics/breastfeeding-benefits.html

Brogan, J., & Rapkin, G. (2017). Implementing evidence-based neonatal skin care with parent-performed, delayed immersion baths. *Nursing for women's health*, *21*(6), 442-450.

Chamberlain, Jill et al. "Impact on Delayed Newborn Bathing on Exclusive Breastfeeding Rates, Glucose and Temperature Stability, and Weight Loss." *Journal of neonatal nursing: JNN* 25.2 (2019): 74–77. Web.

DiCioccio, H. C., Ady, C., Bena, J. F., & Albert, N. M. (2019). Initiative to improve exclusive breastfeeding by delaying the newborn bath. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *48*(2), 189-196.

Laptook, A., & Jackson, G. L. (2006, February). Cold stress and hypoglycemia in the late preterm ("near-term") infant: impact on nursery of admission. In *Seminars in perinatology* (Vol. 30, No. 1, pp. 24-27). WB Saunders.

Long, K., Rondinelli, J., Yim, A., Cariou, C., & Valdez, R. (2020). Delaying the first newborn bath and exclusive breastfeeding. *MCN: The American Journal of Maternal/Child Nursing*, *45*(2), 110-115.

McInerney, C. M., & Gupta, A. (2015). Delaying the first bath decreases the incidence of neonatal hypoglycemia. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *44*(s1), S73-S74.

Ruschel, L. M., Pedrini, D. B., & Cunha, M. L. C. D. (2018). Hypothermia and the newborn's bath in the first hours of life. *Revista gaucha de enfermagem*, *39*.

Taşdemir, H. İ., & Efe, E. (2021). The effect of delaying first bathing on skin barrier function in late preterm infants: A study protocol for multi-centre, single-blind RCT. *Journal of Advanced Nursing*, *77*(2), 1051-1061.

Visscher, M. O., Narendran, V., Pickens, W. L., LaRuffa, A. A., Meinzen-Derr, J., Allen, K., & Hoath, S. B. (2005). Vernix caseosa in neonatal adaptation. *Journal of Perinatology*, *25*(7), 440-446.

Warren, Susan et al. "Effects of Delayed Newborn Bathing on Breastfeeding, Hypothermia, and Hypoglycemia." *Journal of obstetric, gynecologic, and neonatal nursing* 49.2 (2020): 181–189. Web.

Yu, G., Liu, F., Zhao, Y., Kong, Y., & Wei, H. (2021). Promoting Breastfeeding and Lactation Among Mothers of Premature Newborns in a Hospital in China. *Nursing for Women's Health*, *25*(1), 21-29.