

Safe and Effective Human Milk Feeding for Inpatient Care of Newborns

DO NO HARM TECHNICAL BRIEF

The World Health Organization (WHO) recommends that low birth weight (LBW) infants in low and middle-income countries (LMIC) receive human milk and are breastfed. Despite this, data suggest that implementation of this lifesaving intervention is lacking for this critical target population.¹ Much of the focus worldwide has been on the promotion of breastfeeding for healthy mother-infant dyads. Few countries specifically track human milk and breastfeeding practices for those infants who require inpatient care. There are no published data on use of human milk and breastfeeding rates for infants admitted to the NICU in LMIC. However, data from the United States demonstrates that 52% of very LBW infants are being discharged on formula feeds only.² Strengthening systems to ensure that all infants, especially those most vulnerable, have access to human milk should be a priority for policy makers and clinical leaders.³

Why is use of human milk feeding important?

Each year more than 20 million infants are born weighing less than 2,500 grams at birth.⁴ These LBW infants comprise both small infants born near term as well as premature infants born less than 37 weeks gestational age. Many of these infants require inpatient care and have impaired ability to feed through direct breastfeeding or are separated from their mothers. Infants born small or sick are at increased risk for morbidity and mortality due to a lack of human milk and being exposed to formula and other non-human milk feeds.^{1;5;6;7;8}

What are the underlying clinical principles for inpatient feeding of newborns?

- Mothers produce colostrum from 16 weeks of pregnancy through about day 3-4 after delivery, so no matter how early a mother delivers she will have milk available.
- Normal milk supply (once established) is 440-1220 ml per 24 hours with an average of around 700-800 ml.
- On-going breast stimulation and emptying is essential to ensure the establishment of a normal milk supply.
- Vacuum is necessary for milk removal and to convert a mother from producing colostrum to producing mature milk, and preterm/vulnerable infants do not have comparable vacuum pressures while suckling as compared to healthy term infants.
- Without ongoing breast stimulation and emptying, prolactin levels fall to a non-pregnant state within 7-14 days after delivery. If the mother does not stimulate and empty her breasts during the first 2 weeks after delivery, achievement of a full milk supply may not be feasible.
- Skin-to-skin contact (STSC) is essential to protect breastfeeding and provide for optimal health and developmental outcomes. Infants placed skin-to-skin at delivery breastfeed 42 days longer than infants who are swaddled in the first hour of life.⁹

What are examples of practices that result in harm?

- Separating infants admitted to NICUs or Special Care Units from their mothers delays or prevents the establishment of breastfeeding.
- Not breastfeeding increases infant morbidity and mortality^{1;5;6;7;8}
- Formula-fed infants face higher risks of infectious morbidity in the first year of life, compared with breastfed infants. These differences in health outcomes can be explained, in part, by specific and innate immune factors present in human milk.¹⁰
- Formula can be contaminated or tampered with and is not a sterile product.
- Formula increases the financial burden to a family.
- Contaminated water for mixing of formula or cleaning of bottles and nipples increases harm to infants (WHO, 2011).¹
- Mothers who have never breastfed have higher breast cancer rates.⁸



EVERY
PREMIE
SCALE



USAID
FROM THE AMERICAN PEOPLE



 **gappps**
GLOBAL ALLIANCE TO PREVENT
PREMATURITY AND STILLBIRTH


**AMERICAN COLLEGE
of NURSE-MIDWIVES**
With women, for a lifetime™

What are the current WHO recommendations for human milk feeding?

The WHO recommends that human milk is the optimal method of feeding for LBW infants in LMIC. Early initiation of direct breastfeeding is recommended when/if the infant is able to suckle and swallow.¹ The WHO defines exclusive breastfeeding for the first six months as the provision of 100% human milk (no juice, no water, no infant formula, no complementary foods).¹¹ Exclusive breastfeeding includes direct breastfeeding as well as the provision of human milk through other means (feeding tube, cup, bottle, etc.). The WHO guidelines on optimal feeding of LBW and very low birth weight (VLBW) infants in LMIC state that all infants should be fed mother's own milk.¹ Furthermore, if mother's own milk is not available, donor human milk is recommended (when available and feasible) for both LBW and VLBW infants.¹

What is the evidence for clinical impact through the use of human milk?

