Safe and Effective Human Milk Feeding for Small and Sick Newborns

DO NO HARM TECHNICAL BRIEF

Human milk feeding and breastfeeding have immediate and long-term benefits for all babies.[1,2] Small and sick newborns face considerable problems with breastfeeding because of immaturity or medical conditions that interfere with effective oral feeding including sucking and swallowing.[3] Small newborns are further handicapped by variation in the gut microbiome and increased risk for infections. They often need care in special newborn care units (SNCUs) or neonatal intensive care units (NICUs) which can result in separation from their mothers creating additional challenges to feeding. Small and sick babies require extra care and supervision to ensure they receive the support they need without inadvertently causing harm. This care must promote safe, optimal use of human milk and subsequent breastfeeding.

Why is human milk feeding important?

Human milk is unique because it provides nutrition to the newborn, protects against infections, and supports the establishment of a healthy functional gut biome.[4,5] Mother's own milk has many advantages over breastmilk substitutes, especially for preterm and low birthweight (LBW) and very low birthweight (VLBW) babies. These advantages include decreased infections such as neonatal sepsis, pneumonia, diarrhea, meningitis, and urinary tract infection especially in low and middle-income countries (LMICs). Necrotizing enterocolitis (NEC), inflammation of the intestine, is also decreased among preterm infants exclusively fed human milk.[1,6,7,8,9] Human milk provides critical protective benefits and may prevent or decrease suboptimal/poor nutrition. Human milk feeding is also associated with lower mortality including decreased occurrence of sudden infant death syndrome (SIDS) and chronic problems in later life, such as diabetes, ischemic heart disease, Crohn's disease and ulcerative colitis.[10,11,12] Both human milk feeding and direct breastfeeding enhances cognitive development.[2] Benefits for the mother include decreased postpartum bleeding and reduced risk of ovarian and breast cancer.[13,14,15] Provision of human milk as expressed breastmilk to babies who cannot suck adequately followed by subsequent breastfeeding are associated with lower costs of care.[16]

What are examples of practices that can result in harm?

In addition to actively promoting the use of human milk and exclusive breastfeeding, it is essential that care is taken to avoid harmful practices, some of which are listed below.

- Delayed initiation of and infrequent breastfeeding/breastmilk feeding (expressed breastmilk) can jeopardize effective establishment of milk supply and result in breast engorgement, decreased milk supply, and unnecessary use of breast milk substitutes for the baby.[17]
- Withholding colostrum from newborns is harmful. Secretion of colostrum occurs as early as the 16th week of pregnancy and is available for all newborns at birth including preterm newborns.[18]
- Needless separation from the mother, besides having a detrimental impact on breastfeeding, increases the baby's risk of exposure to more dangerous nosocomial infections.
- Poor hygienic practices in breast milk expression, storage, and administration also increase the risk of infection.[19]
- Use of formulas/breastmilk substitutes, even when used for partial supplementation, carries a risk for infections, especially in facilities with poor infection prevention practices and among lower economic quintiles with low education and poor hygiene.[20]
- In high income countries (HIC), pacifiers are frequently used to decrease pain during procedures and to promote maturation of the sucking reflex.[21] However, they are likely to increase risk of infections in LMICs, especially when their use is continued at home after discharge.

What are the current WHO/UNICEF recommendations for human milk feeding?

To improve child survival, health and development, WHO and UNICEF recommend use of human milk for all term, normal weight, preterm and LBW babies. The recently revised and relaunched Baby Friendly Hospital Initiative (BFHI) Implementation Guidance (2018) to support breastfeeding in health facilities includes considerations for small and sick newborns.[22] More specific support for use of human breastmilk and subsequent breastfeeding of these vulnerable babies is promoted in other WHO documents including those on Kangaroo Mother Care (KMC); WHO Guidelines on Facility-based Maternal and Newborn Care; WHO Guidelines on Optimal Feeding of Low Birth-Weight Infants in Low- and Middle-Income Countries; the Neo-BFHI, the adaptation of the BFHI to target these high-risk newborns; and The Ten Steps to Promote and Protect Human Milk and Breastfeeding in Vulnerable Infants.[1,23,24,25,26]

Key WHO/UNICEF recommendations related to feeding small and sick newborns:

