



**National
Association of
Neonatal
Nurses**

The Use of Human Milk and Breastfeeding in the Neonatal Intensive Care Unit

Position Statement #3065

NANN Board of Directors
April 2015

The use of human milk and breastfeeding are essential components in providing optimal health for the critically ill newborn. As the professional voice of neonatal nurses, the National Association of Neonatal Nurses (NANN) encourages all neonatal nurses to provide mothers of critically ill newborns with the education, support, and encouragement needed to provide human milk for their infant.



Association Position

Human milk and breastfeeding are essential for the growth and development of the vulnerable infant. All infants should be exclusively breastfed for the first 6 months, with continued breastfeeding for a year or more. A top priority for neonatal nurses is to ensure that all families understand the unique role that human milk plays in the health of their child. It is the responsibility of neonatal nurses to provide all mothers with education about the benefits of human milk for their infants, regardless of the mothers' original intentions regarding feeding, and to encourage them to express milk for as long as possible. Research by Hallowell and colleagues demonstrated that only 49% of NICUs had lactation consultants working in the NICU and that nurses only reported providing breastfeeding support 13% (median) of the time on their prior shift (Hallowell et al., 2014). Neonatal nurses should incorporate lactation support into their daily care to ensure that infants receive human milk through discharge and to help mothers achieve their personal breastfeeding goals. Nurses must possess evidence-based knowledge regarding the science of human milk, lactation, and breastfeeding.

Background and Significance

The Healthy People 2020 objectives have outlined target goals related to breastfeeding in the United States, with a goal of 81.9% of mothers initiating breastfeeding and 60.6% continuing to breastfeed at 6 months. Although data from the Centers for Disease Control's (CDC) 2014 Breastfeeding Report Card indicate that 79.2% breastfed their infant at least once, breastfeeding rates decline rapidly. Only 18.8% of infants are exclusively breastfed for the first 6 months. This means that more than 80% of infants in the United States receive suboptimal health and developmental outcomes.

In the United States, infant mortality could be reduced by an estimated 21% if all infants received the recommended 6 months of exclusive human milk feeds (Chen & Rogan, 2004). Human milk provides many specific health benefits to the vulnerable infant, both during the hospital stay and following discharge (American Academy of Pediatrics, 2012; Ahmed & Sands, 2010; Conde-Agudelo, Belizán, & Diaz-Rossello, 2011; U.S. Department of Health and Human Services, 2011). These benefits include a 72% decrease in respiratory tract infections, a 64% decrease in gastrointestinal tract infections, and a lower incidence and severity of hospital-acquired infections (American Academy of Pediatrics, 2012). Furthermore, human milk reduces the incidence of necrotizing enterocolitis (NEC) by 77%. Infants who are fed human milk have improved visual acuity and higher scores on tests of neurocognitive and developmental outcomes (American Academy of Pediatrics, 2012). It is known that immune cells, immunoglobulins, long-chain polyunsaturated fatty acids, cytokines, nucleotides, hormones, and bioactive peptides assist the developing immune system, help mature the intestine, and reduce gastric damage (Spatz & Lessen, 2011). Emerging research on the human milk microbiome also has elucidated the complex ability of a mother to specifically tailor her milk to her child and their environment (Fernández et al., 2013). Furthermore, studies demonstrate that there is a dose response effect of human milk on the development of white matter in the brain. Infants who are breastfed have 20% more white matter and improved neurodevelopmental outcomes (Isaacs et al., 2010; Deoni et

al., 2013). For the NICU infant who is at high risk for brain injury and insult, human milk feedings must be a priority.

Based on this evidence, all healthcare providers should promote breastfeeding as the cultural norm, and all infants should be afforded the opportunity to receive human milk. The Baby Friendly Hospital Initiative (BFHI) has gained momentum in the United States, with more than 250 hospitals being designated Baby Friendly (Baby Friendly USA, n.d.). The BFHI model was developed for healthy maternal-infant dyads. For infants requiring intensive care, different models of care are essential. Froh and Spatz (2014) address the ethical considerations related to feeding in the NICU and make the case that to ensure the best possible health outcomes for NICU infants, human milk must be the first priority. Spatz (2004) developed a 10-step model for the use of human milk and breastfeeding in vulnerable infants that has proven to be successful (Edwards & Spatz, 2010). Fugate and colleagues demonstrated that by implementing this model through a quality initiative process in a large children's hospital NICU, human milk rates at discharge increased threefold (Fugate, Hernandez, Ashmeade, Miladinovic, & Spatz, 2015).

