

Protecting, promoting and  
supporting breastfeeding:

**THE BABY-FRIENDLY HOSPITAL  
INITIATIVE FOR SMALL, SICK AND  
PRETERM NEWBORNS**





Protecting, promoting and  
supporting breastfeeding:  
**THE BABY-FRIENDLY HOSPITAL  
INITIATIVE FOR SMALL, SICK AND  
PRETERM NEWBORNS**



Protecting, promoting and supporting breastfeeding: the Baby-friendly Hospital Initiative for small, sick and preterm newborns

ISBN 978-92-4-000564-8 (electronic version)

ISBN 978-92-4-000565-5 (print version)

© **World Health Organization and the United Nations Children's Fund (UNICEF), 2020**

This joint report reflects the activities of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF)

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below. In any use of this work, there should be no suggestion that WHO or UNICEF endorses any specific organization, products or services. The unauthorized use of the WHO or UNICEF names or logos is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO) or the United Nations Children's Fund (UNICEF). Neither WHO nor UNICEF are responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization (<http://www.wipo.int/amc/en/mediation/rules>).

**Suggested citation** Protecting, promoting and supporting breastfeeding: the Baby-friendly Hospital Initiative for small, sick and preterm newborns. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2020. Licence: [CC BY-NC-SA 3.0 IGO](https://creativecommons.org/licenses/by-nc-sa/3.0/igo).

**Cataloguing-in-Publication (CIP) data.** CIP data are available at <http://apps.who.int/iris>.

**Sales, rights and licensing.** To purchase WHO publications, see <http://apps.who.int/bookorders>. To submit requests for commercial use and queries on rights and licensing, see <http://www.who.int/about/licensing>.

**Third-party materials.** If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

**General disclaimers.** The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO or UNICEF concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement. The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO or UNICEF in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO and UNICEF to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO or UNICEF be liable for damages arising from its use.

Design and typesetting by Paprika

Cover photo: ©sutichak - stock.adobe.com

# Contents

<b>Acknowledgements</b> .....	<b>iv</b>
<b>Executive Summary</b> .....	<b>v</b>
<b>Glossary of terms</b> .....	<b>vi</b>
<b>Scope and Purpose</b> .....	<b>ix</b>
<b>1. Introduction</b> .....	<b>1</b>
1.1. The role of human milk and breastfeeding in newborn health and survival.....	3
1.2. Donor human milk.....	4
1.3. Challenges to breastfeeding and human milk in the neonatal ward.....	4
<b>2. The role of facilities in providing neonatal services to small, sick and/or premature newborns</b> .....	<b>7</b>
<b>2.1. Critical management procedures and support</b> .....	<b>7</b>
Step 1: Facility Policies.....	7
Step 1a: Compliance with the Code.....	7
Step 1b: Facility policies.....	9
Step 1c: Internal monitoring.....	11
Step 2: Staff competency.....	15
<b>2.2. Key clinical practices to support breastfeeding</b> .....	<b>16</b>
Step 3: Antenatal information.....	16
Step 4: Immediate postnatal care.....	17
Step 5: Support with breastfeeding.....	19
Step 6: Supplementation.....	21
Step 7: Rooming-in.....	23
Step 8: Responsive feeding.....	24
Step 9: Feeding bottles, teats and pacifiers.....	25
Step 10: Care at discharge.....	27
<b>3. Conclusions</b> .....	<b>29</b>
<b>References</b> .....	<b>30</b>

# Acknowledgements

The development of this document was coordinated by the World Health Organization (WHO) Department of Nutrition for Health and Development, Department of Maternal, Newborn, Child & Adolescent Health & Ageing and the United Nations Children's Fund (UNICEF) Nutrition Section, Programme Division.

This document was developed by Dr Nancy E. Wight, under the supervision of Dr Laurence Grummer-Strawn, in collaboration with Dr Ornella Lincetto, Ms Thahira Shireen Mustafa, Ms Maaïke Arts and Dr France Bégin. Editorial support was provided by Melissa Theurich.

The document was improved through the insightful comments of the following reviewers: Dr Gagan Gupta, Dr Tedbabe Degefe Hailegebriel, Dr Kiersten Israel-Ballard, Ms Kimberly Mansen, Dr Arti Maria, and Dr Alok Patel.

We would also like to acknowledge excellent prior work by the Nordic and Quebec Working Group of the Neo-BFHI: The Baby-friendly Hospital Initiative for Neonatal Wards; Baby-Friendly USA (BFUSA); and PATH.

# Executive Summary

The first few hours and days of a newborn's life are a critical window for establishing lactation and for providing mothers with the support they need to breastfeed successfully (1). The benefits of human milk and the risks of not receiving it have been well studied and are universally recognized. Current World Health Organization (WHO) guidelines and implementation guidance state that all infants, including small, sick and/or preterm infants, should be fed human milk. Preterm and ill infants may not be able to feed at the breast at birth, but can receive the benefits of human milk immediately, and breastfeed eventually. Of various routine neonatal therapies, human milk is one of the most empirically supported for safety, efficacy, availability and cost effectiveness.

Breastfeeding small, sick and/or preterm infants, whether cared for in a neonatal ward or in the regular postnatal ward, presents multiple challenges because of both maternal and infant physiology, psychology, and the environment. Safe donor human milk from a human milk bank is the feeding of choice if mother's own milk is unavailable or contraindicated (2). Systematic reviews have demonstrated the importance of professional and peer support, skin-to-skin care and rooming-in, devoting time and attention to initiating and maintaining milk supply, counsellors, provision of oropharyngeal colostrum early in the hospital course, and the use of donor human milk banks (3, 4).

Unfortunately, one of the biggest barriers to successful breastfeeding is the healthcare system itself and well-meaning, but misinformed health care providers. Lack of planning and design for breastfeeding, inconsistent advice, lack of knowledge or misinformation, personal bad experiences, lack of time, and facility policies all can compromise breastfeeding for mothers of small, sick and/or preterm infants. The care of small, sick and/or preterm newborns cannot be separated from that of full-term infants as they both occur in the same facilities, often attended by the same staff. For breastfeeding to succeed for small, sick and/or preterm infants, staff should focus on the individual mother and her situation, and the facility should provide family-centred care within a supportive environment, including kangaroo mother care for preterm and low-birth-weight infants.

Since 1991, the Baby-friendly Hospital Initiative (BFHI) has motivated and enabled health care providers of maternity and newborn services worldwide to better support breastfeeding (5). Based on the Ten Steps to Successful Breastfeeding (the Ten Steps) (6), the BFHI focuses on providing optimal feeding care for new mothers and their infants. There is substantial evidence that implementing the Ten Steps significantly improves breastfeeding rates for mothers of the targeted population of term, healthy infants with demonstrated benefits for low-birth-weight, ill and preterm infants as well (7-9). The 2018 revised Baby-friendly Hospital Initiative Implementation Guidance document (1) expanded the interpretation of

the Ten Steps to include this distinct group of special infants. The current document provides additional clinical guidance and measures that can be used to apply the BFHI steps to small, sick and/or preterm infants whether cared for in maternity wards or newborn care wards. It aims to aid staff, units, hospitals and systems caring for small, sick and/or preterm infants in their efforts to promote, support and protect breastfeeding in order to achieve the best possible outcomes for the infants, mothers and families under their care.

Quality-improvement is, and should be, a never-ending process. Full compliance with the *International Code of Marketing of Breastmilk Substitutes* and subsequent resolutions (the Code) (Step 1a) (10, 11), a strong breastfeeding policy (Step 1b), staff education and competency (Step 2), and monitoring systems (Step 1c) are just as important for small, sick and/or preterm infants as for full-term, healthy infants. As healthcare provider encouragement significantly increases breastfeeding initiation, prenatal and postnatal counselling and support are essential steps to support initiation and maintenance of a mother's milk supply and breastfeeding (Steps 3, 5). Maternal presence and early, frequent, prolonged, if not continuous, skin-to-skin care (Step 4, 7) are essential for the mother of a small, sick and/or preterm infant to learn her infant's feeding and distress cues (Step 8) and respond appropriately. Involving the mother in the care of her infant gives the mother confidence in handling her child and reduces worry regarding the baby's condition.

As many small, sick and/or preterm infants are unable to fully feed at the breast, feedings of expressed mothers' milk, donor human milk, or if unavailable, infant formula, may be needed (Step 6). Appropriate feeding methods (for example, feeding tubes, cups) should be used (Step 9). Use of bottles and teats has been shown to negatively affect breastfeeding in preterm infants, therefore cup or tube feedings (if needed) with progression to the breast is recommended, although further high-quality randomized trials are needed. For small, previously sick and/or preterm infants, comprehensive discharge planning is crucial for the maintenance of health and growth, maintenance of maternal milk supply and progression to exclusive breastfeeding, if not achieved before discharge (Step 10). Early discharge may be achieved with skin-to-skin care and full breastfeeding, but frequent outpatient follow-up is required by professionals trained in lactation and outpatient care of small, previously sick and/or preterm infants.

Implementation of the Ten Steps in facilities caring for populations of small, sick and preterm newborns can dramatically increase breastfeeding rates. Facilities ensuring adherence to evidence-based recommendations on maternity and newborn care can substantially improve the health and well-being of both mothers and infants, globally.

# Glossary of terms

**Apnoea:** Episode of cessation of breathing for 20 seconds or longer, or a shorter respiratory pause accompanied by bradycardia (low heart rate), cyanosis or pallor.

**Appropriate for gestational age:** Birthweight between 10<sup>th</sup> and 90<sup>th</sup> percentile for infants at the same gestational age.

**Artificial milks:** see breast-milk substitute.

**Breastfeeding (nursing):** The act of the infant removing milk from the mammary gland.

**Breast milk expression:** Use of hands or a mechanical device (pump) to remove milk from the breast.

**Breast-milk substitute (also artificial milks):** Any food being either marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose.

**Bronchopulmonary dysplasia (Chronic lung disease):** a chronic lung disease resulting in prolonged need for supplemental oxygen usually found in very premature infants requiring oxygen and ventilatory support as newborns.

**The Code:** *International Code of Marketing of Breastmilk Substitutes* and subsequent World Health Assembly resolutions.

**Continuous positive airway pressure:** A treatment method for newborns with mild to moderate respiratory distress.

**Cup feeding:** Placing breast milk in a small cup and holding it to the infant's lips so that a small amount of milk can flow into the infant's mouth.

**Donor human milk:** Excess human milk voluntarily contributed to a milk bank by lactating women. Usually the donor mothers are screened for infectious diseases. Donor human milk is screened for common pathogens, pasteurised, then screened again, before being given to the recipient infant.

**Donor human milk bank:** An organisation that recruits and screens human milk donors, then collects, processes, stores and dispenses the donated milk.

**Enteral nutrition:** Method of feeding that uses the gastrointestinal tract to deliver nutrients beyond the oesophagus or oral cavity via feeding tubes.

**Exclusive breastfeeding:** An infant receives only breast milk and no other liquids or solids are given, including water, with the exception of drops/syrups of vitamins, minerals or medicines.

**Extremely low-birth-weight:** An infant with a birth weight less than 1000g.

**Family-centred care:** An approach to care delivery that promotes a mutually beneficial partnership among mothers, families and health-care providers to support health-care planning, delivery and evaluation. The principles of family-centred care include dignity and respect, information sharing, participation and collaboration.

**Feeding cues:** Infant behaviours that indicate a readiness to breastfeed. These include infant being awake in the quiet, alert state and may also include hand suckling. These behaviours occur prior to infant crying, which is a late cue.

**Fortifier/Fortification:** Predominantly protein and mineral supplementation added to human milk so that it approximates the nutrients required for the rapid growth rate and bone mineralisation of the preterm infant. May be derived from human milk or bovine milk.

**Gestational age:** Age of the foetus measured from the first day of a mother's last menstrual cycle to the current date. It is measured in weeks and days.

**Hyperbilirubinaemia:** An excess of bilirubin, a yellow-orange compound produced by the breakdown of haemoglobin from red blood cells and excreted in bile, that may be deposited in the skin, and if extremely high, in the brain.

**Hypoglycaemia:** A deficiency of glucose in the bloodstream.

**Kangaroo mother care:** Care of preterm and/or low-birth-weight infants carried out with the mother including early, continuous and prolonged skin-to-skin contact between the mother and the baby, along with exclusive breastfeeding. The care is initiated in the hospital and continued at home with adequate support and follow-up when discharged early.

**Lactogenesis II (also secretory activation):** The process by which milk synthesis increases after parturition. It is triggered by a fall in serum progesterone during the first two days postpartum.



**Late-onset sepsis:** A life-threatening infection of the blood and tissues that occurs after 72 hours of life.

**Low-birth-weight:** An infant with a birth weight less than 2500g, regardless of gestational age.

**Maternity ward:** An area of the hospital where pre-natal or post-delivery mothers are housed, with or without their newborns.

**Meconium:** Dark green-black stools passed in the first few days after birth. Stools should gradually change to cottage-cheese and mustard soft stools after secretory activation, at least by day five of life.