- Promote use of human milk for preterm/LBW babies with priority being the baby's own mother's milk, with the following options for supplementation if weight gain is inadequate:
  - Use pasteurized donor human milk (PDHM) as the second option in preference to formulas. However, as WHO has specified, this "recommendation (is) relevant for settings where safe and affordable milk-banking facilities are available or can be set up;"[23]
  - Use formulas as the next option taking care to counsel the mothers/families on their proper and clean use; and
  - Use preterm formulas only when the VLBW baby is not gaining weight on standard formula and it can be afforded.
- In VLBW babies (<1500 gm) and premature infants <32 weeks who can tolerate feeds, initiate early feeding of human milk.[25]
- Use cup feeding for babies who can tolerate oral feeds but are unable to directly breastfeed. Compared with bottle feeding, cup feeding is associated with more stable respiration, heart rate and oxygen saturation, fewer desaturations and higher incidence of breastfeeding at discharge.[27]
- Once vulnerable infants have been discharged from special care units, feeding recommendations, counselling and support

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provided should be similar to those which apply to lactating mothers of term, normal weight babies.[28]

- HIV is excreted and transmitted to infants in breastmilk. HIV is prevalent in many LMICs, especially Sub-Saharan Africa. Although avoidance of breastfeeding eliminates the risk of HIV transmission through breast milk, replacement feeds have been associated with increased infant morbidity and mortality. Exclusive breastfeeding during the first months of life carries less risk for HIV transmission than mixed feeding.[29] Where feasible, ensure proper use of milk from HIV+ mothers through safe collection and separate pasteurization to destroy the virus in the facility. Decisions on breastfeeding should be made on an individualized basis, taking into account maternal viral load and treatment regimen, as well as resources in the facility and community.

What are the current evidence-based best practices?

- **Human milk and colostrum oral care** even if the infant is unable to receive enteral feeds. Human milk oral care has been proven to decrease sepsis. Human milk oral care is also beneficial for family attachment.
- **Skin-to-skin contact after birth where feasible.** Low birthweight and more mature preterm babies without problems should be placed after birth in skin-to-skin contact on the mother's chest for a trial of breastfeeding within the first hour of life. However, this must be done with careful assessment and supervision in order to promptly detect and manage any potential problems.
- **Minimizing separation of babies from mothers and promotion of skin-to-skin care and Family-Centered Care (FCC).** Strong efforts must be made to promote both skin-to-skin care and FCC as they have a number of advantages and can also help ensure appropriate nurturing care.[30]
- **Immediate breastfeeding.** If the baby is stable, breastfeeding should be encouraged during the first hour of life. If the baby is unable to directly suckle from the breast, all efforts must be made to ensure that colostrum is expressed and fed through cup or tube. The baby should be fed every 2-3 hours since small and sick babies are often not strong enough to "demand" feedings.[1] If not suckling directly from the breast, volumes should be steadily increased according to accepted guidelines.[1,29]
- **Expression of milk.** Colostrum with its high concentration of anti-infective factors has a beneficial impact on the baby's microbiome and helps protect against infections. If the small baby cannot suckle at the breast, colostrum should be expressed by the mother starting within an hour of birth and used for oral care or fed to the baby if the baby can tolerate feeds. Mothers should express every 2-3 hours for 8 or more sessions per 24-hour period, including at night when there is increased secretion of prolactin that is especially helpful for keeping up the milk supply.[31]
- **Method of expression of milk.** Studies have indicated that combining breast pumping with manual expression may be helpful.[32] However, in many facilities in LMICs, manual expression of milk is practiced. Although the yield is somewhat more with pumping, breast pumps are costly and should be used only in facilities where adequate resources for cleaning and care are consistently available, as inappropriate use and reprocessing of breast pumps can result in increased contamination of the milk and potential nosocomial infections.[33] Expressed milk can be kept at room temperature (60° F – 85° F or 16° C – 30° C) for 4-6 hours, and toward the back of the refrigerator for 4 days, although, shorter storage is likely to be safer in facilities where there are frequent voltage fluctuations and power outages.[34] In LMIC NICU settings, ensure that milk is collected, used and stored for short periods in the refrigerator in a clean/safe manner. Collection of milk in maternity wards and at home and transportation to the neonatal unit can carry significant risks unless great care can be ensured throughout the process.
- **Use of pasteurized donor human milk (PDHM).** PDHM is not the same as preterm mother's milk since most donors who have surplus milk are more advanced in lactation. PDHM is better than formula when mother's milk is inadequate, especially for prevention of infections and necrotizing enterocolitis. In the context of HIV prevalence, where there is no well-functioning human milk bank, donor milk carries additional potential risks.
- **Appropriate alternative methods of feeding.** When babies cannot accept oral feeds, tube feeding is required. Intermittent orogastric or nasogastric tube feeds are commonly used. Continuous infusion using a syringe pump is not only costly but also requires careful patient monitoring and carries the risk of separation of fat as human milk is not homogenized with much of the fat remaining in the syringe unless special precautions are taken.[35] In addition, setting up an infusion through syringe pump requires additional expertise and may not be safe in unskilled hands.
- **Use of non-nutritive suckling (NNS) for promotion of maturation of the suckling reflex in preterm babies and sustaining milk flow.** In LMICs, pacifiers are associated with infections. NNS can be promoted by permitting the baby to suckle on the "empty" breast after expression of milk and before/during tube feeds. This helps promote suckling and also prolongs lactation.[36] Milk should be expressed before placing the baby at the breast for NNS. Placing the LBW/preterm baby who has not successfully established coordinated sucking and swallowing at a full breast, will be risky as this may stimulate the let-down reflex and may result in aspiration of milk.
- **Human milk fortifiers** may have a role in well-established centers that effectively care for VLBW babies if weight gain is inadequate, and when they can afford fortifiers. Liquid human milk fortifiers mix better with human milk compared to powder fortifiers, but they can dilute nutrients, anti-infective properties and growth factors.[37,38] Cost of liquid fortifiers is prohibitive and their availability outside the developed world is a challenge.
- **Appropriate counselling and continued strong support for the mother/family.** Counselling should be initiated in the antenatal period. Lactation support to mothers from hospital personnel including lactation consultants and/or specially-trained nurses, midwives and doctors during inpatient stay is essential. Such support is necessary for all mothers but is particularly relevant for those who have had Cesarean sections, delivered small babies, and for those who have newborns with complications such as cleft lip/palate. Follow-up care of mothers and babies post-discharge must include newborn assessment of weight gain and growth, a review of breastfeeding, and further encouragement and support to ensure exclusive breastfeeding for the first six months.

