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Original Article

Impact on delayed newborn bathing on exclusive breastfeeding rates, glucose and temperature stability, and weight loss

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ABSTRACT

Objective: Determine impact delayed newborn bathing for 24 hours has on exclusive breastfeeding rates, temperature and glucose stability, and percentage of weight loss and, to determine if there was a difference in the nurses' knowledge and comfort levels regarding delayed bathing pre and post implementation.
Design: Pre-post retrospective chart review and, pre-post survey.
Setting: Midwestern health system with three hospitals that has a combined average delivery rate of 2100 births.
Participants: 330 charts were reviewed pre-implementation, 330 charts were reviewed post-implementation, and 100 RNs were asked to participate in the pre and post-survey.
Methods: Newborn baths were delayed 24 hours after birth unless contraindicated by a blood borne pathogen or upon parental requests.
Results: 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. Nurses' perception of comfort and knowledge level increased post-intervention.
Conclusion: Delaying an infant's bath until 24 hours after birth seems to have positive impact on the infant's temperature regulation as well as glucose stability.

1. Introduction

1.1. Background

Newborns are vulnerable in self-temperature regulation, which places them at risk for hypothermia. The World Health Organization (WHO) describes three stages of neonatal hypothermia: cold stress or mild hypothermia from 36.0 to 36.4 degrees Celsius, moderate hypothermia from 32.0 to 35.9 degrees Celsius, and severe hypothermia anything less than 32.0 (1997). Depending on the severity of neonatal hypothermia, symptoms can range from severe such as apnea and bradycardia to milder symptoms such as irritability, sucking weakness, and hypoglycemia (Blackburn, 2003). Newborns rarely obtain thermoregulation immediately after delivery, but instead establishes it throughout the first 24 hours after birth (Laptook and Jackson, 2006). Nurses play a vital role in facilitating newborns thermoregulation in the first day of a newborn's life.

Traditional practice in the United States has been that newborns are bathed within six-hours of life (Brogan and Rapkin, 2017); however, WHO recommends delaying the bath until 24 hours after birth to retain the vernix which supports newborn transition from the intrauterine to extrauterine environment (2017). Vernix, if not washed away after birth, has multiple functions that support the neonate's rapid adaptation from an aqueous to dry environment. These functions include being a barrier to water loss, serving as an anti-microbial protectant, and supporting thermoregulation (Singh and Archana, 2008; Visscher et al, 2005, 2011). Another benefit to delaying the neonatal bath is additional skin-to-skin and bonding time, which influences breastfeeding rates (Crenshaw, 2014; Preer et al., 2013).

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1.2. Objectives

The main goal of the study was to determine the impact of implementing the evidence-based practice protocol of delaying newborns' bath until 24 hours after birth. The variables chosen to study the protocol's impact include exclusive breastfeeding rates, neonates' temperature and glucose stability, and percentage of weight loss. These variables were chosen because they have been noted in the literature as benefits of delayed bathing (Brogran & rapkin, 2017; Perlman and Kjaer, 2016; Preer et al., 2013).

The study team also wanted to determine if a mother's demographic variables such as education level, marital status, and age had any influence on her decision regarding delaying the newborn bath. This information was used to guide future education initiatives on delayed bathing. A final objective was to determine if there was a difference in the nurses' knowledge and comfort levels regarding delayed bathing pre and post implementation. This information helped determine effectiveness of staff education and engagement regarding the new protocol.

2. Methods

2.1. Design

The study design was a pre-post quasi-experimental retrospective chart review. An online survey was given to maternity nurses to determine if there was a difference in the nurses' knowledge and comfort level regarding delayed bathing pre and post implementation. A retrospective chart review was conducted to determine the impact delayed bathing had on breastfeeding rates, neonates' temperature and glucose stability, and percentage of weight loss. Mothers' demographic variables of education level, marital status, and age were also collected to identify which variables, if any, influenced whether or not they chose to delay the bath.

2.2. Setting

The study took place in a Midwestern health system with the main hospital (A) being a 500-bed, Magnet-designated, Level 1 Trauma center. The maternity unit consisted of 19 beds with an average delivery rate of 1500 deliveries per year and 65 registered nurses on staff. Hospital B had 12 beds, and is also Magnet designated. Their unit consists of an average yearly delivery rate of 390 and 17 registered nurses on staff. Hospital C had three labor and delivery beds. Their maternity unit has an average of 200 deliveries per year and 18 registered nurses on staff.