**Microbiome:** The pattern of bacterial content of the intestine.

**Nasal cannula:** A treatment method for newborns with mild respiratory distress.

**Necrotising enterocolitis:** A serious inflammation and infection of the intestines characterized by abdominal distention, inability to feed and significant respiratory deterioration.

**Neonatal intensive care unit:** an intensive care unit specializing in the care of ill or premature newborn infants.

**Neonate:** An infant between the first and 28th day of life.

**Neonatal abstinence syndrome:** A group of symptoms including irritability, tremors, hyperactivity, heightened reflexes, excessive crying, overeating with vomiting, diarrhoea, fever and sometimes seizures, associated with withdrawal from maternal drugs or medications, especially opioids.

**Newborn nursery:** An area of the hospital where infants are kept separate from their mothers.

**Neonatal ward:** All levels and classifications of neonatal care facilities that care for neonates requiring special attention. Terms used for neonatal wards include: neonatal intensive care units, mother-newborn intensive care units, intensive care nurseries, special care baby units, special newborn care units, newborn stabilization units or newborn care centres.

**Non-nutritive sucking/breastfeeding:** Infant sucking at the breast without removing any breast milk. Intermittent swallowing can occur due to the accumulation of saliva.

**Nutritive sucking:** Infant sucking at the breast that results in the removal of milk. Co-ordination of sucking, swallowing and breathing is critical to avoid aspiration during nutritive sucking and removing and swallowing breast milk.

**Oropharyngeal colostrum:** Applying very small amounts of expressed colostrum to an infant's oral mucosa to stimulate the immune response.

**Parenteral nutrition:** Method of feeding that bypasses the gastrointestinal tract where fluids are administered via the intravenous route to provide most of the nutrients the body needs. This method is used when it is not possible to deliver adequate nutrients for a prolonged period of time through oral or tube feeding, as in the case of infants with major anomalies or conditions affecting the gastrointestinal tract.

**Peritonitis:** Inflammation of the lining of the intestines, usually accompanying necrotising enterocolitis.

**Preterm:** An infant born at less than 37 completed weeks of gestational age. Sub-categories of preterm infants based on gestational age are: extremely preterm infants (born less than 28 weeks of gestational age), very preterm infants (born between 28 and 32 weeks of gestational age) and moderate to late preterm infants (born between 32 and 37 weeks of gestational age).

**Retinopathy of prematurity:** A potentially blinding disease caused by abnormal development of retinal blood vessels in the eyes of preterm infants.

**Rooming-in:** A hospital arrangement whereby a newborn infant is kept in the mother's hospital room instead of a nursery.

**Secretory activation:** see Lactogenesis II.

**Semi-demand breastfeeding:** The infant exhibits feeding cues and is put to the breast until he/she stops sucking. The feeding is then completed by another method, usually tube feeding.

**Sick newborn:** A newborn who requires medical care.

**Skin-to-skin:** Care in which an infant is placed prone on the mother's abdomen or chest with no clothing separating them.

**Small for gestational age:** An infant with a birth weight less than the 10th percentile compared to infants of the same gestational age.

**Small newborn:** A newborn who is preterm and/or low-birth-weight, or small for gestational age.

**Spontaneous intestinal perforation:** A hole in the intestinal wall caused by something other than infection.

**Substitute feedings:** Feedings given when breast milk or breastfeeding is contraindicated for either maternal or infant reasons.

**Supplemental nursing system:** A feeding tube device consisting of a fine tube leading from a reservoir of breast milk and positioned just past the tip of the nipple so that as the infant suckles at the breast, milk can be sucked through the tube to nourish the infant.

**Supplementation:** Nutrient-containing fluid feed (donor human milk, fortifier, or infant formula) given in addition to mother's own milk.

**Test weighing:** Weighing an infant before and after a breastfeeding, without changing the diaper or any clothing or attachments to ascertain breast milk intake. It can be quite accurate if done carefully by protocol.

**Trophic feedings:** Providing nutritionally insignificant volumes of enteral substrate to compromised infants to stimulate the developing gastrointestinal system, supply nutrients, and prevent gastrointestinal atrophy.

**Tube feeding:** Feeding through a tube that is passed through the nose or the mouth down the oesophagus into the stomach.

**Very low-birth-weight:** An infant with a birth weight less than 1500g.

## Scope and Purpose

The core purpose of the Baby-friendly Hospital Initiative (BFHI) is to ensure that mothers and newborns receive timely and appropriate care before and during their stay in a facility providing maternity and newborn services. It enables the establishment of optimal feeding of newborns, thus promoting their health and development.

Whereas the 2018 BFHI Implementation Guidance (1) focuses primarily on the in-facility care of healthy, full-term infants, this document addresses the application of the BFHI principles for small, sick, and premature newborns and their mothers in neonatal wards.

In this document, the term neonatal ward refers to all levels and classifications of neonatal facilities that care for neonates requiring special attention. Terms used for neonatal wards include: neonatal intensive care units, mother-newborn intensive care units, intensive care nurseries, special care baby units, special newborn care units, newborn stabilization units or newborn care centres.

This guidance is based on, and complements the 2018 WHO/UNICEF BFHI Implementation Guidance (1) with provision of special guidance for the support of infant feeding in neonatal wards. The purpose of focusing on small, sick, and premature newborns is to ensure that these vulnerable infants receive the care necessary to establish optimal infant feeding and thereby reach their full health potential.

This document follows the general format of the 2018 BFHI Implementation Guidance (1), discussing each of the Ten Steps and referencing the BFHI global standards where appropriate for neonatal wards, while giving additional clinical guidance as needed.

This guidance focuses specifically on infants requiring medical care beyond that routinely provided to infants in a newborn nursery or postpartum care facility. This includes neonates separated from their mother due to maternal or infant illness, or infants requiring special procedures (for example, phototherapy or supplementation) in the mother's room. The mothers of these infants may need additional assistance in establishing and maintaining milk supply.

All inpatient newborns, except those affected by rare metabolic diseases, will benefit from breastfeeding and human milk. For many, it will mean their survival. These evidence-based recommendations will strive to encompass all infants receiving special care, irrespective of birth weight and severity of illness.

This guidance targets health-care workers in first-, secondary- and tertiary-level referral hospitals, as well as policy-makers, program managers and health-facility managers. It aims to establish a system of care which emphasizes the provision of human milk to small, sick and/or premature infants, especially those who are initially unable to feed directly at breast. Historically, neonatal wards have presented obstacles to successful breastfeeding (12, 13) but a supportive environment can increase access to human milk and exclusive breastfeeding (14-16). Although neonatal wards vary greatly in their capacities and competencies, all can benefit from improved knowledge, skills and attitudes regarding the importance and management of breastfeeding. As noted by an editorial in the 2016 Lancet series on breastfeeding:

---

The common practices in neonatal units worldwide of separation of mothers and infants, routine supplementation and fortification, and targets for weight gain, disrupt the essential close maternal–newborn contact and are counter to the evidence on the conditions needed to establish breastfeeding. It is hard to imagine an environment that is more antagonistic to breastfeeding. A transformational shift is needed in the way we care for these infants and their parents. This change includes the development of parents and staff as partners in care, promotion of kangaroo mother care as standard, and tackling barriers to its implementation, and adherence to the International Code on the Marketing of Breast-milk Substitutes to limit claims about specialised formula that lack evidence (17).

---



# 1. Introduction

Every year, 30 million newborns require inpatient care (18). These include 15 million preterm, low-birth-weight and sick infants, who represent a sizable population of infants who can benefit from evidence-based, cost-effective interventions such as skin-to-skin care and human milk.

Having a preterm or ill infant admitted to a neonatal ward often has a negative effect on mothers' self-image and sense of competency (19) which may manifest as a post-traumatic stress disorder (20, 21). Breastfeeding and supplying expressed milk gives mothers a sense of purpose, closeness and bonding with their infant (15, 22). With the neonatal ward staff caring for her infant, the mother may feel like an outsider. Skin-to-skin care, kangaroo mother care, family-centred care, providing milk and breastfeeding empowers mothers to become the primary caregivers of their infant (23, 24).

The first few hours and days of a newborn's life are a critical window for establishing lactation and for providing mothers with the support they need to breastfeed successfully (1). Since 1991, the BFHI has motivated and enabled health care providers of maternity and newborn services worldwide to better support breastfeeding (5). Based on the Ten Steps to Successful Breastfeeding (the Ten Steps) (6) the BFHI focuses on ensuring optimal feeding support for new mothers and their infants.

The 2018 *WHO Implementation Guidance: protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services: the revised Baby-friendly Hospital Initiative* (1) updates and supersedes the original Ten Steps. The revision is based on the 2017 WHO Guideline (7) that examined the current evidence and made 15 recommendations under the headings of: immediate support to initiate and establish breastfeeding, feeding practices and additional needs of infants, and creating an enabling environment. The 2018 Implementation Guidance organizes the Ten Steps into those that address the management procedures necessary to ensure that care is delivered consistently and ethically, and those that spell out the standards for

clinical care of mothers and infants. The scope was also expanded to include preterm and ill infants. The updated Ten Steps are presented in Box 1.

The 2018 Implementation Guidance document proposes several revisions to the implementation of the BFHI to facilitate nationwide scale-up and ensure sustainability over time. The guidance focuses on integrating the protection, promotion and support of breastfeeding more fully into the health-care system as part of quality improvement processes. The modifications and increased feasibility serve the purpose of increasing newborns' access to breastfeeding in all healthcare facilities, whether private or public.

“*Skin-to-skin care, kangaroo mother care, family-centred care, providing milk and breastfeeding empowers mothers to become the primary caregivers of their infant.*”

Provision of mothers' own milk varies widely among countries, regions, and individual neonatal or postpartum wards. There have been many quality improvement initiatives in individual facilities and regionally based on factors suspected or known to facilitate greater use of human milk (15, 25-29). There is also some evidence that standard BFHI designation has a spill over effect with improved human milk use in the hospital's neonatal ward (30-32).

In a survey of Neo-BFHI (34) principles and adapted steps, scores on neonatal wards in hospitals ever-designated baby-friendly were significantly higher than in those never designated (35). There is already some evidence of progress in supporting mothers and breastfeeding in neonatal wards globally (35) such as increased use of skin-to-skin care and increased maternal education and support for milk expression. There seems to be a readiness for expansion of baby-friendly standards to small, sick and/or preterm infants. This is due to greater newborn survival, an increased recognition and agreement of the importance of human milk for health outcomes, and an improved understanding of the role of maternal-infant support.

As noted in the 2018 Guidance document, the care of the small, sick and/or preterm newborns cannot be separated from that of healthy infants, as the care occurs in the same facilities, often attended by the same staff or in the same units (1). The current document will provide clinical guidance and measures that can be used to apply the Ten Steps to Successful Breastfeeding for such newborns, whether cared for in separate neonatal wards/ neonatal intensive care units or in the same wards as all other newborns.

“

*Much of our present confidence that a mother's milk is the best, even for a more vulnerable newborn, came from pioneering work in less privileged countries, where greatly improved outcomes followed the use of expressed breastmilk, fed by cup, to low birth weight infants (33).*”

## Box 1.

### Ten Steps to Successful Breastfeeding (revised 2018)

#### Critical management procedures

1. a. Comply fully with the *International Code of Marketing of Breast-milk Substitutes* and relevant World Health Assembly resolutions.
  - b. Have a written infant feeding policy that is routinely communicated to staff and parents.
  - c. Establish ongoing monitoring and data-management systems.
2. Ensure that staff have sufficient knowledge, competence and skills to support breastfeeding.

#### Key clinical practices

3. Discuss the importance and management of breastfeeding with pregnant women and their families.

4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth.
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties.
6. Do not provide breastfed newborns any food or fluids other than breast milk, unless medically indicated.
7. Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day.
8. Support mothers to recognize and respond to their infants' cues for feeding.
9. Counsel mothers on the use and risks of feeding bottles, teats and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to on-going support and care.



## 1.1. The role of human milk and breastfeeding in newborn health and survival

Breastfeeding improves the survival, health, and development of all children (36). The importance of human milk and the risks of not receiving it have been well studied and are universally recognized (2, 37-40). Exclusive and continued breastfeeding ensures optimal maternal and infant health in both low-resource and high-resource countries (36, 39-41). The scaling up of breastfeeding can prevent an estimated 823,000 child deaths and 20,000 breast cancer deaths every year (36).

Current WHO guidelines and implementation guidance state that all infants, including small, sick and/or preterm infants, should be fed human milk in the first 6 months of life (1, 2, 7). The neonatal ward population is highly heterogeneous in weight, gestational age, and diagnosis. Preterm and ill infants may not be able to breastfeed at birth, but can receive the benefits of human milk immediately, and breastfeed eventually. Of various routine neonatal ward therapies, human milk is one of the most empirically supported for safety, efficacy, availability and cost effectiveness (42). Human milk is medicine for both the infant and the mother: the milk for the infant, and the provision of it for the mother (43).

“Globally, an estimated 15 million infants are born prematurely (44) and 20.5 million live births are low birth weight every year.”

