

THE BENEFITS AND COST SAVINGS OF USING DONOR BREASTMILK IN THE NICU

Breastmilk has been proven to be the best food for infants and is vital to the healthy development of premature babies. Compared to formula, breastmilk can help lower the risk of hospital-acquired infections, such as necrotizing enterocolitis, and reduce the likelihood of sudden infant death syndrome, childhood cancers, diabetes, high cholesterol, and inflammatory bowel disease. While bovine and plant-based infant formula substitutes may approach the same nutritional levels of fat, carbohydrate, and protein composition, they cannot replicate the human-specific bioactive matrix found in breastmilk that protects infants from illness and disease. These protective attributes of mother's milk become essential to the feeding and protection of compromised, high-risk babies in neonatal intensive care units (NICUs). The American Academy of Pediatrics states that when a mother's own milk is not available, donated human banked milk is the next best option. Hospitals that provide banked milk to at-risk infants see decreased patient length of stay, which in turn may lead to reduction in medical costs and an increase in patient satisfaction.

Health Complications Facing Premature Infants

Approximately 500,000 preterm babies are born in the United States each year, and face a myriad of complications including, but not limited to: necrotizing enterocolitis, lack of organ development, compromised immune system, cardiovascular disorders, hearing and vision problems, and delayed neurological development.¹⁶ The last months and weeks of pregnancy are crucial for the full development of the brain, lungs, and liver, and lack of development can lead to infant illness and even death. The less time an infant spends developing in utero, the greater the risk of health complications and mortality.¹⁷ Complications and illnesses related to prematurity account for more than a third of all infant deaths.¹⁸

Necrotizing enterocolitis (NEC) is the greatest health complication facing premature infants born with underdeveloped digestive systems. The incidence of NEC in premature infants admitted to NICU's in the United States varies between 6-10%. NEC is responsible for 10-30% of infant morbidity and mortality. This rate has not decreased even with recent advances in the care of extremely premature infants; the total cost of care is estimated to be as much as \$1 billion annually in the United States. NEC can lead to gastrointestinal bleeding, systemic inflammatory response syndrome, intestinal perforation, and infection. Necrotizing enterocolitis carries a 50% mortality rate and is the greatest medical threat to preterm infants less than 3lb 5oz.

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Focus for this paper:
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Benefits of Breastmilk for Patients and Hospitals

The benefits of mother's breastmilk make it the ultimate nutrition for infants, and these benefits are especially important for premature infants, who need rich nutrition to fuel development and weight gain--much like how the placenta nourishes the fetus--during the precarious beginnings of their lives. Colostrum, the richest and most nutritious breastmilk, is produced either before or immediately after delivery and provides the infant with essential nourishment. Colostrum contains immunoglobulins, leukocytes, and macrophages which coats the GI tract with beneficial bacteria and protect the infant from harmful bacteria and viruses. Nutrients contained in colostrum provide protection from potential gastrointestinal complications like NEC.¹⁹ Colostrum is also the first natural immunization for the infant.

Preterm milk, which arrives following delivery of a preterm infant but after the ebb of colostrum, is richer in nutrients than the milk of a mother whose infant was born at term; preterm milk provides the extra nutrients premature infants need to grow and develop, including growth modulators that help the baby's digestive system adjust to oral feedings.²⁰ Preterm milk then transitions to term breastmilk after about 30 days regardless of how premature the infant was at birth.

When a mother is able to pump or hand express her own colostrum or preterm breastmilk, it can be given to the baby through direct breastfeeding, a feeding tube, or other supplementation methods. When infants are born prematurely, or a birth is traumatic, a mother's ability to lactate is sometimes delayed or insufficient to meet the nutritional needs of the newborn. When a mother's own milk is not available, banked donor milk provides the optimum nutrition until the infant's mother can provide her own milk.²¹ As there is a limited volume of colostrum produced after birth, it can also be donated by women who have an excess or by bereaved mothers. For many hospitals, using human donor milk has become the standard of care, particularly for premature infants who weigh less than 1.5 kg.

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Neonatal intensive care units (NICUs) are one of the highest cost centers in a hospital. In a study of 12 hospitals conducted by the National Association of Children's Hospitals and Related Institutions, premature infants represented on average only 8% of patient admissions but incurred 25% of hospital costs and 21% of patient days. The study also found that NICUs were the most costly service provided by children's hospitals.²² Infants admitted to the NICU, regardless of

gestational age, stay for an average of 13.2 days.²³ A stay in the NICU can cost patients between \$1500 and \$22,000 per day, and these numbers do not account for any specialized equipment, drug or lab test charges.²⁴ In summary, a premature infant's stay in the NICU may cost upwards of half a million dollars. Hospitals that provide banked milk to at-risk infants see decreased patient stays, lower medical costs, and increased family satisfaction.