Human milk influences health and developmental outcomes for all infants including preterm or NICU infants:

- Decreased incidence and severity of infections (ear, gastrointestinal, respiratory, urinary) and sepsis^{5;12}
- Decreased incidence and severity of necrotizing enterocolitis⁵
- Improved feed tolerance, advancement of feeds for vulnerable infants (decreased total parenteral nutrition [TPN] days)¹³
- Decreased retinopathy of prematurity¹²
- Decreased bronchopulmonary disease¹²
- Improved brain development (increase in white matter and grey matter) and improved intelligence and developmental outcomes^{14;15}
- Decreased risk of sudden infant death syndrome (SIDS)⁵
- Improved long term health outcomes (reduction in obesity, diabetes, heart disease)⁶
- Enhanced long term protection of gastrointestinal system (reduction in irritable bowel syndrome, Crohn's disease, celiac disease)⁶
- Reduced risk of childhood cancers (leukemia and lymphoma)⁵
- Decreased mortality^{12;16}



What are the current evidence-based best practices?

All infants should have access to human milk/breastfeeding. Ensure opportunities for direct breastfeeding as soon as the infant is physiologically stable and assess for infant's feeding effectiveness. Initiate pumping within one hour after birth in the case of maternal-infant separation.¹⁷ Mother should have access to pump technology for at least part of the day. When mother does not have access to pump technology, ensure she is instructed on how to manually express milk.¹⁸

The Baby Friendly Hospital Initiative (BFHI) was developed to protect and support breastfeeding during the birth hospital stay. The ten steps of the BFHI focus on improving breastfeeding practices for newborns immediately following birth. A 2017 publication from the WHO demonstrates that in 168 countries including LMIC, only 10% of hospitals have achieved this designation in the European region (with a range of less than 5% in Africa and 35% in Southeast Asia).¹⁹ This report also highlights the challenges of implementation of the BFHI including lack of oversight and re-accreditation of facilities. Despite a 25-year history, the BFHI has not been consistently able to improve breastfeeding outcomes globally.¹⁹

To specifically address the needs of critically-ill or hospitalized infants, a model has been proposed by the Nordic countries to modify the BFHI for the NICU.²⁰ However, this model may not be cross-culturally relevant for countries without full year paid maternity leave and socialized medicine. Spatz (2004) has developed a ten step model. The model includes ten steps for the protection and promotion of human milk and breastfeeding in vulnerable infants and can guide all health professionals working in this arena.^{21,22} The ten steps are listed to the right.

What are the system requirements for human milk feeding?

- Educated health professionals who know the science of human milk and breastfeeding in the context of maternal infant separation (milk expression, tube feeding, cup feeding, STSC, transition to direct breastfeeding)
- Access to breast pump technology for initiation and maintenance of milk supply
- Access to cup feeding and tube feeding strategies when infants are unable to direct breastfeed
- Open NICUs for direct family visitation even if infants are critically ill
- STSC/Kangaroo Mother Care (KMC) in the NICU and having beds/chairs/space for mothers inside of the NICU
- Mothers are encouraged to direct breastfeed their infants when infants show feeding readiness cues
- Educate families on hand hygiene and have access to soap and clean water to clean milk expression equipment
- Adequate refrigeration and freezer facilities for maternal milk to be stored at the hospital
- Need to collect quality improvement data on the time to first milk expression by mother, what is first feed infant receives and how soon, maternal milk volume, and transition to direct breastfeeding/feeding status at discharge

Ten Steps for the Protection and Promotion of Human Milk and Breastfeeding in Vulnerable Infants^{21,22}

1

Mothers and their families should be provided with all the information or facts of how human milk improves health developmental outcomes.

2

In order to establish and maintain milk supply, mothers should pump within one hour of birth and pump every 2-3 hours for a goal of 8 pumping sessions in a 24-hour period. Target milk volume should be at least 500-1,000 ml per 24-hour period.

3

Mother's own milk (fresh or refrigerated) should always be prioritized over frozen thawed milk or donor milk.

4

While infants are unable to receive enteral feeds prior to oral feeding, they should receive human milk oral care. Research demonstrates that by keeping an infant's buccal mucosa coated with colostrum/human milk, they can absorb components of human milk through their buccal mucosa and the risk of infection is significantly reduced. Upon the initiation of enteral feeds, colostrum should always be fed first followed by a prioritization of fresh milk feeds. Infants who are unable to directly breastfeed should be fed by tube or cup.¹

5

Infants should have skin-to-skin contact daily as soon as their condition permits. Use Kangaroo Mother Care (KMC) to facilitate breastfeeding and improved infant outcomes when feasible.