Globally, an estimated 15 million infants are born prematurely (44) and 20.5 million live births are low birth weight every year (45). It is estimated that 30 million newborns every year require inpatient care as a result of being born preterm, low birth weight or with a medical condition (18). Current research confirms that human milk especially benefits the small, sick and preterm infant in several areas: host defence, gastrointestinal development, special nutrition, and neurodevelopmental outcomes (37, 39, 43, 46-49). Even the dose and timing of mothers' own milk is important, with small increases in human milk in the first 14 days of life reducing the number of hospitalizations at one year, and the types of specialists and specialized therapies needed at two years in very low-birth-weight infants (50). As human milk contains bioactive substances with bactericidal, immune-modulating, and intestinal maturation-inducing properties, the potential to

ameliorate preterm morbidities and to improve health in preterm infants is consequential, especially for those born extremely premature (51). Human milk has been shown to significantly decrease complications associated with prematurity, including feeding intolerance (52-55), late-onset sepsis (56-60), and retinopathy of prematurity (61). Other benefits include improved neurodevelopmental outcomes (62-66), lower obesity rates and blood pressure (36), and less insulin resistance in adolescence (67, 68). Bioactive compounds in both maternal colostrum and mature human milk support both anti-infectious and anti-inflammatory properties, which aids in the regulation of the neonatal inflammatory response (69, 70).

“Human breastmilk is therefore not only a perfectly adapted nutritional supply for the infant, but probably the most specific personalized medicine that he or she is likely to receive, given at a time when gene expression is being fine-tuned for life. This is an opportunity for health imprinting that should not be missed (36).”

One of the most severe preterm morbidities is necrotising enterocolitis, an acute inflammatory bowel disease, which may lead to intestinal perforation and peritonitis. The underlying cause of necrotising enterocolitis appears multifactorial with intestinal mucosal injury, inflammation, and the presence of abnormal intestinal colonization theorized as contributing to its development (51, 71, 72). Human milk feeding has been credited with consistent reduction in necrotising enterocolitis in preterm infants (51, 60, 73). It is thought that human milk reduces the incidence and severity of necrotising enterocolitis through its bactericidal, immunologic, antioxidant, and anti-inflammatory properties (51, 74). Even partial feeding of human milk can reduce the incidence of necrotising enterocolitis (54, 75, 76). Protection against necrotising enterocolitis appears to be dose-dependent, with consumption of more than 50% of the total feeds providing the greatest protection (59, 76-79). The cause of this dose-dependent response is unclear, and may be related to either more protection provided through a

greater intake of mother's own milk or less exposure to cow's milk-based artificial milks (80-83). The timing of the milk dose also seems to be important, with the first 14 to 28 days of human milk giving the most protection (56, 57, 76, 84). Small (0.5-2.0mL) trophic feedings started during the first two days of life do not appear to increase the risk of necrotising enterocolitis, and may facilitate earlier, full volume feeds (85, 86).

The protective effects of human milk occur through the synergistic actions of its unique nutritional, enzymatic, hormonal, direct immunologic, immunomodulatory, anti-inflammatory, anti-oxidant, and growth factors (87). As the mammary gland is immature with loose endothelial cell tight junctions which allow more and larger proteins to cross into the milk at the time of preterm birth, most of these factors appear to be concentrated in the milk of mothers who deliver prematurely (87-89).

The small, sick and/or preterm infant also benefits from having a physically and psychologically healthier mother (22, 23). Both mother and infant benefit from the mother's presence as a loving caretaker- both learning about and from each other. Ultimately there are economic and environmental benefits for all (90-94). Human milk has been rediscovered as one of the key factors in improving overall outcomes and is the standard of care for small, sick and/or premature infants (37, 95, 96).

## 1.2. Donor human milk

The WHO (1, 2, 7, 38, 97), American Academy of Pediatrics (37), European Society for Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition (98), and other national and global policy groups (99-102) call for use of donor human milk as the feeding of choice, if mother's own milk is insufficient, unavailable or contraindicated. Donor human milk is somewhat inferior to mother's own milk, but superior to infant formulae. It can act as a bridge and a way to achieve an exclusive human milk diet until mother's own milk is available (103). Providing donor human milk to vulnerable neonates without access to mother's own milk can save lives and increases awareness of the value of breastfeeding and human milk in the community (15, 104-108).

As human milk donors may be mothers of healthy term infants, the milk may be significantly different from the milk of a mother who has just delivered, especially if she delivers prematurely. In addition, there may be a decrease or loss of nutrients and other important milk factors with processing, storage and feeding. Although fresh mother's own milk with donor human milk may provide adequate growth for small, sick or preterm infants (2, 109-111), there is some evidence of slower growth with donor human milk in this population (112).

Donor human milk has been cited as reducing necrotising enterocolitis (54, 81, 113-115) and other morbidities such as bronchopulmonary dysplasia (116), late-onset sepsis (77), and retinopathy of prematurity (61, 117) in small, sick and/or preterm infants, especially the very low-birth-weight (VLBW) and extremely low birth weight (ELBW) infants. Supplementation of mother's own milk with donor human milk instead of formula has been shown to be cost-effective as it decreased necrotising enterocolitis and the post-discharge costs of medical care in one study (118) and length of stay and costs in another (119). The evidence for decreased morbidity and cost-effectiveness with donor human milk appears more robust for VLBW infants given an exclusive human milk diet (55, 77, 80, 115, 117, 120-127).

Given the high mortality in low- and middle-income countries, particularly as a result of infections, safe donor human milk is still the recommendation for infants who do not have access to mother's own milk (2). Safe donor human milk should come from a human milk bank with standards and procedures to ensure sustainability, safety, ethics and appropriate clinical use. This requires significant planning, resources and systems which may be difficult for low- and middle-income countries. Governments and health authorities have a crucial role in providing the best possible nutrition for small, sick and/or preterm infants by supporting an integrated system of care that includes human milk banking (100, 101).

---

“  
Providing donor human milk  
to vulnerable neonates without  
access to mother's own milk  
can save lives and increases  
awareness of the value of  
breastfeeding and human  
milk in the community.”

---

## 1.3. Challenges to breastfeeding and human milk in the neonatal ward

Despite research showing that breastfeeding rates for small, sick and/or preterm infants can be improved (15, 16, 26-28, 42), any human milk rates at discharge from the hospital remain significantly lower than rates for healthy newborn infants (128-130). Breastfeeding small, sick and/or preterm infants in the neonatal ward presents multiple challenges because of maternal or neonatal physiology, psychology, and the environment (43).



The physical environment of the neonatal ward may be a significant impediment to successful breastfeeding. It may be noisy, brightly lit, and intimidating, without much privacy, and with a perceived high stress level (131). In low- and middle-income countries there may be less medical equipment, resources or staff available. Overall, the experience may be perceived as stressful to the family. Often the infant cannot be handled or held for a time because of physiologic instability and a multitude of tubes and wires. In addition, some infants may have been transported from a distance or the mother is too ill herself to visit or stay in the neonatal ward.

In many neonatal care wards mothers' access to their infants is limited due to severe space constraints or well-meaning but invalid infection-control and other parent-restrictive infant care policies. Interruption of the attachment process can have devastating, long-lasting consequences for both parents and children (132, 133). Stressors and separation can inhibit milk expression (134) and make it more difficult for parents to assume the role of primary caregiver once their newborn is home (135). On the contrary, when the mother can stay with her infant, such as in kangaroo mother care or family-centred models of care, feeding breast milk is facilitated and psychological problems are reduced.

The small size and perceived fragility of the infant, the infant's physical appearance, prematurity, and medical complications can be barriers to breastfeeding (131, 136). A preterm infant has a disproportionately large head compared to the average term infant, and specific congenital malformations, poor perfusion, or just a lack of response to the parents' voice or touch may compromise bonding and breastfeeding. The small size of the infant's mouth relative to the mother's nipple, combined with poor oro-motor skills and suck-swallow-breathing dyscoordination, may preclude early breastfeeding and may be frightening to the mother.

Family members and health care professionals sometimes discourage mothers of small, sick and/or preterm infants from initiating lactation, as they think that providing milk will be an added stress (137). Additionally, mothers may be advised, usually in error, that their medications preclude the use of their milk (138). Similarly, mothers may be inappropriately advised that their own high-risk conditions may interfere with adequate volumes or composition of their milk (43, 49). Mothers of ill infants often feel a loss of control of their lives and a loss of their role as a mother. The infant is in the hands of strangers and she is the outsider. However, studies indicate that providing milk for their infants helps mothers cope with the emotional stresses surrounding the neonatal ward experience and gives them a tangible claim on their infants (22-24).

Mothers who deliver preterm are at increased risk for delayed lactogenesis II (139, 140) and stress-mediated lactation problems that can affect milk volume adversely.

Mothers often report a decline in milk supply when their infant has a complication or when the mother returns to work. Maternal exhaustion, either due to peripartum events, or later, due to return to work or home duties, is also a barrier to establishing and maintaining a milk supply (131). Mothers who have had prolonged antenatal inpatient stays before delivery may feel guilty for being away from home, spouse, and children.

The infant's father, grandparents (141), and other family members or friends may also have significant influence over the mother, providing either enormous support or significant barriers to establishing breastfeeding. Although most studies of fathers' influence on breastfeeding have been done with fathers of term infants, after controlling for potentially confounding demographic and biomedical factors, the father's reported preference for breastfeeding was found to be the most important factor influencing a woman's decision to breastfeed (142) or bottle feed (143). Where breastfeeding is the social norm, a greater percentage of mothers of preterm and sick infants provide breast milk at infant discharge, but a shorter duration of breastfeeding is still seen compared to full-term controls (144).

Financial barriers may also contribute to the challenge of providing mother's own milk (145). If not provided at no cost by the facility, the availability and cost of breast pump rental or purchase, and the cost of other supplies to support breast pumping and milk storage can be significant. Travel, housing and food costs associated with remaining close by the infant for an extended period of time can be barriers to breastfeeding. Providing care for other children may also stress available family resources.

Unfortunately, one of the biggest barriers to successful breastfeeding may be the healthcare system and well-meaning, but misinformed health care providers. Inconsistent advice, lack of knowledge or misinformation, personal breastfeeding experiences and attitudes, lack of time, and poor hospital policies create barriers to successful breastfeeding (3, 4, 146, 147). Many healthcare providers have not had the education and training to support mothers who are pumping or expressing milk (148). Parent-infant separation, inadequate staff knowledge and skills, healthcare staff attitudes and practices, including resistance to change, and high staff workloads pose barriers to applying the Ten Steps in neonatal wards (3, 4).

Facilitators of enacting BFHI principles include clear, breastfeeding-friendly policies, adequate staff education and time, interprofessional collaboration, and a positive organizational culture and leadership. Facilitative policies include those which specify that mothers are allowed unrestricted access to infants, including participation in infant care and kangaroo mother care (149).



## 2. The role of facilities in providing neonatal services to small, sick and/or premature newborns

The WHO Framework on integrated people-centred health services (150) states that all people should have equal access to quality health services that respect individual needs. For breastfeeding to succeed in neonatal wards the staff should focus on the individual mother and her situation, and the facility should provide overall family-centred care within a supportive environment.

### 2.1. Critical management procedures and support

#### Step 1: Facility Policies

##### Step 1a: Compliance with the Code

*Step 1a: Comply fully with the International Code of Marketing of Breast-milk Substitutes and relevant World Health Assembly resolutions.*

#### Rationale:

Families are most vulnerable to the marketing of breast-milk substitutes during the prenatal, perinatal and postnatal period when they are making decisions about infant feeding (1). Hospital staff may unintentionally undermine breastfeeding by providing formula companies access to patients via commercial literature and formula marketing strategies, such as baby clubs, gift bags, and no cost formula (151-153). Food for facility staff, patient education materials with commercial logos, and other gifts are attractive and perceived as no cost, but formula prices include the costs of those materials. Medical staff wearing lanyards and badge holders, or using pens, pads,

and coffee mugs with formula company logos, even when unintended, implies endorsement. By providing low cost or no cost supplies to hospitals, companies expect their products will be introduced to patients and families, who may then be influenced to continue to purchase that brand after discharge. Due to increased needs for specialized supplies and equipment, neonatal wards caring for small, sick and/or preterm infants may be under significant pressure to accept no cost items from commercial interests that conflict with breastfeeding.

Because marketing clearly influences both staff and mothers' choices (154), it is imperative that the *International Code of Marketing of Breast-milk Substitutes* and relevant World Health Assembly resolutions be complied with fully. In line with the WHO Guidance on ending inappropriate promotion of foods for infants and young children, published in 2016 (155), health workers and health systems should avoid conflicts of interest with companies that market foods for infants and young children. Health professional meetings should never be sponsored by industry, and industry should not participate in parental education (1).

#### Clinical guidance:

##### *Purchase of supplies*

- Neonatal wards and their related areas use many specialized supplies in addition to formula, feeding bottles and teats. These include fortifiers (concentrated nutrients), breast milk collection kits and bottles, IV tubing, needles, sterile dressings, blankets, measuring tapes, scales, etc. To avoid any conflict of interest, all supplies in the neonatal ward should be purchased through normal procurement channels.