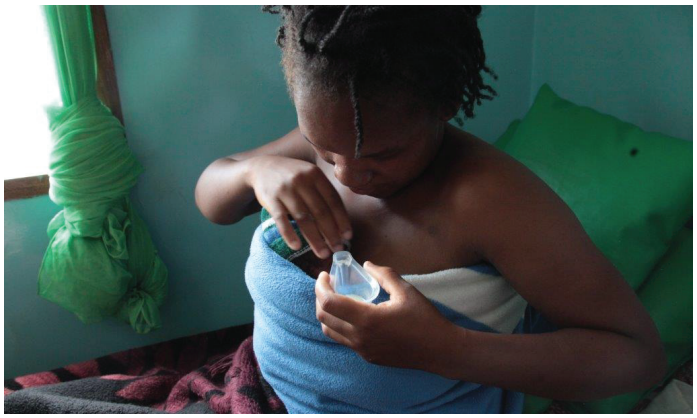

Table 1. Priority Actions for Safe Use of Human Milk and Successful Breastfeeding of Preterm/Low Birth Weight Babies in LMICs*

1. **Promote with adaptation of key principles** of the WHO International Code for Marketing of Breast-milk Substitutes, and WHO/UNICEF Baby Friendly Hospital Initiative.
2. **Advocate for/promote/strengthen policies that continue support for breastfeeding mothers** in the community, including working women. Advocate for adequate minimum 6 months maternity/family leave and support in the workplace as these are important to sustain breastfeeding among working mothers of preterm/LBW and sick babies.
3. **Have a written policy and guidelines for feeding preterm/LBW/sick babies.** Countries should have evidence-based standardized guidelines adapted appropriately to suit their requirements.
4. **Initiate counselling and support for the mother** before delivery during the antenatal period.
5. **Implement optimal actions at birth:**

   (a) Where appropriate, place active, late preterm and larger term LBW babies in skin-to-skin contact soon after birth and initiate breastfeeding if they can suck well, ensuring close supervision to detect any problems early;