2.3. Participants

At the time of the project, the average yearly birth rate of the health system was approximately 2100 births. To obtain a required sample size with a 95% confidence and 5% margin of error, a power analysis estimated the need for 330 charts per group (control and experimental) which equaled 28 charts per month. At each hospital, a monthly report of births was generated. A randomizer calculator was used to determine which charts would be selected from the generated reports for purposes of data collection. Due to the population differences between hospitals, data collection was based on birth rate per hospital. Hospital A of the organization collected data on sixteen charts per month, Hospital B collected data on eight charts per month, and Hospital C collected data on four charts per month.

All maternity nurses working for the organization were invited to participate in the survey regarding their perceptions and comfort level related to delayed bathing. There was a potential for 100 nurses to take the survey.

2.4. Intervention

The control group included charts from January–December of 2014. This year was chosen to avoid the likelihood of nurses independently practicing delayed bathing prior to the study implementation, which may have skewed the data. For the purpose of this study and protocol, newborns were defined as newborns born without complications or need for specialized care. Newborns who were transferred to a higher level of care due to prematurity and/or physical distress were excluded from the study.

An email was sent out to all nurses of the maternity unit that described the anonymous and voluntary survey they could take regarding delayed bathing. The pre-survey was sent out in March of 2017 prior to the protocol implementation. During the same time period, the new delayed bathing protocol to be utilized at all three facilities within the organization was drafted by the project team.

Education regarding the new delayed bathing protocol occurred at all designated maternity units in April and May of 2017. Nursing staff were introduced to the new protocol during unit meetings, safety huddles, and one-on-one education. Staff education regarding the new protocol included the benefits of delayed bathing, how to educate families, and how to manage blood or meconium on newborn infant without bathing. Physicians were notified of the nursing practice change during department meetings.

Implementation of the new delayed bathing protocol began in June of 2017. Families were provided information and counseled on the benefits of delayed bathing upon admission to the unit.

The process of bathing remained the same; however, the bath was delayed until 24 hours after birth unless contraindicated by a bloodborne pathogen due to risk of transmission of disease from mother's blood or neonate's vernix (Dyer, 2013) or upon parental request due to cultural reasons such as religious practice. If there was a cultural reason to bathe the newborn early, staff and family were encouraged to wait until at least six hours after birth. All staff were encouraged to wear non-sterile gloves when caring for the newborn prior to the bath.

Newborns were placed skin-to-skin with mother immediately after birth for a goal time of one hour. After skin-to-skin contact was completed, the newborn was appropriately clothed. If excessive blood or meconium was noted in newborn's hair, the healthcare provider could comb out excess and apply a hat. If excessive meconium was noted on newborn's skin, the healthcare provider could wipe off excess with a warm washcloth (no soap), avoiding removal of amniotic fluid on newborn's hands which helps increase the rooting reflex for breastfeeding (AWHONN, 2015).

Current practice of taking newborn's axillary temperature prior to the bath and within 60 minutes post-bath remained the same. Baths were only given if the neonate's temperature was 36.5 Celsius and above. A duck sticker was placed on the card slot at the head of the crib to signify that a bath had been completed.

Post intervention data collection followed the same pre-data collection process and included charts from June 2017–May 2018. An email invite was sent out in December 2017, six months post intervention, to all nurses of the study units to complete the post-intervention survey. The pre-survey was repeated and used as the post survey.

3. Results

Fifty-one nurses took part in the pre-survey, a 51% response rate. The majority of the nurses (n – 25) were over the age of 40, had a certification in perinatal care (n-25), and held a baccalaureate nursing degree (n-31). There was an increase in the number of participants in the post survey. It is assumed some of the nurses who were reluctant during pre-survey period engaged in the post intervention period and survey when they saw success of the protocol. It is also assumed that the majority of the pre-post participants were the same participants. Sixty-three nurses took part in the post-survey, a 63% response rate. The

Table 1
RN delayed bathing perceptions.

RN Survey Statements	Pre-Survey	Post-Survey
	% of Very Comfortable	
I feel confident in identifying the benefits to mom and infant regarding delaying the 1st infant bath 24 hours after birth.	45%	81%
I feel confident in identifying the circumstances in which delaying 1st bath 24hours is contraindicated.	41%	71%
I feel comfortable encouraging the family to delay the 1st bath until 24 hours post birth.	52%	81%
I feel comfortable encouraging other nurses to delay the 1st bath until 24 hours post birth.	47%	71%
I feel comfortable in personally delaying the 1st bath until 24 hours post birth.	62%	82%
I feel supported by my peers to delay the 1st bath until 24 hours post birth.	33%	90%

majority of the nurses (n – 30) were over the age of 40, had a certification (n-35), and held a baccalaureate nursing degree (n-37).