*Visibility of branded products and information*

- Materials that have logos, brands, wording or pictures from companies that make breast-milk substitutes, bottles or teats, for example: pens, pads, mugs, toys, measuring tapes, lanyards, calendars, etc., should not be used in the neonatal ward and related areas where mothers or their families could see them.
- Needed feeding supplies should be stored in drawers, closets or rooms where they are not visible or accessible to the families or public. When formula is used, consider transferring it to generic containers labelled for the infant, removing the brand label, or covering the brand label with the infant's label before bringing it to the infant's bedside.
- Educational and other materials on display or given to families should be reviewed and all images or logos not in compliance with the Code should be eliminated.

*Policy on marketing and conflicts of interest*

The facility policies should include stipulations that:

- Gifts are marketing materials and engender reciprocity toward the giver. Therefore, the neonatal ward and its staff should not accept gifts, including food, non-scientific literature, materials, equipment, money or support for breastfeeding education or events from manufacturers or distributors of breast-milk substitutes, bottles or teats.
- No pregnant women, or mothers or families with infants in the neonatal ward should be given samples or coupons for materials covered under the Code, including discharge gift packs. Provision of clinically necessary supplies to allow for safe continuity of medically-indicated, therapeutic feedings are acceptable.
- Employees of manufacturers or distributors of products covered under the Code should have no contact with pregnant women or mothers and families of infants. A vendor policy should require contact with the facility purchasing department and appointments to meet with maternity and neonatal ward staff for specific purposes only.

*Staff knowledge about marketing of breast-milk substitutes*

- At a minimum, neonatal ward staff should be able to explain why accepting gifts from makers or distributors of infant formula, feeding bottles and teats is unethical and why infant formula, feeding bottles and teats should not be in view of mothers and families in the neonatal ward or related areas.
- Neonatal ward staff should challenge each other if they see marketing materials that are not compliant with the Code.
- A random selection of mothers should confirm that they were not given any marketing materials containing items prohibited by the Code.

---

## BFHI Global standards on compliance with the *International Code of Marketing of Breast-milk Substitutes* and relevant World Health Assembly resolutions

- All infant formula, feeding bottles and teats used in the facility have been purchased through normal procurement channels and not received through free or subsidized supplies.
  - The facility has no display of products covered under the Code or items with logos of companies that produce breast-milk substitutes, feeding bottles and teats, or names of products covered under the Code.
  - The facility has a policy that describes how it abides by the Code, including procurement of breast-milk substitutes, not accepting support or gifts from producers or distributors of products covered by the Code and not giving samples of breast-milk substitutes, feeding bottles or teats to mothers.
  - At least 80% of health professionals who provide antenatal, delivery and/or newborn care can explain at least two elements of the Code.
-

## Step 1b: Facility policies

*Step 1b: Have a written infant feeding policy that is routinely communicated to staff and parents.*

### Rationale:



*Policy drives practice. Written guidelines are the vehicle for ensuring patients receive consistent, evidence-based care, and are an essential tool for staff accountability (1).*

Facilities with comprehensive breastfeeding policies are likely to have better breastfeeding support services and better breastfeeding outcomes (4, 34, 41, 156-158). Because the policy will address multidisciplinary practices, its development and implementation should include a broadly-defined, multidisciplinary team (3, 4, 15).

### Clinical guidance:

#### Content of policy

- The neonatal ward should have an evidence-based infant feeding policy/procedure which includes, at a minimum, all the points listed in Box 2.
- The policy ought to include a statement that all mothers, regardless of how they feed their infants, receive the support they need.
- The policy may be a single document or multiple policies and procedures and should be reviewed and updated periodically based on current evidence and guidelines.
- Other policies/protocols that may be separate or a part of the overall neonatal ward feeding protocol must be consistent with BFHI principles.

#### Knowledge of policy

- A summary of the facility's breastfeeding policy should be publicly displayed. The size and placement of the summary policy may vary depending on the layout of the neonatal ward, waiting room, mothers' ward and

related areas. The posters should be available in the languages most common to the parents and families of neonatal ward patients.

- Clinical staff in the neonatal ward must have general knowledge of the overall infant feeding policy, as well as more detailed knowledge of the policies and procedures for small, sick and/or premature patients.
- New neonatal ward staff members and healthcare providers with hospital privileges should be oriented to the policy. All regular staff should be familiar with the content and implementation of the policy. Staff who rotate through the neonatal ward should be oriented on the key provisions of the policies.

## BFHI Global standards on facility policies

- The health facility has a written infant feeding policy that addresses the implementation of all eight key clinical practices of the Ten Steps, Code implementation, and regular competency assessment.
- Observations in the facility confirm that a summary of the policy is visible to pregnant women and their families.
- A review of all clinical protocols or standards related to breastfeeding and infant feeding used by the maternity services indicates that they are in line with BFHI standards and current evidence-based guidelines.
- At least 80% of clinical staff who provide antenatal, delivery and/or newborn care can explain at least two elements of the infant feeding policy that influence their role in the facility.

## Box 2.

### Neonatal ward infant feeding policy

#### Skin-to-skin care

- Initiate skin-to-skin care soon after birth whenever possible
- Stability and safety of mother and infant are the prime criteria
- Frequent and continuous skin-to-skin care whenever possible
- Procedures to bring the mother and infant together when possible if the mother is too ill to visit the neonatal ward or neonatal intensive care unit
- Training in safety measures, including monitoring and safe transfer to and from mother

#### Establishing and maintaining maternal milk supply

- Immediate instruction on hygienic hand expression and/or breast pumping
- Instruction on breast pumping and massage
- Safe, hygienic collection, handling, labelling, storage and feeding of human milk
- Provision and care of breast pumping, collection, labelling and feeding supplies

#### Supplementation/fortification/feeding advancement

- Oral colostrum care (oropharyngeal colostrum)
- Obtaining, storage, handling and use of donor human milk
- Supplementation methods, nipple shields and pacifiers

- Transition from tube feedings to oral feeding that is cue-based rather than determined by gestational age or weight
- Protocols should clearly state the indications for donor human milk, fortifiers, and substances other than mother's own milk

#### Facility space utilization

- Mother and baby should not be separated unless medically necessary
- Space for mothers to sleep or rest near the care space for small, sick and/or preterm infants
- Unrestricted parental access to neonatal ward at all times
- Provision for a breastfeeding room near the care space for small, sick and/or preterm infants with space for breastfeeding, milk expression and refrigeration to store human milk until infant discharge

#### Miscellaneous

- Procedures to be followed in case of misadministration of one mother's milk to another infant
- Support for late preterm infants
- Teaching non-breastfeeding mothers how to prepare and feed breastmilk substitutes
- Contraindications to using mother's own milk
- Coordination with referring facilities to ensure breastfeeding-supportive, compatible policies
- Prenatal consults for high-risk antepartum patients should include breastfeeding



## Step 1c: Internal monitoring

### *Step 1c: Establish ongoing monitoring and data-management systems.*

#### **Rationale:**

Evidence-based quality improvement efforts continue to demonstrate the importance of measuring current practice to improve future practice (29, 159). There exists a quality chasm between the health care we have and the care we could have. A prime example is the lack of breast milk use in neonatal wards despite overwhelming evidence of the short- and long-term benefits of human milk for small, sick and/or preterm infants (160). Ongoing measurement, coupled with quality improvement approaches, is needed to explain large variations in care practices and outcomes and to change the system of care.

#### **Clinical guidance:**

##### *Monitoring protocol*

- Every facility should be able to monitor the care for small, sick and preterm newborns, inside the neonatal ward and outside. The optimal way to collect data is to build it into the daily neonatal ward routine, either as electronic data or routine paper charting. Exit interviews and paper questionnaires could also be used to assess the parents' views of the support provided.
- A list of potential monitoring elements to be recorded in the newborn and/or maternal record is shown in Box 3.



©WHO/Yoshi Shimizu

## Box 3. Potential monitoring indicators from individual patient records<sup>1</sup>

### Growth parameters

- Weight (growth velocity)
- Age of regaining birthweight
- Length
- Head circumference

### Feeding measures

- Oropharyngeal colostrum use: first use for mouth care
- First non-nutritive or nutritive breastfeeding
- Feeding history (volume, frequency, method and type of feed at each feeding)
- Type of first feed (mother's own milk, donor human milk, infant formula)
- Time at first feed (hours after birth)
- Discharge feeding (mother's own milk, donor human milk, infant formula, mixed feeding)
- Percentage of human milk (mother's own milk, donor human milk) over duration of hospital stay
- Method of feeding (at breast, tube, cup, bottle)
- Parenteral nutrition (initiation, duration, discontinuation)
- Central line days (with or without parenteral nutrition)

- Age of achieving full volume feeds (more than 140mL/kg of body weight per day or other set parameter)

### Skin-to-skin care

- First skin-to-skin care
- Frequency
- Duration

### Laboratory testing

- Method and protocol for standardized blood monitoring
- Days the blood urea nitrogen or albumin in the accepted range

### Related clinical diagnoses

- Spontaneous intestinal perforation
- Necrotising enterocolitis
- Central line-associated bloodstream infection

### Maternal milestones/measures

- Documentation of breastfeeding education (type of education, time conducted)
- Time to first hand expression or pumping
- Maternal milk supply (expression log)

<sup>1</sup> Source: California Perinatal Quality Care Collaborative 2018 Toolkit: Nutritional Support of the Very Low Birth Weight Infant (Modified by N. Wight)



### Regular review of implementation

- The data from medical charts should regularly be aggregated to form the basis of unit-wide assessment of performance and quality improvement. Possible summary indicators are listed in Box 4.
- Staff should regularly discuss the feeding and growth of infants in the neonatal ward. Maternal milk supply should be discussed at neonatal ward work rounds and recorded. Neonatal wards with electronic database systems can often program specific reports to meet measurement goals. In neonatal wards with less resources, paper registries can serve the same purpose.
- A multidisciplinary team is needed to review, analyse and make recommendations based on the data collected so effective changes can be made if necessary. More frequent review of the data may be needed if quality-improvement cycles are underway. Weekly or monthly charts can spot trends earlier than six-month reviews. Including parents in data review can often be very helpful in improving the information system, policies and procedures of the neonatal ward.
- Failure-mode and effects analysis (161): reviewing the charts of those infants discharged on formula alone can often reveal problems to be addressed.
- Regional networks of facilities with neonatal wards can serve as a forum for sharing data on policies, practices, and outcomes. Examples include the Vermont-Oxford Network (162) and the network of Newborn Stabilization Units and Special Newborn Care Units at the sub-district and district levels in India (18). Such networks allow facilities to compare themselves to other similar facilities and adopt the policies and practices of the better-performing facilities (26, 163).



## BFHI Global standards on internal monitoring

- The facility has a protocol for ongoing monitoring and data-management system to comply with the eight key clinical practices.
- Clinical staff at the facility meet at least every six months to review implementation of the system.

## Box 4. Possible unit-based indicators<sup>1</sup>

### Growth parameters

- Average weight velocity
- Average age when birth weight was regained
- Average length velocity
- Average head circumference velocity
- Percentage of infants who were appropriate for gestational age at birth and small for gestational age at discharge

### Feeding measures

- Percentage of patients who received oropharyngeal colostrum in any given time period
- Average time from birth to first feed (mother's own milk, donor human milk, infant formula)
- Mother's own milk feeds as a percentage of total feeds
- Any mother's own milk at discharge
- Parenteral nutrition measurements
  - Percent of infants started on parenteral nutrition by 24 hours of life
  - Protein intake of more than 3g/kg of body weight per day by three days of life
  - More than 80kcal/kg of body weight per day by five days of life
  - Average age when lipids are more than 3g/kg of body weight per day
  - Percentage of patients getting parenteral nutrition for more than 30 days
- Central line days (with or without parenteral nutrition use)

- Average age of infant when achieving full volume feeds
- Average age of infant when first non-nutritive or nutritive breastfeeding occurs

### Skin-to-skin care

- Average time and duration from birth until skin-to-skin care
- Average frequency of skin-to-skin care over any given time period
- Average duration of skin-to-skin care over any given time period

### Rates of related clinical diagnoses

- Spontaneous intestinal perforation
- Necrotising enterocolitis
- Central line-associated bloodstream infection

### Maternal measures

- Percentage of all mothers who received breastfeeding education
  - Prenatal teaching
  - First neonatal ward teaching
- Average time from delivery to first lactation consultation or peer counselling consult
- Average time from delivery to first pumping and/or hand expression
- Percentage of mothers documenting milk supply
- Percentage of mothers reporting satisfaction with care

<sup>1</sup> Source: California Perinatal Quality Care Collaborative 2018 Toolkit: Nutritional Support of the Very Low Birth Weight Infant

## Step 2: Staff competency

### *Step 2: Ensure that staff have sufficient knowledge, competence and skills to support breastfeeding.*

#### **Rationale:**

Timely and appropriate care for mothers with infants in the neonatal ward can only be accomplished if staff have the knowledge, competence, skills and positive attitude to carry it out. There is evidence that in facilities without baby-friendly accreditation, nurses' knowledge was not in accordance with current best practices and hospital policies were not founded on evidence-based practices (164). Education of all members of the neonatal ward staff that have any contact with infants, parents or families is the foundation for creating consistent information, communication and practices (3, 4, 165-167). Education requirements may vary based on individual staff roles. Significant increases in knowledge are possible with nursing and other staff education, but attitudes appear more difficult to change (168-170).