   (b) Where feasible, continue breastfeeding with close monitoring of the baby's feeding and weight trends to determine if supplementation with expressed breast milk is needed with an alternative method of feeding (cup or tube).
6. **Avoid separation of mother/parents and babies, promoting skin-to-skin contact and FCC in Neonatal Units (SNCU/NICU).** These practices will provide important nurturing care for the baby, promote breastfeeding, support parents during hospital stay and promote better follow-up care.
7. **Use alternative methods of feeding** when baby cannot accept direct breastfeeding, initiate feeding using oro-gastric tube where required and subsequently use cup/paladai which can be cleaned properly. Do not use a bottle for feeding or for collection of milk. Using a bottle for collection may wrongly imply that bottles are suitable for feeding.
8. **Use the baby's mother's own milk (MOM - Mother's Own Milk)** which is the best choice.
9. **Supplement mother's own milk only when unavoidable**, following the WHO recommendations and best practices noted above.
10. **Provide and advocate for continued lactational support.** Continue advocacy and behavior change communication (BCC) activities to mothers, fathers, and other key family members during the hospital stay and during the postnatal period in the community. Educate, engage and train fathers and other caregivers to provide support for breastfeeding. Structure follow-up clinics to monitor weight gain, assess feeding practices, provide necessary support.

* These practices also apply to normal weight babies who are not able to suckle or swallow for varying periods following problems such as perinatal asphyxia and sepsis.

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

- Ensure that the WHO International Code of Marketing of Breast-milk Substitutes and relevant World Health Assembly resolutions are adopted by countries, promoted, monitored, and applied at all levels.[39]
- Promote adoption of sound policies on maternity and, where feasible, paternity leave.
- Incorporate the Ten Steps of the BFHI into relevant programs, quality improvement, and/or hospital accreditation at scale and ensure funding for implementation.
- Avoid separation of mother/parents and babies while promoting skin-to-skin contact, FCC, and subsequent support for breastfeeding including the necessary infrastructure.
- Review, update and disseminate standards, guidelines, manuals and job aids. Ensure these interventions are taught in both in-service and pre-service education.
- Implement policies recommended in the water and sanitation for health facility improvement tool (WASH-FIT[40]) such as continuous clean water supply and hand hygiene.
- Review and adapt indicators to ensure appropriate documentation of use of human milk in hospitals with SNCUs and NICUs.
- Initiate policies for lactation consultants, with task shifting and training of staff in the art of counselling and supporting mothers both with normal and with at-risk, small and sick babies.
- Ensure sufficient quantities of commodities for expressing, storing and administering breast milk are included in procurement plans and standards of commodities to be used at different levels of the health system are defined for procurement and safe use.

Program Planners/Implementers

- Provide appropriate training, periodic updates and mentoring for care providers dealing with mothers and babies on the type of support to be provided to mothers/families including the practice of skin-to-skin contact, KMC, FCC, safe use of breast milk, and initiating and strengthening BFHI activities.
- Ensure standard guidelines and job aids are placed in strategic locations in the SNCU/NICU for various actions related to safe use of breast milk for small babies and provision of support to mothers/families along with appropriate strategies for mentoring.
- Initiate/expand implementation of skin-to-skin contact, KMC and FCC with advocacy for suitable care providers/staff.
- Provide adequate commodities needed for feeding human milk to early/small and sick babies and for their cleaning and high-level disinfection/sterilization between use.
- Ensure high quality of care in the expression, storage (even short-term), and feeding of human milk.
- Ensure implementation of suitable activities to promote counselling of parents and families regarding continued use of human milk and breastfeeding at discharge and follow-up support at community/home level.

Facility Managers/Administrators

- Ensure that established country policies are adopted and followed by the facility care providers through quality improvement activities.
- Identify champions for skin-to-skin contact, KMC, FCC and breastfeeding, and empower them with dedicated time and resources.
- Actively support implementation of skin-to-skin contact and FCC, and ensure that care providers are suitably trained, supervised/mentored and as a team implement the relevant best practices.
- Ensure adequate supplies for feeding babies such as disposable (one-time use) intragastric tubes and syringes and reusable (clean, disinfect and reuse) feeding cups/paladai.[41]
- Document impact and update practices as needed through the design of appropriate indicators, consistent data collection, and facility staff data review.

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

- Initiate support for breastfeeding and counselling for expression of milk in the antenatal period.
- Promote the best practices outlined above to support breastfeeding from birth onwards, while ensuring the proper care and safety of these small and sick babies.
- Promote, in a clean, safe manner, the use of biologic mother's expressed breast milk for babies who cannot directly breastfeed in the SNCU/NICU, while monitoring weight gain.
- Promote skin-to-skin contact and KMC and avoid separation of newborns from their parents by actively promoting FCC.[30]
- Work as a team to counsel mothers/families on safe use of human milk and subsequent breastfeeding.
- Apply the principles of good quality of care related to maternal and newborn health advocated by WHO to ensure safe use of human milk and to promote breastfeeding.[42]

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