Table 1 displays the pre-post survey results regarding nurses' knowledge and comfort level of delayed newborn bathing. Pre-survey results demonstrated less than half or 45% (n-23) of the respondents felt very comfortable with identifying the benefits of delayed bathing. Post implementation comfort level of identifying the benefits of delayed bathing increased to 81% (n – 51) in the post-survey. Only 41% (n-21) of respondents stated they felt very comfortable with identifying contraindications of delayed bathing pre-intervention. The response increased to 71% (n-45) in the post survey. A little over half of the participants or 52% (n-26) reported in the pre-survey that they felt very comfortable encouraging families to delay the first bath until 24 hours after birth. This increased to 81% (n-51) in the post-survey. Nurses in the pre-survey were slightly less comfortable 47% (n-24) encouraging other nurses to delay the first bath. The post-survey comfort level of encouraging other nurses to delay the first bath increased to 71% (n-45). Personal comfort levels in delaying infant's first bath increased from 62% (n-31) in the pre-survey to 82% (n-51) post survey. Finally, in the pre-survey only 33% (n-17) of nurses felt supported by their nursing peers in delaying the first bath; however, in the post-survey this response increased to 90% (n-57).

Table 2 represents the pre-post evaluation of outcomes of the study. A paired-samples *t*-test was conducted to determine if there was a significant difference in the number of families participating in delayed bathing. Delayed bathing was coded during data collection as “0” for baths given less than 24 hours of birth and “1” for baths given after 24 hours of birth. The paired-samples *t*-test indicated that the number of families that participated in delayed bathing was significantly higher post-intervention ($M = 1.22$, $SD = 0.722$) than the pre intervention phase ($M = 0.06$, $SD = 0.345$), t(-21.00), $p < .001$. This result is most likely due to effective education to staff and families on the importance and value of delayed newborn bathing.

Table 2
Paired *t*-test.

	Pre - Intervention		Post - Intervention		*t*-test	*p*
	M	SD	M	SD		
Delayed Bath > 24 Hrs	.06	.345	1.12	.772	−21.00	.001
Weight Loss	5.134	2.53	4.90	2.54	1.210	.227
Number of Glucose Checks	2.53	3.71	1.53	2.67	3.08	.002
Glucose ≤45	3.79	4.74	.76	1.20	3.551	.001
Temperature Within Normal Range Post Bath	.87	.334	.93	.253	−2.02	.045

Note: M = Mean, SD = Standard Deviation. Delayed bath ranges from 0 (no bath), 1 (> 24 hrs), 3 (home bath). Temperature within Normal Range 0 (≤36.4), 1 (≥36.5).

The percentage of infant weight loss from birth to discharge was collected to determine if delayed bathing had an impact on infant weight loss. Even though there was a decreasing trend in the mean percentage of weight loss from birth to discharge with delayed bathing, the paired-samples *t*-test did not indicate any statistical significance pre-intervention ($M = 5.13$, SD 2.53) when compared to post-intervention ($M = 4.90$, SD 2.54), t(1.21), $p = .227$.

The number of times a blood glucose level was checked on the infant was collected to determine if delayed bathing had an impact on this outcome. The paired-samples *t*-test scores did show a statistically significant decrease in the number of blood glucose level checks post intervention ($M = 1.53$, SD 2.67), t(3.08), $p = .002$ when compared to pre-intervention ($M = 2.53$, SD 3.71). The paired-samples *t*-test scores also showed a statistically significant decrease in the number of blood glucose levels equal to or below 45 post-intervention ($M = 0.76$, SD 1.20), t(3.551), $p = .001$ when compared to pre-intervention ($M = 3.79$, $SD = 4.74$). The team believes that due to delayed bathing, the number of cold stress events in neonates decreased. When newborns are cold-stressed, an increased metabolic rate is required to generate warmth, thus decreasing their glucose stores causing hypoglycemia (Brogan and Rapkin, 2017; Laptook and Jackson, 2006).