Neonatal ward-specific in-service training must be mandated by policy and supported by supervisory and senior staff to cover the special requirements of breastfeeding care for small, sick and/or preterm infants. The entire neonatal ward must evolve into a culture where the use of human milk and breastfeeding are the norm. Training of multidisciplinary staff has been effective for improvement of breastfeeding counselling practices. Skilled support from trained staff may be cost-effective in the neonatal ward (171). Specific topics to be covered and competencies to be assessed for all staff who help mothers with infant feeding are listed on page 15 of the Implementation Guidance document (1). These include how to help a mother to breastfeed a low-birth-weight or sick baby (1).

#### **Clinical guidance:**

##### *Pre-service and in-service training*

- All clinical staff working in the neonatal ward must be competent in the knowledge and skills needed to provide appropriate care for feeding of preterm and low-birth-weight newborns. This competency must be kept up to date through continuous medical education.
- Facilities can develop their own educational programs or adapt those already available to meet their specific needs. Any program must include both knowledge and skills, as well as demonstration of competency. Online education can provide basic education and be

cost-effective, but in-person interactive components are also needed to demonstrate application of knowledge and skills (167).

- An overview of the Ten Steps should be included in the initial orientation of all new neonatal ward staff, so they are aware of the overall feeding philosophy and the scope of training they will receive.
- Educational programs that include staff with different roles in the neonatal ward can facilitate teamwork and a multidisciplinary approach to addressing problems. Staff with different duties in the neonatal ward will require basic breastfeeding education, including anticipatory guidance for the expression-dependent mother as to techniques and expected volumes, but also education and skill training related to their roles. Students, interns and other temporary personnel who rotate through the neonatal ward should receive training commensurate with their roles.
- Although all neonatal ward staff should be educated and trained in basic support for the small, sick and/or premature infant, individuals with advanced and/or specialized training on infant feeding (for example, nutritionists, dieticians, international board-certified lactation consultants, peer counsellors, occupational and speech therapists) are valuable and should be utilized when available.
- Mother-to-mother support groups, especially when supervised by trained staff, can be very effective in education and support of mothers of small, sick and/or preterm infants in both low- and middle-income countries and resource-rich countries.

##### *Competency assessment*

Education of healthcare professionals is important, but application of that knowledge to high risk mothers prenatally and vulnerable patients in the neonatal ward is the key to promoting and supporting breastfeeding. Competency can be assessed at skills fairs (using education and return demonstration) devoted to certain topics. These might be planned on a rotating basis and organized by a qualified lactation consultant or other skilled caregiver. In addition, competency may be assessed by direct observations that are unannounced, as in observing handwashing. A system and responsibility for maintaining educational and competency records should be integrated with other required trainings, such as cardiopulmonary resuscitation (CPR), handwashing, safety, etc.

## BFHI Global standards on staff competency

- At least 80% of health professionals who provide antenatal, delivery and/or newborn care report they have received pre-service or in-service training on breastfeeding during the previous 2 years.
- At least 80% of health professionals who provide antenatal, delivery and/or newborn care report receiving competency assessments in breastfeeding in the previous 2 years.
- At least 80% of health professionals who provide antenatal, delivery and/or newborn care are able to correctly answer three out of four questions on breastfeeding knowledge and skills to support breastfeeding.

## 2.2. Key clinical practices to support breastfeeding

### Step 3: Antenatal information

#### *Step 3: Discuss the importance and management of breastfeeding with pregnant women and their families.*

##### **Rationale:**

All pregnant women and mothers should receive evidence-informed breastfeeding counselling as a public health intervention to improve breastfeeding rates and practices (172). Staff working in neonatal wards may be requested to do prenatal consults with mothers at known risk of having small, sick and/or preterm infants. As healthcare provider encouragement significantly increases breastfeeding initiation among women of all social and ethnic backgrounds (173-176), the prenatal consult should cover human milk and breastfeeding, just as it discusses medical procedures, possible decisions and outcomes. Antepartum hospital stays are opportunities for dispelling myths (for example, maternal beliefs that breastfeeding isn't possible when their risk for premature delivery is high). They are also useful for providing anticipatory guidance regarding the importance of human milk and the risks of formula for the small, sick and/or preterm infant. Prenatal consults by staff should always include the value of human milk and establishing and maintaining the mother's milk supply. Antenatal breastfeeding counselling should be tailored to

the individual needs of the woman and her family and given sensitively with consideration of the social and cultural context of the family.

Healthcare providers have the responsibility to provide accurate, evidence-based information on the consequences of a mother's decision, just as on other recommendations and parental decisions in the neonatal ward. Despite considerable evidence that breastfeeding and human milk is a healthcare issue, breastfeeding is still perceived by some healthcare providers as a simple lifestyle choice. Healthcare providers may be afraid to "push" breastfeeding for fear of making mothers feel guilty if they do not breastfeed (174, 177) But in fact, mothers may end up feeling guilty about choosing not to breastfeed if they later learn that some of the health problems their child faces could have been prevented through breastfeeding. Withholding such information is unethical (178).

Women at increased risk for preterm delivery or birth of an ill infant must begin discussions with knowledgeable providers as soon as is feasible concerning the special circumstances of feeding a premature, low-birthweight or sick infant. If, on initial discussion, a high-risk pregnant woman does not intend to breastfeed, she may yet provide her colostrum and breast milk for a period of time once provided with medical information explaining why breast milk is important to the medical needs of her infant (179). The healthcare provider in charge of the mother's care can reinforce the importance of human milk and breastfeeding by inquiring about the mother's milk supply and praising the mother's efforts during routine postpartum care. A systematic review of health professional breastfeeding support interventions noted that repeated discussions and interventions from the prenatal period through postpartum were more effective than single interventions at any time (180).

##### **Clinical guidance:**

- A facility should have a plan for providing education and counselling regarding lactation and breastfeeding to pregnant women at risk of having infants admitted to the neonatal ward. Antenatal consults regarding the importance of human milk and breastfeeding can be a part of general neonatal ward anticipatory guidance, done by neonatologists, paediatricians or obstetricians, or by team members with special expertise in lactation. Both physician and staff member consultations should be recorded in the mother's medical record.
- Prenatal breastfeeding counselling for high-risk women should include all the topics listed in the Global Standard below. In addition, information on the importance of early colostrum production and the special benefits of human milk for preterm or ill infants is critical for high-risk births. High-risk women can be reassured that milk production will occur, even after an



extremely preterm birth. They should be taught how to establish and maintain a milk supply with hand expression and frequent pumping, if breast pumps are available. They can be counselled that feeding cues may not be seen immediately in very preterm infants, but that they will present eventually. The importance of skin-to-skin contact for small, sick and/or preterm infants should be emphasized. If donor human milk is available, it is important to emphasize that it is only used as a bridge to mother's own milk supply and does not replace the need for mother's own milk.

- All information should be presented to pregnant women in a culturally sensitive manner, considering literacy level, cultural background, previous breastfeeding experiences and current plans for infant feeding. Repeat consultations may be needed if the mother is anxious, has questions, or is hospitalized for a considerable period of time.
- Information on breastfeeding may be presented one-on-one or in small group counselling, written form, via patient television channels, or through on-line resources. All media should be screened carefully for commercial influence.

## BFHI Global standards on antenatal information

- A protocol for antenatal discussion of breastfeeding includes at a minimum:
  - the importance of breastfeeding;
  - global recommendations on exclusive breastfeeding for the first 6 months, the risks of giving formula or other breast-milk substitutes, and the fact that breastfeeding continues to be important after 6 months when complementary foods are given;
  - the importance of immediate and sustained skin-to-skin contact;
  - the importance of early initiation of breastfeeding;
  - the importance of rooming-in;
  - the basics of good positioning and attachment;
  - recognition of feeding cues.
- At least 80% of mothers who received prenatal care at the facility report having received prenatal counselling on breastfeeding.
- At least 80% of mothers who received prenatal care at the facility are able to adequately describe what was discussed about two of the topics mentioned above.

## Step 4: Immediate postnatal care

### *Step 4: Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth.*

#### **Rationale:**

Immediate skin-to-skin contact and early breastfeeding are two closely-linked interventions that need to take place immediately after birth and together for optimal benefit (1). Immediate and prolonged skin-to-skin care facilitates breastfeeding, populates the infant's microbiome, helps prevent hypothermia and hypoglycaemia, and stabilizes respiratory function (181). Early suckling at the breast stimulates lactogenesis II (secretory activation) and transfers colostrum, which is rich in immune-active substances and especially important for the preterm infant (182). A recent review noted a 33% increase in infant mortality if breastfeeding initiation was delayed over one hour and 100% increase if breastfeeding was started more than 24 hours after birth (183).

Extensive research supports the benefits of skin-to-skin care for both the mother and infant. For the infant, skin-to-skin care reduces infant mortality and morbidity (183-187), as well as increasing exclusive breastfeeding, decreasing neonatal ward stay and hospital readmissions, and improving short (188) and long-term outcome (189-190). Skin-to-skin care decreases pain response in preterm infants during the many painful procedures experienced during the hospital stay (191, 192). There is also some evidence of improved sleep patterns and improved brain maturation (193-195). For the mother, skin-to-skin care improves milk volume (27, 196, 197), assists with bonding and attachment (19, 198, 199), boosts parental engagement and improves breastfeeding (200, 201). Fathers benefit as well (202, 203). Skin-to-skin care is an integral part of the Nurturing Care Framework (204).

#### **Clinical guidance:**

##### *Skin-to-skin care*

- Because immediate and continued skin-to-skin care may not be feasible for all preterm, esp. very preterm, newborns, the 80% threshold specified in the BFHI Global Standard is not applied to this group, but facilities should be encouraged to set both realistic and ambitious targets for their own setting.
- Delayed infant bathing for 12-24 hrs has been associated with an amniotic fluid sensory cue for longer breastfeeding, better temperature stability and

less stress for the infant, thereby allowing immediate skin-to-skin care and facilitating breastfeeding initiation (205).

- Delayed cord clamping for at least one minute should be standard care for all newborns (206) with gentle cord milking for infants needing immediate resuscitation (207). Vitamin K and the hepatitis B vaccine can be given with the infant in skin-to-skin care with weighing after one hour of skin-to-skin care.
- Small, sick and/or preterm infants should be placed in skin-to-skin care on the mother as soon after birth as the mother's and infant's conditions allow (that is, both are deemed to be in stable condition). The WHO defines "stable" as the absence of severe apnoea, desaturation and bradycardia (1). In practice, the definitions of "stable" and "stabilized" vary widely, but should not be unreasonably restrictive, should be based on evidence (including expert experience and opinion), and be clearly defined in the neonatal ward skin-to-skin care policy or protocol (208). The definition of stable may also include lack of significant blood pressure fluctuations. Skin-to-skin care can begin as soon as both mother and infant are deemed stable and can be together (209). Some examples are:
  - An active, stable infant born by caesarean section of an awake and alert mother should be placed prone across the mother's chest after delivery with an intact cord, or after delayed cord cutting, with the infant's head toward her chin and turned to the side, and the infant's body and back of the head covered by a warm blanket after brief drying. A separate caretaker should be assigned to assess and stabilize the infant on the mother's chest to provide safety. If the mother is under general anaesthesia or heavily sedated, another family member should provide skin-to-skin care until the mother is awake and alert.
  - An infant with mild respiratory distress on nasal cannula or continuous positive airway pressure (CPAP) may be placed on the mother's chest in the delivery room or operating room and transported to the neonatal ward on the mother if adequate assistance is available to monitor the infant.
  - An infant requiring significant resuscitation may need to be moved to the neonatal ward for further observation and management for hours or days, before skin-to-skin care is possible.
  - Infants with known terminal conditions may be placed in skin-to-skin care immediately (comfort care) if the parents are comfortable with the procedure.
  - A stable, ill or preterm infant born under general anaesthesia should be placed skin-to-skin as soon as the mother is stable, responsive and alert. If the mother is unstable or still experiencing the effects of general anaesthesia, the mother's partner or other family member should be encouraged to do skin-to-skin care until the mother is available.

- Skin-to-skin care must be practiced safely. In the first few hours after birth, health professionals should observe the mother and infant and manage any signs of distress (210). If the mother is not fully awake and responsive, a health professional, doula, friend or family member should stay with the mother to prevent accidental injury to the infant.
- Skin-to-skin care applies to all infants whether they are breastfed or not. Skin-to-skin care should be used for all stable infants in both high-tech and low-tech environments and reduces hypothermia, hypoglycaemia and crying, while facilitating breastfeeding initiation.
- When continuous skin-to-skin care is not possible, delivery and neonatal staff should be trained to transfer the infant to and from mother to minimize any stress to the infant or disruption in neonatal care.