Recommendations

1. Prenatal Lactation Intervention

Many infants who are cared for in NICUs are born to mothers who had high-risk pregnancies. If a mother is identified as being at risk to have an infant in the NICU prior to delivery, she should receive tailored education regarding the importance of human milk. Mothers should be given the opportunity to make an informed choice regarding the provision of human milk (not breastfeeding, per se) even if they did not have the prenatal intent to breastfeed their child (Froh & Spatz, 2014). By providing tailored education, virtually all mothers will make the decision to pump for their child (Edwards & Spatz, 2010; Spatz, 2011).

2. Assessment and Maintenance of Human Milk Supply

Neonatal nurses care for the infant but also provide evidence-based support and care to the mother to ensure that she both establishes and maintains milk supply. Nursing education regarding milk production through pumping is important because lactation consultants are not always readily available. Nurses must assess milk supply daily during the first 1 to 2 weeks to ensure that maternal milk supply reaches full volume. Mothers should be instructed to pump within 1 hour of delivery, which has been correlated to early lactogenesis II and increased milk volumes at 1 and 3 weeks post delivery (Parker et al., 2012).

The use of a hospital-grade electric pump with a double collection kit is recommended. To initiate lactation, mothers who are pump-dependent should use a hospital-grade pump with a pattern that mimics a newborn suckling pattern. This suckling pattern has been shown to increase removal of colostrum from the breast, facilitate lactogenesis II, and increase milk production and maintenance of milk supply (Meier, Engstrom, Janes, Jegier, & Loera, 2012). Initiation of lactation via

mechanical expression required the mother to pump every 2 to 3 hours with a goal of eight pumps per 24 hour period (Froh, Hallowell, & Spatz, 2015). It is important that mothers pump right before sleep, at least once in the middle of the night, and first thing in the morning.

Mothers should be provided with a target daily milk volume based on mature milk production in the healthy mother-infant dyad (440–1,220 milliliters). Early and frequent monitoring of milk supply during the first 2 weeks is critical to ensure that the mother will have an adequate supply at the time of the infant's discharge. Maintaining a pumping log allows the mother to track her progress and provides valuable information to the healthcare provider. This information can be used to make research-based decisions regarding the mother's pumping patterns. For example, mothers with a large storage capacity or milk production may be able to decrease pumping frequency if 24-hour daily volumes can be maintained.

3. Oral Care with Human Milk

As soon as the infant is born and the mother initiates pumping, oral care with human milk can commence. This should be done after each time the mother pumps around the clock until the infant can receive human milk by mouth. Oral care mimics what would occur with a healthy term infant feeding by breast. There are three primary rationales regarding the benefits of oral care for the infant: (a) human milk is a powerful antimicrobial agent and by coating the infant's mouth with milk a front-line defense is provided (Edwards & Spatz, 2010; Gephart & Weller, 2014); (b) human milk is a rich source of cytokines, and these cytokines may be absorbed through the infant's buccal mucosa, thus positively impacting the infant's immune system (Rodriguez, Meier, Groer, & Zeller, 2008) and (c) human milk has a sweet flavoring, therefore oral care with human milk provides a positive oral experience (Edwards & Spatz, 2010; Gephart & Weller, 2014). In addition, recent research by Froh and colleagues demonstrated that maternal and family participation in human milk oral care was a strong motivator for mothers to keep pumping to build their milk supply for their infant (Froh, Deatrack, Curley, & Spatz, 2015).

4. Human Milk Management, Prioritization, and Optimizing of Human Milk Feedings

Using colostrum first has been shown to prime the infant's intestine because of colostrum's high concentration of immunoglobulin A (Spatz, 2011). After the infant has received colostrum, fresh human milk feeds can be introduced. Freezing milk decreases the functioning of many bioactive components of human milk and frozen, thawed milk is at increased risk for bacterial contamination (Akinbi et al., 2010). Once the infant is receiving fresh milk feeds, milk can be stored for up to 96 hours in the refrigerator (Slutzah, Codipilly, Potak, Clark, & Schanler, 2010). Fresh milk feeds should always be prioritized to ensure the infant receives the maximal benefit and effect of the milk. If fresh human milk is unavailable, then frozen thawed milk should be used. Thawed milk must be used within 24 hours. Lastly, if

maternal human milk is not available, donor human milk should be used rather than formula (American Academy of Pediatrics, 2012; Edwards & Spatz, 2012).