Post-first bath temperatures were also collected. Temperatures were coded during data collection as “0” for temperatures less than or equal to 36.4 degrees Celsius (cold stress) and “1” for temperatures that were equal to or greater than 36.5 degrees Celsius (normal). A paired-samples *t*-test was conducted to determine if there was a significant difference in the amount of cold-stress experienced by infants post bathing. The paired-samples *t*-test indicated that the number of cold-stress babies after their first bath significantly decreased post intervention ($M = 0.93$, $SD = 0.253$) when compared to the pre-intervention phase ($M = 0.87$, $SD = 0.334$), t(-2.02), $p < .001$. Even though the coding of the temperatures correlated with WHO guidelines of hypothermia, it is noted that there is only 0.1° difference between cold stress and normal temperatures.

Unlike other studies, exclusive breastfeeding rates were not impacted by delayed bathing. The study's percentage of exclusive breastfeeding rates before delayed-bathing implementation was 62%. The percentage of exclusive breastfeeding rates post-delayed bathing implementation was 57%. The Joint Commission (TJC) reports that exclusive breastfeeding rates continue to be below 50% at half of the hospitals that are accredited by TJC (2017). They noted that despite women being educated and encouraged to breastfeed, some women do not want to exclusively breastfeed causing the rates to remain well below 100% (TJC, 2017). The low rate could also be influenced by nurses' behaviors towards breastfeeding promotion.

Table 3 demonstrates the analysis of variance which did not find a significant mean difference in participation of delayed bathing and the mother demographics of age ($p = .171$), marital status ($p = .134$), and education level ($p = .078$), thus supporting the need for universal delayed bathing education to all families.

Table 3
One-way analysis of variance of mother's age, marital status, and education level by delayed bathing.

Source		*df*	*SS*	*MS*	*F*	*p*
Mother's Age	Between Groups	3	7.342	2.45	1.68	.171
	Within Groups	306	445.68	1.46		
	Total	309	453.02			
Mother's Marital Status	Between Groups	3	3.72	1.24	1.87	.134
	Within Groups	314	207.69	.661		
	Total	317	211.41			
Mother's Education Level	Between Groups	3	7.13	2.38	2.29	.078
	Within Groups	310	321.41	1.04		
	Total	313	328.54			

4. Discussion

The pre-survey revealed apprehension regarding the new protocol among the nurses. Some nurses voiced concern over contamination, parents not wanting to delay, and increased workload. Interestingly, not one of these concerns came to fruition. In fact, many parents were delighted in the new practice, workload remained the same, and there were no reported cases of infection or cross contamination. The post-survey showed a dramatic increase in comfort level and support of the new delayed-bathing protocol. Many nurses commented on how great it was to see the family engaged in the first bath and that it seemed like babies were less fussy than before.

Delayed bathing of infants until 24 hours after birth did demonstrate a positive impact on infant outcomes. Delayed bathing showed a significant decreased in the number of infant glucose-levels that were required, a significant decrease in the number of babies that experienced hypoglycemia (blood glucose less than or equal to 45), and a significant decrease in post bath temperatures being at or below 36.4 degrees Celsius (cold stress).

Unfortunately, delayed bathing did not seem to affect exclusive breastfeeding rates. This is opposite of what has been found in the nursing literature (AWHONN, 2015; Preer et al., 2013). The limited effect of breastfeeding rates could be the result of many variables such as nurses' actions towards the encouragement of breastfeeding or mother's unwillingness to breastfeed (TJC, 2017). A mother's age, marital status, or educational level did not affect the decision on whether the newborn's bath was delayed. These results emphasize the need for continuing encouragement and education regarding the benefits of delayed bathing and breastfeeding to all mothers and families.

5. Limitations

This study is from one organization so generalizability to the entire population may be limited. The majority of the data used in the study came from infant health records, which may have variance in how it was obtained and documented among staff. Efforts were made to enhance standardization of the new protocol among all staff in the health system; however, it was not feasible to observe that the protocol was adhered to 100% of the time.

6. Conclusion

The first day of life takes much of the infant's energy in learning how to transition from the intrauterine to extrauterine environment. 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. The delay has also given the family a chance to have more early bonding time and to be more engaged in the infant's first bath. Nurses have a responsibility to advocate for their smallest patients, as well as to encourage and educate families on the value of delayed bathing.

There is a wide variation in newborn care practices which need to be reviewed to ensure evidence-based practice is at the forefront. Many newborn care practices have been born out of tradition or practiced to allow nurses timely task completion. There is a professional call to action to review and question current protocols and procedures to determine if nursing care is based on current evidence or based on task efficiency.

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