### Early initiation of breastfeeding

- Stable infants should be offered unrestricted access to the breast, regardless of gestational age or weight (211-213). Mothers or infants who are unstable following delivery may need to delay the initiation of breastfeeding until the mother and infant are deemed stable and can be together. It is for this reason that the BFHI global standard of 80% is not applied to preterm infants. However, as with skin-to-skin, facilities should be encouraged to set both realistic and ambitious targets for their setting.
- Some extremely preterm infants may not be able to suckle effectively immediately after birth, even with very small volumes of colostrum. In infants not stable enough for immediate breastfeeding, immediate hand expression of maternal colostrum and application to the infant's oral mucosa with a 1mL syringe or cotton swab is well tolerated and can serve as immunomodulatory therapy (214, 215).

## BFHI Global standards on immediate postnatal care

- At least 80% of mothers of term infants report that their babies were placed in skin-to-skin contact with them immediately or within five minutes after birth and that this contact lasted one hour or more, unless there were documented medically justifiable reasons for delayed contact.
- At least 80% of mothers of term infants report that their babies were put to the breast within one hour after birth, unless there were documented medically justified reasons.

## Step 5: Support with breastfeeding

### *Step 5: Support mothers to initiate and maintain breastfeeding and manage common difficulties.*

#### **Rationale:**

Several studies have shown lower breastfeeding rates for preterm infants compared with term infants. Small, sick and/or preterm infants are at higher risk of not establishing exclusive breastfeeding, both due to their own physiology and unsupportive clinic environments (144, 216, 217). Establishing and maintaining lactation is often the biggest challenge for successful breastfeeding in the neonatal ward.

A systematic review determining barriers to exclusive breastfeeding in low- and middle-income countries showed that active support, including promotion, counselling and education, both in the health facility and in the community led to a 152% increase in exclusive breastfeeding (218). An enabling environment for successful breastfeeding includes several family-engagement approaches. Family centred care recognizes the family as partners in health care and promotes collaboration for better health and developmental outcomes, improved family experiences, enhanced staff satisfaction and wiser allocation of resources (219). Nurturing care (204) is facilitated by skin-to-skin contact, breastfeeding and a companion to support the mother. Continuum of care (163) targets improved practices and services from pre-conception through postnatal care, including specialized breastfeeding counselling and support for mothers with small, sick and/or premature infants. The WHO Quality of Care framework (220) includes the management of care for small, sick and/or preterm newborns and focuses on patient-centred care in the domains of respect, emotional support, physical comfort, information and communication, continuity and transition, care coordination, involvement of patients and their family, and access to care.

Mothers who must rely on hand expression or breast pumps have predictable barriers to the initiation and maintenance of lactation (145). Mothers of preterm infants have the additional barriers of infant immature suckling patterns as well as a lack of full-term breast development, delayed lactogenesis II (secretory activation), inadequate emptying with milk expression and often an inadequate milk ejection reflex due to stress.

The volume of milk produced by a mother who must express her milk is the strongest determinant of the exclusivity and duration of breastfeeding for preterm and ill infants. Establishing a milk supply is a time-sensitive

process requiring frequent and thorough emptying of the breasts as soon as possible (14, 141, 221-225). In order to maintain milk availability, mothers and healthcare professionals must understand the change from endocrine to autocrine regulation of milk volume, and the importance of establishing a milk volume of at least 500mL/d in the first 14 days after birth. It is often difficult for mothers with initial low initial milk volumes to increase their milk supply after the first two weeks (145).

Late preterm infants (born at 34 to 37 gestational weeks) need special breastfeeding attention as their ability to breastfeed may be overestimated, leading to hyperbilirubinemia, hypoglycaemia and dehydration, whether they are rooming-in with mother or in the neonatal ward (226-228). Mothers of these infants will need extra assistance in establishing and maintaining their milk supply as the infant may not be able to successfully breastfeed alone.

#### **Clinical guidance:**

##### *Breastfeeding assistance*

- Mothers of small, sick and/or preterm infants admitted to the neonatal ward at any time should be helped with breastfeeding as soon as feasible after the infant is admitted.
- Positioning for breastfeeding may be quite different for preterm and ill infants and will be learned over the course of the neonatal ward stay. Support can be hands-off or hands on depending on the mother's culture, needs or specific requests. Small and preterm infants often require additional head and neck support, and easy visibility of the latch and infant face by the mother to assess infant safety and milk transfer.
- Correct attachment may be difficult for small, sick and preterm infants and should be taught and observed frequently until both the mother and the infant are comfortable with the latch.
- Standardized, relatively objective breastfeeding assessments (229), such as the Infant Breastfeeding Assessment Tool (IBFAT) (230), Mother-Baby Assessment (MBA) (231), LATCH (232) or the UNICEF b-r-e-a-s-t tool (233), should be routine. Non-nutritive breastfeeding has been shown to increase milk supply and duration of breastfeeding post discharge (234).

##### *Milk expression*

- Establishing a full milk supply is especially challenging for mothers of small, sick and/or preterm neonates. Therefore, mothers should be offered appropriate assistance with milk expression within the first one to three hours after delivery or as soon as possible if the mother is unstable (235).

## Protecting, promoting and supporting breastfeeding

- Mothers should be encouraged to breastfeed or express milk at least 7-8 times or more every 24 hours, including at least once at night to establish and maintain their milk supply. The expressions need not be regularly spaced, but care must be taken to thoroughly empty the breasts each time to avoid milk stasis and inhibition of lactation.
- As the average expressed milk yield without let-down is less than 4% of available milk (236, 237), psychological inhibitors of the neuro-endocrine let-down reflex (fear, pain and embarrassment) may compromise milk yield. Expressing at the infant's bedside or with positive stimuli, such as seeing, hearing or touching the infant, like during skin-to-skin care, can increase milk yield (238).
- All mothers should be taught hygienic hand expression. Frequent hand expression (more than five times per day) in addition to electric pumping in the first three post-partum days can significantly increase milk supply by day 14 by more thorough emptying of the breasts, as well as increase the caloric content of the milk (239, 240). If electric double-pumping (both breasts simultaneously) is not available, manual pumps can be used.
- While milk volumes will vary, typical goal amounts of milk to be expressed each day are shown in Table 1.
- If the mother intends to use a breast pump, she should be taught how to use it safely and appropriately and how to clean all parts well.
- During the first two weeks, during coming to volume, the neonatal ward staff should assess the mother's technique and troubleshoot any problems, including pain and breast flange size. Further assessments should continue on a periodic basis.
- Mothers should be encouraged to keep a record of milk expressed to provide early opportunities for remediation when milk volume falters. Neonatal

staff should be aware of a mother's ongoing milk volume and refer the mother for specialized lactation assessment and care if volumes fall short of anticipatory guidance goals.

- Any clean, dry, glass or food-grade/BPA-free hard plastic container with a secure lid may be used for milk collection and storage. In high income countries sterile storage containers provided by the hospital are recommended for critically ill NICU patients (242). A nipple/teat should not be used as a lid. Careful attention should be paid to hand hygiene when expressing and handling human milk. Best practice documents for expressing, storing and handling human milk are available from human milk banks worldwide (242) and other expert sources (243, 244).

### Support for establishing and maintaining milk supply

- Specific guidance for establishing and maintaining a milk supply is essential for mothers to have adequate milk for infant growth and development. Consistent information regarding the initiation and maintenance of a milk supply is critical for expression-dependent mothers of small, sick and/or preterm infants. An information packet and educational support group can be utilized to assure mothers receive and retain needed information (245). Coordination and collaboration between the mother's and the infant's healthcare staff assure current, consistent information is provided by all.
- Mothers who have difficulties in establishing or maintaining a milk supply may require focused, individualized support. Proactive interventions to assure coming to volume ( $\geq 500\text{mL/day}$  by day 14 postpartum) are especially important in the first two weeks after birth (145).

**Table 1: Average volume of breast milk by day<sup>1</sup>**

Time since birth	Volume (mL) each pumping (both breasts)	Volume per day <sup>2</sup> (mL)
Day 1-2	Drops to 20mL	Drops to 120mL
Day 3	25 to 45mL	160 to 360mL
Day 4-5	50 to 60mL	400 to 600mL
Day 6-9	75 to 90mL	600 to 720mL
Day 10 and beyond (to maintain supply)	90mL or more	720mL

<sup>1</sup> Table created with data from Hurst & Meier (177) and Neville (240)

<sup>2</sup> Volumes expected with pumping combined with hand expression after pumping at least 8 times in a 24-hour day.



- Clinical assessment of milk transfer is unreliable in preterm infants (246). Test weighing, done by standard protocol, appears to be a valid measure of intake at the breast and can be used to determine the need for supplementation (247, 248). Mothers can be taught to do accurate test weights.

## BFHI Global standards on support with breastfeeding

- At least 80% of breastfeeding mothers of term infants report that someone on the staff offered assistance with breastfeeding within 6 hours of birth.
- At least 80% of mothers of preterm and sick infants report having been helped to express milk within 1-2 hours after birth.
- At least 80% of breastfeeding mothers of term infants are able to demonstrate how to position their infant for breastfeeding and that the infant can suckle and transfer milk.
- At least 80% of breastfeeding mothers of term infants can describe at least two ways to facilitate milk production for their infants.
- At least 80% of breastfeeding mothers of term infants can describe at least two indicators of whether a breastfed infant consumes adequate milk.
- At least 80% of mothers of breastfed preterm and term infants can correctly demonstrate or describe how to express milk.

### Step 6: Supplementation

*Step 6: Do not provide breastfed newborns any food or fluids other than breastmilk, unless medically indicated.*

#### **Rationale:**

Human milk is species-specific and all substitute feeding preparations differ markedly from it (34). As noted in Section 1.2 above, formula feeding of preterm infants is associated with increased risks of feeding intolerance, late-onset sepsis, retinopathy of prematurity, later obesity and high blood pressure, and most especially necrotising enterocolitis. Artificial milks lack the antimicrobial factors

and gut growth and maturation factors present in human milk. They alter the microbiome and are associated with increased inflammatory mediators (70, 249, 250). Newborn stomachs are very small; the preterm newborn's stomach even more so. If fed other foods or fluids they will not breastfeed well, creating a cycle of insufficient milk and supplementation that leads to breastfeeding failure. The WHO Acceptable medical reasons for use of breast-milk substitutes document describes the few conditions for which supplementation may be needed or breastfeeding is contraindicated (251). The Academy of Breastfeeding Medicine has published a protocol for managing situations in which supplementation may be needed in full-term infants (252).

#### **Clinical guidance:**

##### *Exclusive human milk feeding*

- The potent qualities of human milk are such that all infants should receive human milk, including small, sick and/or preterm hospitalized infants. Small, sick and/or preterm infants may require tube feeding or supplementation by another method to consume enough nutrients for adequate growth and development. In those cases, neonatal ward protocol or physician orders will determine the amounts and timing of feeds to assure adequate intake.
- As clinical estimates of milk transfer at the breast have been shown to be unreliable (246), test-weights before and after a breastfeeding are often helpful as infants transition from tube-feeding to the breast (253).
- Colostrum can be used for oral care and early trophic feedings are beneficial before an infant is able to directly breastfeed (182, 254-257).
- Mother's with insufficient milk to meet their infant's current and anticipated future needs should receive specific instruction on how to increase their milk supply.
- Special attention to milk volume should be placed on the first 2 weeks after birth, as after that time increasing the milk volume may be difficult, due to milk stasis and glandular involution. If a lack of increase to full volume in the first 2 weeks, or a slight decrease in milk supply is noted early enough, it may be possible to increase the frequency and completeness of milk expression, as well as address maternal stress and exhaustion, which may contribute to a declining milk supply.

##### *Possible Indications for Supplementation in Small, Sick and/or Preterm Infants*

- Infants for whom breastfeeding is contraindicated, for either maternal or infant reasons, will require supplementation. In addition, infants of mothers who choose not to breastfeed will require supplementation. If the mother is unable to provide the infant sufficient

volume or nutrition through breastfeeding or feeding of expressed milk, supplementation will be required for a time.

- Maternal indications for infant supplementation include:
  - Delayed secretory activation (day 3-5 or later) with inadequate infant intake.
  - Primary glandular insufficiency as evidenced by abnormal breast shape, poor breast growth during pregnancy, and/or lack of indications of secretory activation.
  - Breast pathology or prior breast surgery resulting in poor milk production.
  - Contraindicated maternal medications.

Infant indications for supplementation include:

- Laboratory-documented asymptomatic hypoglycaemia unresponsive to breastfeeding.
- Signs and symptoms of inadequate milk intake at breast:
  - Clinical or laboratory evidence of dehydration (elevated serum sodium, poor feeding, lethargy, poor skin turgor).
  - Excessive weight loss for gestational age and birth weight. For late preterm and term infants, more than 8-10% weight loss from birth should trigger further evaluation.
  - Growth faltering on gestational age-specific growth charts.
  - Delayed bowel movements with meconium stools still present by day 5.
  - Persistent jaundice from lack of intake, with ongoing weight loss, limited stools and uric acid crystals in the urine.
- Most infants born VLBW and those born at less than 32 weeks will require supplementation, at least for a limited period (251).