Although human donor milk is more expensive than bovine infant formula, its use in the NICU environment is cost effective, reducing incidence of NEC and sepsis, as well as shortening length of stay. A recent study, looking at cost savings of using human donor milk in a San Diego NICU, found that \$8,800 per infant was saved after the cost of human donor milk was removed. The same study estimated that for every \$1 spent on human donor milk, a NICU can expect to save between \$11 and \$37 dollars.

According to one study, “a minimum of \$3.6 billion would be saved if breastfeeding were increased from current levels (64% in-hospital, 29% at 6 months) to those recommended by the US Surgeon General (75% and 50% respectively). These savings would result from both direct costs, such as formula, physician, and lab fees, and indirect costs, such as time and wages lost from parents attending an ill child.”²⁵

Milk Banking Safety Guidelines

Hospitals, clinics, health providers, and mothers around the world depend on donated breast milk to supplement a mother’s supply. The Food and Drug Administration (FDA) and the Oregon Pediatric Nutrition Practice Group recommend that mothers donate excess milk to certified milk banks that not only screen donors, but also safely collect, pasteurize, and store human milk. The FDA points to The Human Milk Banking Association of North America (HMBANA), the leading milk banking organization in the United States, as the source of knowledge regarding safety guidelines for donated breastmilk.²⁶ HMBANA has established rigorous standards for milk donor screening and has set the standard for safe human milk collection, pasteurization, and storage. These standards, first published in 1990, form the basis for many other milk banking documents around the world and are reviewed and updated annually to reflect the latest data and evidence-based best practices.

Women who desire to become milk donors are screened thoroughly for health history and serologically tested, and health care providers for both the donor and her infant are consulted. According to HMBANA guidelines, breastmilk must be pasteurized and handled in accordance with evidenced-based methods. Donated milk is pasteurized through the Holder Method, the gentlest form of pasteurization, which kills viruses and most bacteria while retaining the nutritive properties of human milk. Heat treatment can affect some of the nutritional and immunologic components of breastmilk, but many immunoglobulins, enzymes, hormones, and growth factors are unchanged or minimally decreased.²⁷ Prior to dispensing, HMBANA milk banks test every batch of milk for bacteria at a CLIA certified lab. After pasteurization, breastmilk is labeled and frozen. The milk is dispensed to hospitals and outpatient families in a frozen state. Guidelines for safe handling and thawing are provided for hospitals and outpatient families.

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The Holder Method is the safest and most widely accepted pasteurization method for treating breastmilk. However, some for-profit breastmilk laboratories use a method called Ultra-High Temperature (UHT) processing, which is not FDA-approved. For UHT, breastmilk is heated to above 280 degrees Fahrenheit for over two seconds. UHT kills bacteria, but it does not completely eliminate potentially harmful fungal spores.

Additionally, UHT substantially lowers the nutritional value of the milk by reducing the content of folate, thiamin, and vitamins B12 and C to levels lower than traditionally pasteurized milk.²¹ Because this method does not follow the standards HMBANA requires to maintain safe and nutritionally valuable banked breastmilk, UHT processing is not approved by HMBANA.

Milk Banking in the Pacific Northwest

Northwest Mothers Milk Bank (NWMMB) is the leading not-for-profit milk bank in the Pacific Northwest and serves every NICU in Oregon and many in Washington. NWMMB opened its doors in July of 2013 in response to a community need for a local source of safe, pasteurized human milk. Since opening, NWMMB has experienced unprecedented community support from hospital systems, foundations, and countless generous women who have lovingly donated their milk. In 2014, over 160,000 ounces of human donor milk has been dispensed to fragile infants in Pacific Northwest communities.

Northwest Mother's Milk Bank is a HMBANA-affiliated milk bank and adheres to strict standards for screening, processing, and distribution. At NWMMB, batch samples are tested at the Oregon State Public Health Laboratory.

Portland's Randall Children's Hospital at Legacy Emanuel feeds human milk to every preterm baby under 1,500 grams. According to lead neonatal dietitian Andi Markell, "Since the hospital started using breastmilk instead of formula, the rate of necrotizing enterocolitis has declined significantly." Markell trusts the evidenced-based practices used by HMBANA milk banks and is not familiar with any medical literature assessing certain for-profit milk banks UHT pasteurization method."²⁸

"We are always willing to consider alternative and innovative methods for processing breastmilk, so long as these methods are proven to be safe and effective for fragile infants. We will never consider a 'cheaper' pasteurization method that could put the safety of these children at risk. We will continue using the evidence based Holder Method until, and if, a new pasteurization method is developed and backed by the necessary supporting research.