6

Infants should have the opportunity to participate in non-nutritive sucking at the "empty breast" from birth or immediately post-extubation if they required ventilator support.

7

Once the infant is ready for nutritive feeding, the infant should attempt to breastfeed. Breastfed infants can be supplemented with tube or cup. Infants should be put to breast as soon as possible after birth as soon as they are clinically stable.¹

8

Assessing for the infant's ability to effectively suckle and transfer milk at the breast is essential.

9

Rooming-in for direct feeding should be encouraged as soon as the infant is physiologically stable. Mothers should be encouraged to breastfeed their infants on cue.

10

Mothers should have specific lactation and breastfeeding follow-up care and support related to the needs of their LBW or VLBW infant.

What program actions can be taken to improve human milk feeding?

In line with Sustainable Development Goals focused on ending child malnutrition (Goal 2.2), reducing newborn deaths (Goal 3.2) and deaths from non-communicable diseases (Goal 3.4), programs and policies should invest in ensuring sick and vulnerable neonates receive safe human milk whether through breastfeeding or provision of donor human milk, as a critical component of newborn care. Specific actions are presented below.

Policy Makers

- Prevent the public marketing of breast milk substitutes (formula)
- Establish national quality improvement and data collection initiatives on infant's first feeding, maternal milk supply, transition to direct breastfeeding, and breastfeeding rates at discharge
- Develop national strategies to ensure that mothers have access to pump technology at least part of the day during inpatient care to optimize infant's access to mother's own milk
- Donor milk is important to consider as a bridge to mother's own milk but not as a replacement
- Develop national strategies for safe sources of pasteurized donor human milk
- Develop standards, guidelines and teaching aids and establish policies for in-service and pre-service training related to human breastmilk feeding for health care providers

Program Planners/Implementers

- Establish national quality improvement and data collection initiatives on infant's first feeding, maternal milk supply, transition to direct breastfeeding, and breastfeeding rates at discharge
- Implement national training programs to educate health professionals on evidence-based lactation support and care in the context of maternal-infant separation (different than BFHI training)
- Promote peer and professional support that have been demonstrated to increase breastfeeding continuation

Facility Managers/Administrators

- Work with health care providers to identify priorities and develop action plans to support human milk feeding
- Mothers need to have access to their infants even if they require care in the NICU
- NICUs should ensure mothers and their families can interact with their babies
- Ensure quality of care with supportive supervision/mentoring, appropriate job aids and effective with periodic review of data for quality improvement
- Procurement planning for a sustainable supply of equipment and related consumables required for a complete package of human milk feeding (refrigeration, pumps, cups with lids/spoons, feeding cups, nipple shields, etc)

Health Care Providers (Physicians, Nurses, Midwives, Ancillary Staff)

- Implement quality improvement activities such as plan, do, study and act (PDSA) cycles
- Provide/promote on-going breastfeeding and lactation support for mothers
- Promote peer and professional support that have been demonstrated to increase breastfeeding continuation
- At discharge, assess mothers and babies and counsel families on human milk feeding practices at home

Acknowledgements

The Do No Harm Technical Series was prepared by a team led by Jim Litch and Judith Robb-McCord (Every Premie –SCALE) and Lily Kak (USAID). We would like to acknowledge the development of the draft by Diane Lynn Spatz, (University of Pennsylvania), with expert reviews provided by Ashok Deorari (AIIMS), Carole Kenner (Council of International Neonatal Nurses), Jim Litch (Every Premie/Global Alliance to Prevent Prematurity and Stillbirth), Judith Robb-McCord (Every Premie/Project Concern International), Kiersten Israel-Ballard, Kimberly Amundson, and Emma Green (PATH), Sufang Guo (Unicef), Indira Narayanan (University of Georgetown), Jeneice Alvery, Lindy Fenlason, Pavani Ram, Lily Kak, and Smita Kumar (USAID), and Ornella Lincetto (WHO).