### Use of donor human milk

- If a mother's own milk is insufficient to meet the infant's needs or otherwise unavailable, the first choice for supplementation, especially sick or premature infants, should be donor human milk from a qualified human milk bank (2). Donor human milk should be used as a stopgap until mother's own milk is available, and not supplant mother's own milk. Neonatal wards may establish an agreement with an existing milk bank or consider establishing a human milk bank to collect and process milk to meet the needs of their patients for whom mother's own milk is insufficient.
- In high resource countries it is common for a multi-nutrient fortifier to be added to mother's own milk and donor human milk to try to match preterm in-utero growth rates. The 2016 Cochrane Systematic Review (258) concluded the limited available data do not provide strong evidence that feeding preterm infants with multi-nutrient fortified mother's own milk compared with unfortified mother's own milk affects

important outcomes, except that it leads to slightly increased in-hospital growth rates. The most effective way to improve growth in small and preterm infants is to use mother's own milk and increase feeding volumes to tolerance levels.

### Support for non-breastfeeding mothers

- Mothers of neonatal ward patients who are not able (for example, due to mastectomy or breast reduction) or have decided not to breastfeed should also be fully informed of the feeding options (including donor human milk if available) and risks of alternate feeding choices. As even partial feeding of human milk, especially for the first few weeks of life is important for small, sick and/or preterm infants, with appropriate information, some mothers may choose to provide colostrum or mother's own milk for some period of time.
- The mother who will be using any breast-milk substitutes for her infant should receive written instructions and be individually taught how to safely prepare, store and use these substances prior to infant discharge from neonatal ward.



## BFHI Global Standards on Supplementation

- At least 80% of infants (preterm and term) received only breast milk (either from their own mother or from a human milk bank) throughout their stay at the facility.
- At least 80% of mothers who have decided not to breastfeed report that the staff discussed with them the various feeding options and helped them to decide what was suitable in their situations.
- At least 80% of mothers who have decided not to breastfeed report that the staff discussed with them the safe preparation, feeding and storage of breast milk substitutes.
- At least 80% of term breastfed babies who received supplemental feeds have a documented medical indication for supplementation in their medical record.
- At least 80% of preterm babies and other vulnerable newborns that cannot be fed their mother's own milk are fed with donor human milk.
- At least 80% of mothers with babies in special care report that they have been offered help to start lactogenesis II (beginning of plentiful milk secretion) and to keep up milk supply, within 1-2 hours after their babies' births.

### Step 7: Rooming-in

*Step 7: Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day.*

#### Rationale:

Rooming-in allows mothers to recognize feeding cues (259) and comfort their infants day and night. Rooming-in promotes breastfeeding in preterm infants (221, 260-262) as well as attachment and parent empowerment (259). In high-income countries, rebuilding neonatal wards with single family rooms has been shown to improve breastfeeding rates at discharge and at three months post discharge and reduce stress (221, 260, 261, 263). Rooming-in can help the mother toward progressively increasing her care of her infant in all areas.

However, not all facilities have adequate space or resources to place a mother's bed next to each infant's care area or provide an adjacent separate mothers' room with appropriate facilities for prolonged maternal stays. Mothers and other family members can, however, be invited to visit more frequently, for longer periods of time and be welcomed as partners in the infant's care.

#### Clinical Guidance:

- Rooming-in may be particularly challenging for small, sick and/or very preterm infants, particularly if their mothers have been discharged or the infants require specialized and intensive medical treatment. However, it is important to find ways to enable mothers to stay as close to their sick newborns as possible.
- If the neonatal ward is an open bay, dividers can be made using curtains in the neonatal ward if space permits. If there is no room for a bed for the mother to remain beside her infant, a room in another area of the hospital (mother-in residence concept) or a room in another, close-by facility within a short walk should be considered.
- While some medical procedures require separation of the mother and baby, many infants, including those under phototherapy, asymptomatic infants under observation, and infants under treatment for neonatal abstinence syndrome can remain in the mother's room (264, 265). Care of both the mother and baby can be coordinated to be provided at the infant's bedside.
- Visitation policies should include encouraging parents or other support persons to be present and care for their infant as much as they feel comfortable. Parents should be present for rounds on their infant and contribute to the discussion and decisions. Parents may also be present during change of shift but should be informed that staff may not be easily available to them at that time.
- When separation of mothers and baby is unavoidable, care includes coordination of feedings with mother and transport of the mother to the infant to prevent an infant being tube or bottle fed just before mother arrives to breastfeed.

#### Kangaroo Mother Care

- Kangaroo mother care is the preferred method of care of preterm and low birthweight infants in which the infants are cared for, usually by the mother, with skin-to-skin contact. Kangaroo mother care is often an effective alternative to separate neonatal care units and provides for the infant's needs for warmth, breastfeeding, protection from infection, stimulation, safety and love.
- Kangaroo mother care emphasizes STS, exclusive breastfeeding and early discharge with follow-up. Kangaroo mother care involves uninterrupted mother-infant contact and breastfeeding with the infant prone

and upright, usually between the mother's breasts, with no clothing separating them. The infant is positioned with flexed arms and legs and head turned sideways with the mother or other caretaker in a semi-reclined and supported position. Kangaroo mother care is normally practiced continuously 24 hours a day for stable, low birth weight infants both in the neonatal ward and after early discharge. However, in some settings, the method has been implemented as intermittent skin-to-skin sessions for stabilized low birth weight, very low birth weight or extremely low birth weight infants (209, 266, 267).

## BFHI Global standards on rooming-in

- At least 80% of mothers of term infants report that their babies stayed with them since birth, without separation lasting more than 1 hour.
- Observations in the postpartum wards and well-baby observation areas confirm that at least 80% of mothers and babies are together or, have medically justifiable reasons for being separated.
- At least 80% of mothers of preterm infants confirm that they were encouraged to stay close to their infants, both day and night.

## Step 8: Responsive feeding

### *Step 8: Support mothers to recognize and respond to their infants' cues for feeding.*

#### **Rationale:**

Because of neurologic immaturity or degree of illness, an infant-led approach to feeding may not be possible initially for all small, sick and/or preterm infants in the neonatal ward. However, as the infant matures and/or heals, semi-demand breastfeeding, where breastfeeding is initiated in response to infant cues, but ended when the infant stops sucking, can be used. Test-weights can be utilized to assess milk transfer and supplementation can be given for any remaining requirement by another method. A cue-based oral feeding strategy may result in earlier full oral feeding (246, 268, 269). Non-nutritive breastfeeding during tube feeding can also be used to start feedings at the breast before an infant has a fully competent suck/swallow/breathe pattern.

#### **Clinical guidance:**

- The global standards above are not applied to preterm infants as they may not exhibit any feeding cues in the first few weeks of life, depending on gestational age. However, as the newborn matures and begins to exhibit feeding cues, mothers can be taught to recognize these cues. Crying is a very late sign of hunger.
- The mother and designated support persons should be encouraged to be present for as many feeds each day as possible and taught to observe and respond to the infant's feeding cues, behaviours and subsequent responses to interventions, regardless of feeding method.
- Before feeding cues are exhibited, the timing and volume of feedings will need to be carefully managed. Depending on the size, gestational age and condition of the infant, feedings may be timed every one, two, three, or four hours, or continuously via gavage tube with advances per neonatal ward protocol or physician orders.
- Feeding of human milk should be started as soon as the infant is deemed stable (appropriate vital signs including blood pressure, infrequent changes in respiratory support, and no contraindications to feeding such as severe perinatal asphyxia or gut malformations). In most cases, trophic feeds can begin within the first few hrs of life.
- Medications and other treatments should be scheduled to cause the least interference with infant feeding.
- Where mothers have an excellent milk supply and ready let-down, infants may be overwhelmed with the flow of milk during early feeds at breast. To overcome this, infants can be started with non-nutritive breastfeeding (mother expresses as usual before putting the infant to breast), then partial expression before breastfeeding, gradually decreasing the expression time.
- Although some readiness for oral feeding scales exist, there is currently no evidence to inform clinical practice in preterm infants (270). Until research demonstrates a valid objective system, starting oral feeds should depend upon infant stability when handled, normal handling of oral secretions, and some evidence of suck on a clean finger or emptied breast, but not on weight or gestational age.



## BFHI Global standards on responsive feeding

- At least 80% of breastfeeding mothers of term infants can describe at least two feeding cues.
- At least 80% of breastfeeding mothers of term infants report that they have been advised to feed their babies as often and for as long as the infant wants.

### Step 9: Feeding bottles, teats and pacifiers

#### *Step 9: Counsel mothers on the use and risks of feeding bottles, teats and pacifiers.*

##### **Rationale:**

Research has confirmed that preterm infants are able to latch to the breast, suck and swallow, and attain full breastfeeding at earlier gestational ages than previously believed (211, 212, 271). As many small, sick and/or preterm infants are initially unable to fully feed at the breast, alternative methods of providing milk to the baby may be needed. Use of bottles has been shown in some small studies to negatively impact breastfeeding success for preterm (272-275) infants. Bottle-feeding is associated with lower oxygen saturation, lower temperatures and increased desaturation episodes than breastfeeding or cup feeding in preterm infants (276-280). Bottles and teats are not recommended as they are difficult to clean properly and increase infection risk (2, 7).

The 2017 WHO literature review and revised Ten Steps (7) found pacifier use did not appear to impact the prevalence or duration of exclusive or partial breastfeeding in term infants. Non-nutritive sucking is recommended in the neonatal ward and can be done with a clean finger or pacifier to allow non-nutritive sucking when the mother is not available for skin-to-skin care or breastfeeding. Non-nutritive sucking has pain-relieving and stress-relieving effects in both premature and full-term neonates (281). When pacifiers are used, they need to be kept hygienic to avoid infection in the baby.

##### **Clinical guidance:**

###### *General considerations*

- There is no need to evaluate the infant feeding with a bottle or with any other alternate feeding method before initiating breastfeeding. Breastfeeding should be initiated before any alternate oral feeding method.
- Close attention to hand hygiene and proper cleaning of all feeding implements and pump parts is essential.
- Parents should be encouraged to comfort their infants during procedures. Non-nutritive suckling at the breast or skin-to-skin care is preferred for pain control and calming.
- Non-nutritive breastfeeding used before alternate oral feeding methods can be used to introduce the infant to the breast even before oral competency is achieved.

###### *Vehicles for feeding of mother's own milk or supplements*

- There is no consensus as to the best method or device to transition a preterm infant from tube feedings to the breast. In some cases, infants may go directly from tube feedings to the breast, sometimes with a transition phase with mother carefully expressing the milk directly into the baby's mouth. In other cases, an intermediate oral feeding method will be appropriate.
- Table 2 lists multiple supplemental feeding methods and notes their benefits, concerns, and the population groups where they are most appropriately used.



©WHO/Yoshi Shimizu

**Table 2: Supplemental feeding methods**

Method	Benefits	Concerns	Optimal use
Cup	Easy to teach, use and clean, globally available, inexpensive unless choosing commercial brand, slightly better breastfeeding outcomes compared to bottles (282)	Spillage, slower feeds, lower intakes, different oro-motor movements from breastfeeding (282)	Preterm infants, late preterm and term infant supplementation, low- and middle-income countries, short or long-term use
Paladai (a small, beaked cup)	Easy to teach, use and clean, readily available in certain countries, low to moderate expense	Spillage, slower feeds, different oro-motor movements, risk of aspiration if milk is poured into the infant's mouth	Preterm infants, late preterm and term infant supplementation, low- and middle-income countries, short or long-term use
Feeding tube (nasogastric or orogastric)	Efficient, intake can be measured	Expensive, requires frequent replacement, no suckling or mouth movement, correct placement requires more training, infants may fight and/or remove tube as they mature	Very preterm infants with no suck-swallow-breathe coordination, long-term use
Finger feeding	Can be used to reward appropriate suck-swallow, may improve breastfeeding rates at discharge	Requires complex learning, slow, different oro-motor movements, the feeding tube and syringe should be replaced for each feed, increased medical waste	Neurologically compromised and preterm infants, short-term use
Spoon	Inexpensive, readily available, can discard or clean easily, can be used to capture colostrum during hand expression	Spillage, slow, different oro-motor movements from breastfeeding	Term or late-preterm infants with good suck-swallow coordination, short-term use
Dropper or syringe	Can be used alone or to supplement at breast at the corner of the mouth, can be used to collect colostrum	More expensive than cup or spoon, difficult to clean, increased medical waste, different oro-motor movements from breastfeeding	Term or late-preterm infants with good suck-swallow coordination, short-term use
Supplemental nursing system	Encourages latch and normal suckling, allows baby-led feeding as well as measurement of intake	Expensive, difficult to clean, awkward to use, moderately complex learning for parent	Term or late preterm infants with good suck-swallow coordination, long-term use for adoptive nursing or supplementation
Bottle and teat	Efficient, slow flow teats mirror breastfeeding more closely than rapid flow teats	Expensive, difficult to clean, allows overfeeding, risk of aspiration with immature suck/swallow/breathe coordination, different oro-motor movements	Any infant with some suck-swallow-breathe coordination, long-term use

- When feeding with a cup, paladai, or spoon, the infant should be wrapped securely (so the infant's hands do not interfere) with a drip cloth under their chin and held in a semi-upright position. The cup should be tipped so the milk is just touching the baby's lips with the cup resting gently on the baby's lower lip. The infant can smell the milk and will sip or lap the milk. The cup should be kept in place while the infant swallows or rests, allowing him to pace his own intake. Milk should not be poured into the infant's mouth, as this risks possible aspiration. A mother should receive verbal and written instructions, observe neonatal ward staff

cup feeding her infant, and practice cup feeding under direct staff supervision at least 2-3 times before cup-feeding her infant on her own.