A fragile infant's life is not something we are willing to experiment with."

-Joanne Ransom, Clinical Director of Northwest Mothers Milk Bank

References

1. AAP. Policy Statement: Breastfeeding and the Use of Human Milk. *Pediatrics* 2012; 129:827-841.
2. International Code of Marketing of Breast-milk Substitutes. World Health Organization
3. Preterm Birth. (2014, December 23). Centers for Disease Control and Prevention. Retrieved from <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/pretermbirth.htm>
4. Hospital Support for Breastfeeding. (2011, August 2). Retrieved from http://www.cdc.gov/vitalsigns/Breast-Feeding/?s_cid=vitalsigns_082.
5. archive.ahrq.gov/downloads/pub/evidence/pdf/brfoutlbrfout.pdf
6. American Academy of Pediatrics. Breastfeeding and the use of human milk. *Pediatrics*, :2012; 129:e827-e841.
7. Parker Mg, Barrero-Castillero A, et al. Pasteurized Human Donor Milk Use among US Level 3 Neonatal Intensive Care Units. *Journal of Human Lactation*. 2013; 29(3):381-89.
8. Earlier Breastfeeding Could Save 830,000 Babies a Year, Says Save the Children. (2013, January 1). Save The Children.
9. Ganapathy, V., Hay, J., & Kim, J. (2011, January 1). Costs of Necrotizing Enterocolitis and Cost-Effectiveness of Exclusively Human Milk-Based Products in Feeding Extremely Premature Infants. Retrieved February 19, 2015.
10. Donor Human Milk. San Diego County Breast Feeding Coalition(n.d.). Retrieved from https://www.breast-feeding.org/site_page.php?page=donor_milk
11. Yang, Y., Guo, Y., Kan, Q., Zhou, X., Zhou, X., & Li, Y. (2011, January 1). A meta-analysis of probiotics for preventing necrotizing enterocolitis in preterm neonates. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4143209/>
13. Necrotising enterocolitis. (n.d.). Retrieved from <http://www.action.org.uk/necrotising-enterocolitis>
14. Johnson, T., Patel, A., Jegier, B., & Meier, P. (n.d.). Cost of morbidities in very low birth weight infants.
15. Map of United States of America - Single Color by FreeVectorMaps.com
16. CDC website
17. IOM, 2007
18. Perinatal Health Status Indicators: Infant Mortality. (n.d.). Retrieved from <http://mchb.hrsa.gov>
19. Gates, RD, CSP, LD, A. (n.d.). Nourishing Your Premature Baby in the NICU. Retrieved from <http://handtohold.org>
20. Colostrum Milk. (n.d.). Retrieved from <http://www.sciencedaily.com>
21. Joanne Ransom, Clinical Director, NWMMB
22. Financing Neonatal Intensive Care. (n.d.). Retrieved from <https://www.princeton.edu>
23. March of Dimes, 2011 Report. Retrieved from <http://marchofdimes.org> .
24. Oregon Health Authority, 2013. Retrieved from <http://oregon.gov/oha>
25. Weimer, J. (2001, March 1). The Economic Benefits of Breastfeeding: A Review and Analysis. Retrieved from <http://www.ers.usda.gov>
26. Use of Donor Human Milk. (n.d.). Retrieved from <http://www.fda.gov>
27. The Transfer of Drugs and Other Chemicals Into Human Milk. (n.d.). Retrieved from <http://pediatrics.aap-publications.org>
28. The Perfect Food. (2014, July 11). Retrieved from <http://www.oregonbusiness.com>
29. Effect of pasteurization on immune components of milk: implications for feeding preterm infants. National Center for Biotechnology Information. U.S. National Library of Medicine, 1 Apr. 2011. Web. 02 Mar. 2015. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/21609278>
30. "Women, Infants and Children Program." WIC. How Does Formula Compare to Breastmilk, n.d. Web.
31. Wright, Victoria Clay. "Assisted Reproductive Technology Surveillance — United States, 2003." *Morbidity and Mortality Weekly Report: Surveillance Summaries* 55.SS-4 (2006): 1-22. Oregon Public Health. Web.
32. Vaidyanathan Ganapathy,1 Joel W. Hay,1 and Jae H. Kim2 BREASTFEEDING MEDICINE Volume 6, Number 0. 2011
33. "March of Dimes Premature Birth Report Card." March of Dimes. March of Dimes Foundation, 15 Aug. 2015. Web. 24 Aug. 2015.