References

- 1 WHO. Guidelines on optimal feeding of low birth-weight in low- and middle-income countries. Geneva: World Health Organization, 2011. http://www.who.int/maternal_child_adolescent/documents/9789241548366.pdf
- 2 Hallowell SG, Rogowski JA, Spatz DL, Hanlon AL, Kenny M, Lake ET. Factors associated with infant feeding of human milk at discharge from neonatal intensive care: Cross-sectional analysis of nurse survey and infant outcomes data. *International Journal of Nursing Studies* 2016; 53:190-203. doi:10.1016/j.ijnurstu.
- 3 WHO. Planning guide for national implementation of the global strategy for infant and young child feeding. Geneva: World Health Organization, 2007. http://apps.who.int/iris/bitstream/10665/43619/1/9789241595193_eng.pdf?ua=1
- 4 WHO. Kangaroo mother care: A practical guide. Geneva: World Health Organization, 2003. <http://apps.who.int/iris/bitstream/10665/42587/1/9241590351.pdf>
- 5 American Academy of Pediatrics Work Group on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics* 2012. 129(3): e827–e841.
- 6 Spatz DL, Lessen R. The Risks of Not Breastfeeding-Position Statement. *The International Lactation Consultant Association* 2011.
- 7 Froh EB, Spatz DL. An ethical case for the provision of human milk in the NICU. *Advances in Neonatal Care* 2014; 14(4): 269-273. doi:10.1097/ANC.0000000000000109.
- 8 Stuebe A. The risks of not breastfeeding for mothers and infants. *Rev Obstet Gynecol* Fall 2009; 2(4): 222–231.
- 9 Moore ER, Anderson GC, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database Syst Rev* 2007; 4: CD003519.
- 10 Hamosh M. Bioactive factors in human milk. *Pediatr Clin North Am* 2001; 48:69–86.
- 11 WHO. Health topics: Breastfeeding. Geneva: World Health Organization, 2017. <http://www.who.int/topics/breastfeeding/en/>
- 12 Hair AB, Peluso AM, Hawthorne KM, Perez J, Smith DP, Khan JY, O'Donnell A, Powers RJ, Lee ML, Abrams SA. Beyond Necrotizing Enterocolitis Prevention: Improving Outcomes with an Exclusive Human Milk-Based Diet. *Breastfeeding Medicine* 2016. 11(2):70-4. doi: 10.1089/bfm.2015.0134.
- 13 Ghandehari H, Lee ML, Rechtman DJ. H2MF Study Group. An exclusive human milk-based diet in extremely premature infants reduces the probability of remaining on total parenteral nutrition: a reanalysis of the data. *BMC Research Notes* 2012; 5:188. doi: 10.1186/1756-0500-5-188.
- 14 Deoni SC, Dean DC 3rd, Piryatinsky I, O'Muircheartaigh J, Waskiewicz N, Lehman K, Han M, Dirks H. Breastfeeding and early white matter development: A cross-sectional study. *Neuroimage* 2013; 82: 77–86.
- 15 Isaacs EB, Fischl B, Quinn BT, Chong WK, Gadian DG, Lucas A. Impact of breast milk on intelligence quotient, brain size, and white matter development. *Pediatric Research* 2010. 67(4): 357–362.
- 16 Victora CG, Rollins NC, Murch S, Krasevec J, Bahl R. Breastfeeding in the 21st Century. *Lancet* 2016; 38: 479-490.
- 17 Parker LA, Sullivan S, Krueger C, Kelechi T, Mueller M. Effect of early breast milk expression on milk volume and timing of lactogenesis stage II among mothers of very low birth weight infants: a pilot study. *Journal of Perinatology* 2012; 32: 205–209.
- 18 Froh EB, Hallowell S, Spatz DL. The use of technologies to support human milk & breastfeeding. *Journal of Pediatric Nursing* 2015. doi:10.1016/j.pedn.2015.01.023
- 19 WHO. National Implementation of the Baby-friendly Hospital Initiative. Geneva: World Health Organization, 2017. <http://apps.who.int/iris/bitstream/10665/255197/1/9789241512381-eng.pdf?ua=1>
- 20 International Lactation Consultant Association (n.d.). The Neo-BFHI: The Baby Friendly Hospital Initiative for Neonatal Wards. <http://www.ilca.org/main/learning/resources/neo-bfhi>
- 21 American Academy of Nursing. 10 Steps to Promote and Protect Human Milk and Breastfeeding in Vulnerable Infants. American Academy of Nursing 2015. <http://www.aannet.org/initiatives/edge-runners/profiles/edge-runners--10-steps-to-promote-and-protect-human-milk>
- 22 Spatz DL. Ten Steps for Promoting and Protecting Breastfeeding in Vulnerable Populations. *Journal of Perinatal and Neonatal Nursing* 2004. 18(4): 412-423. doi:10.1097/00005237-200410000-00009