NICUs should also consider development of a human milk management center to optimize milk, ensure its safety, and minimize wastage of human milk (Spatz, Schmidt, & Kinzler, 2014). Human milk is highly variable, especially in fat content. Typically, fat increases as the breast is emptied during a pumping and is lower after a longer non-pumping interval (e.g., at the mother's first pumping session of the day) (Spatz, 2011). Given this variability, instructing the mother to maintain a pumping log in order to monitor her 24-hour production can be useful in assessing the need for modifications in the choice of specific milk specimens for these smaller-volume feedings. If the lipid and caloric density of human milk is a concern, measuring the creatinocrit value can be used to determine the potential need for lacto-engineering strategies (Meier et al., 2006). Mothers can easily separate/fractionate their milk to increase the caloric density of milk used to feed to the infant.

For the very-low-birth-weight infant, human milk alone does not provide the levels of protein and minerals required for adequate growth. This insufficiency is due mainly to the infant's fluid-restricted status, not to the inadequacy of the mother's milk. Human milk fortifiers can be used to enhance these essential nutritional components. Commercially available human milk fortifiers made by formula companies are bovine products, thus feeding intolerance may occur for some infants. The only human milk fortifier made from human milk is manufactured by Prolacta and research conducted by the Prolacta study group demonstrates that infants who receive a human milk-only diet have a significantly reduced risk of NEC, sepsis, and mortality and on average have 8 days less need for total parental nutrition (Abrams, Schanler, Lee, Rechtman, D. J., and the Prolacta Study Group, 2014). Practitioners should carefully consider their options before adding fortification. If a bovine product is used, the infant should be assessed daily for signs of intolerance.

5. Transitioning the Vulnerable Infant to At-Breast Feedings

Until an infant is able to orally feed, oral care with human milk should be used as a stepping stone to at-breast feedings, as described previously. Oral care with human milk may help to facilitate direct at-breast feedings (Edwards & Spatz, 2010). Skin-to-skin care is an essential component of NICU care that allows mothers to feel connected to their infants and has been demonstrated to improve breastfeeding outcomes (Conde-Agudelo, Belizán, & Diaz-Rossello, 2011). Prior to holding her infant skin to skin, the mother should completely empty her breasts. Skin-to-skin contact has been demonstrated to improve milk supply. In addition, skin-to-skin care is an important component of transitioning the infant from tube feedings to direct feedings at the breast (Conde-Agudelo, Belizán, & Diaz-Rossello, 2011). As a component of skin-to-skin care, non-nutritive sucking at the emptied breast during tube feeds can be initiated as soon as the infant is no longer ventilator dependent (Edwards & Spatz, 2010).

Once an infant is stable for oral feedings at the breast, an electronic scale should be used to measure pre- and post-weights to determine milk transfer volume (Hurst, Meier, Engstrom, & Myatt, 2004; Haase, Barreira, Murphy, Mueller, & Rhodes, 2009; Froh, Hallowell, & Spatz, 2015). Pre- and post-weights are the only method that allow for direct measurement of milk transfer to ensure that an infant is not over- or underfed. The nipple shield can facilitate breastfeeding in preterm or otherwise ill infants. The use of the nipple shield has been associated with increased sucking bursts, increased milk transfer, and a prolonged duration of breastfeeding in mothers of low-birth-weight infants (Meier et al., 2000). Cue-based feeding in the NICU is also essential to promote breastfeeding (Chrupcala, Edwards, & Spatz, 2015 [in press]).

Furthermore, discharging infants with tube feedings and home support from community nursing and lactation consultants has been demonstrated to increase breastfeeding rates post discharge (Meerlo-Habing, Kusters-Boes, Klip, & Brand, 2009). Research by Martino and colleagues on 165 maternal infant dyads found that the majority of mothers were feeding their surgical infant NICU graduates via multiple modalities (breast, bottle, and tube), and 30% of the infants required tube feedings of expressed human milk for part or all of the post-discharge period. It is significant to note that the mean/median breastfeeding duration for these mothers was 8 months (range, 0.25 to 30 months), thus demonstrating that with evidence-based support and care NICU infants can receive human milk and breastfeed (Martino, Froh, Wagner, Hanlon, & Spatz, 2015). Mothers must have a realistic expectation of the post-discharge breastfeeding ability of their infant. Continued lactation support and follow-up by appropriate healthcare providers following discharge can increase the duration of breastfeeding and optimize outcomes for vulnerable infants (Ahmed & Sands, 2010).

Conclusions

Neonatal nurses have a responsibility to facilitate, through support and evidence-based information, the provision of human milk and breastfeeding. It is essential to ensure that infants receive human milk through hospital discharge and that mothers have the opportunity to reach their personal breastfeeding goals.

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