- If special bottle/nipple systems are required for discharge (for example, cleft lip and palate infants who have been unable to achieve full breastfeeding) mothers should be instructed on proper use, cleaning and transition to the breast, as well as maintaining a milk supply.

## BFHI Global standard on feeding bottles, teats and pacifiers

- At least 80% of breastfeeding mothers of preterm and term infants report that they have been taught about the risks of using feeding bottles, teats and pacifiers.

### Step 10: Care at discharge

*Step 10: Coordinate discharge so that parents and their infants have timely access to ongoing support and care.*

#### Rationale:

Receiving timely support after discharge is a key factor in transitioning from partial breastfeeding with additional alternate methods to full, exclusive breastfeeding and to maintaining exclusive breastfeeding if achieved in the hospital setting. Neonatal wards must be aware of, and refer mothers to, a variety of resources that exist in the community. Early and frequent follow-up care, whether in the health facility or in the community by a community health worker, is especially important for small and/or preterm infants, and any infant still recovering from illness who required a neonatal ward stay. The most vulnerable period for breastfeeding progression and maintenance appears to be the first month after discharge (283). The successful transition to full direct breastfeeding depends upon the extent to which the mother has established an adequate milk supply and how much breastfeeding she has done in the neonatal ward before discharge (284). Successful transition to exclusive breastfeeding will depend upon the degree of feeding maturity, medical complications and nutritional requirements for appropriate growth.

Continuity of care should be a priority with both written and verbal communication from the neonatologist/neonatal ward professional to the outpatient primary care provider. Consistent follow-up care is especially important for small, sick and/or preterm infants for whom a lack of a clear follow-up plan could lead to significant health hazards.

#### Clinical guidance:

- Small, sick and/or preterm infants have an especially high need for follow-up care, particularly for feeding support. As it may take weeks or months for some infants to transition to full exclusive breastfeeding, mothers and infants should be referred to clinics or individuals with specialized expertise in breastfeeding support. Specialized follow-up clinics (285) may have expertise in lactation for infants discharged from neonatal wards.
- Alternately, some facilities, especially in low- and middle-income countries, may require full direct breastfeeding as a criterion for discharge, or train community health workers to support transitioning mother-infant dyads.
- Kangaroo mother care can be continued in the outpatient family setting or even started in the community setting (185, 286).
- The healthcare system should engage community partners to support the Framework for Nurturing Care: good health, adequate nutrition, responsive caregiving, security and safety, and opportunities for early learning (204).
- Mothers should be reassessed regarding their breastfeeding goals and intentions prior to their infants' discharge. If mothers have decided to discontinue expressing milk, they should be advised of the importance to the infant of continued human milk feeding and how to gradually reduce expression to prevent engorgement, pain and mastitis.
- Mothers who have chosen to provide milk and/or breastfeed in the neonatal ward should be counselled regarding the importance of continuing exclusive human milk feedings (with or without fortifier as directed) for about 6 months corrected age (term plus postnatal age).
- A detailed discharge feeding plan can be a part of a comprehensive discharge summary or a separate document. The discharge feeding plan should include:
  - when, what and how to give supplementary feeds if prescribed
  - how to fortify feeds if prescribed
  - how to use special techniques or devices if required (for example, bottle, nipple, supplemental nursing system) and how to adjust milk expression as breastfeeding improves
  - how to safely transport and store expressed milk at home or in the community

- Mother-to-mother support can be provided by appropriately trained peer counsellors or support groups. Peer counsellors have been shown to improve the duration of breastfeeding for mothers of neonatal ward infants (287-289). Mother-to-mother support can also be supervised by lactation professionals and available to mothers of current and prior inpatient neonatal ward infants (42, 245, 290).

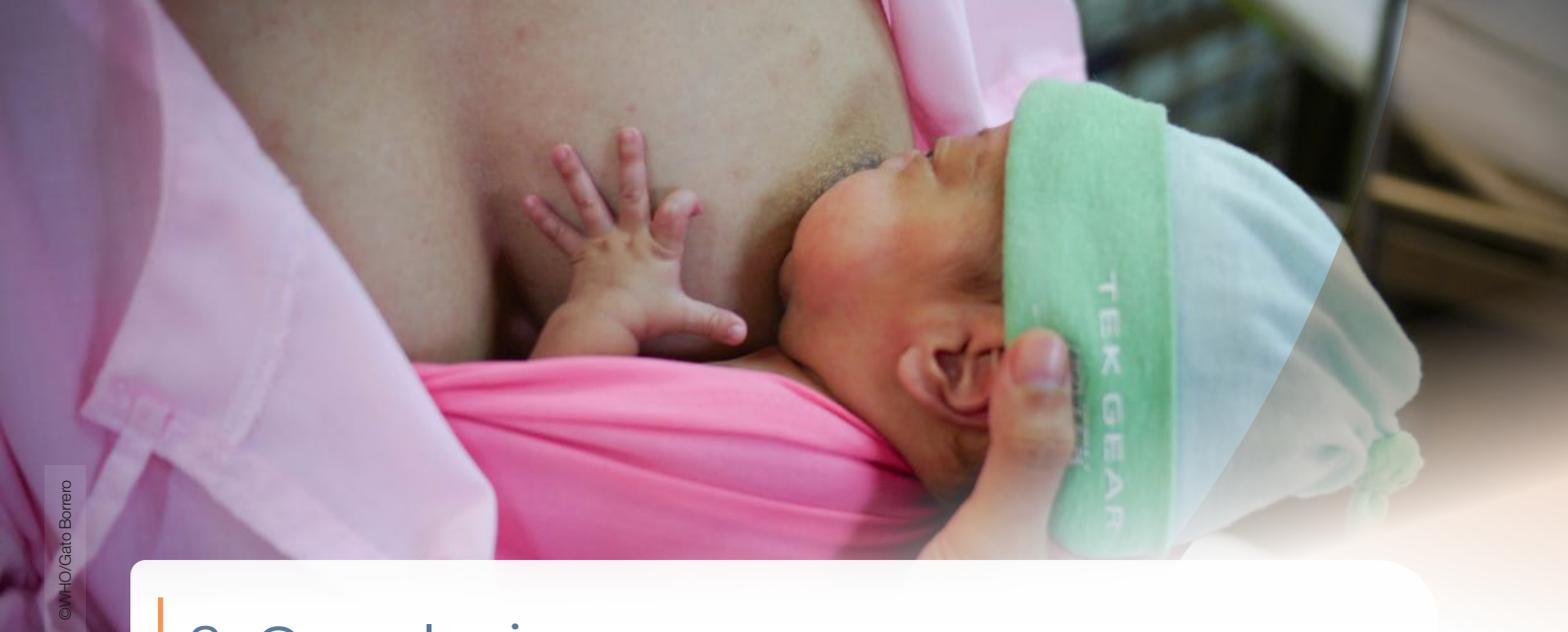
---

## BFHI Global standards on care at discharge

- At least 80% of mothers of preterm and term infants report that a staff member has informed them where they can access breastfeeding support in their community.
  - The facility can demonstrate that it coordinates with community services that provide breastfeeding/infant feeding support, including clinical management and mother-to-mother support.
- 







©WHO/Gato Borrero

### 3. Conclusions

Breastfeeding and human milk are the cornerstones of child survival, nutrition and maternal health. Through the BFHI, the Innocenti Declaration, the Code, the Global Strategy for Infant and Child Feeding and multiple other evidence-based guidance documents, the WHO and UNICEF have supported this basic tenet for over 30 years.

Several countries have expanded the BFHI to other settings that care for breastfeeding mothers and infants, such as community health centres and neonatal wards (29, 32, 34, 291). Coordination among breastfeeding-supportive interventions, such as health-professional education, workplace support, community clinics and peer support networks can make all efforts more effective (1, 145, 292). Evidence-based changes to breastfeeding support are possible when the following are in place: leadership of supportive and committed public officials and private champions, a culture of support among many diverse institutions, and measurement and pathways allowing teams to create the change.

While the primary focus of BFHI has traditionally been on the term healthy mother-infant dyad, the preterm and ill infant cannot be forgotten. The information in this document is designed to ensure that every small, sick and/or preterm infant and every high-risk mother, in every neonatal ward, in every country receive the care they need to survive and thrive.

Small, sick, and preterm newborns are at increased risk of early growth retardation, infectious disease, developmental delay and death during infancy and childhood. Human milk and breastfeeding are extremely important for these fragile infants to reduce morbidity and mortality and support the best possible growth, development and overall outcome. Indeed, for many of fragile newborns, access to human milk is often life-saving. Routine implementation of the Ten Steps to Successful Breastfeeding to protect, promote, and support breastfeeding in this vulnerable group should become the standard of maternal and newborn care worldwide.

## References

1. Implementation Guidance: protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services - the revised Baby-Friendly Hospital Initiative. Geneva: World Health Organization; 2018, (<https://www.who.int/nutrition/publications/infantfeeding/bfhi-implementation-2018.pdf>), accessed 15 August 2019).
2. Guidelines on Optimal feeding of low birth-weight infants in low-and middle-income countries. Geneva: World Health Organization; 2011.
3. Benoit B, Semenic S. Barriers and facilitators to implementing the Baby-Friendly hospital initiative in neonatal intensive care units. *J Obstet Gynecol Neonatal Nurs*. 2014;43(5):614-24. doi: 10.1111/1552-6909.12479.
4. Taylor C, Gribble K, Sheehan A, Schmied V, Dykes F. Staff perceptions and experiences of implementing the Baby Friendly Initiative in neonatal intensive care units in Australia. *J Obstet Gynecol Neonatal Nurs*. 2011;40(1):25-34. doi: 10.1111/j.1552-6909.2010.01204.x.
5. World Health Organization, United Nations Children's Fund, Wellstart International. The Baby-friendly Hospital Initiative: monitoring and reassessment: tools to sustain progress. Geneva: World Health Organization; 1991, (WHO/NHD/99.2; <http://apps.who.int/iris/handle/10665/65380>, accessed 15 August 2019).
6. World Health Organization, United Nations Children's Fund. Protecting, promoting and supporting breast-feeding: the special role of maternity services. A joint WHO/UNICEF statement. Geneva: World Health Organization; 1989 (<http://apps.who.int/iris/bitstream/10665/39679/1/9241561300.pdf>, accessed 15 August 2019).
7. Guideline: protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services. Geneva: World Health Organization; 2017 (<https://apps.who.int/iris/bitstream/handle/10665/259386/9789241550086-eng.pdf;jsessionid=5B1D44BCCECFCE593CAB5144ED87D2D6?sequence=1>, accessed 15 August 2019).
8. Perez-Escamilla R, Martinez JL, Segura-Perez S. Impact of the Baby-friendly Hospital Initiative on breastfeeding and child health outcomes: a systematic review. *Matern Child Nutr*. 2016;12(3):402-17. doi: 10.1111/mcn.12294.
9. Munn AC, Newman SD, Mueller M, Phillips SM, Taylor SN. The Impact in the United States of the Baby-Friendly Hospital Initiative on Early Infant Health and Breastfeeding Outcomes. *Breastfeed Med*. 2016;11:222-30. doi: 10.1089/bfm.2015.0135.
10. International Code of Marketing of Breast-milk Substitutes. Geneva: World Health Organization; 1981 ([http://www.who.int/nutrition/publications/code\\_english.pdf](http://www.who.int/nutrition/publications/code_english.pdf), accessed 15 August 2019).
11. The International Code of Marketing of Breast-Milk Substitutes. 2017 update: frequently asked questions. Geneva: World Health Organization; 2017 (<https://www.who.int/nutrition/publications/infantfeeding/breastmilk-substitutes-FAQ2017/en/>), accessed 15 August 2019).
12. Maastrup R, Bojesen SN, Kronborg H, Hallstrom I. Breastfeeding support in neonatal intensive care: a national survey. *J Hum Lact*. 2012;28(3):370-9. doi: 10.1177/0890334412440846.
13. Powers N, Bloom B, Peabody J, Clark R. Site of Care Influences Breastmilk Feedings at NICU Discharge. *J Perinatol*. 2003;23:10-3. doi: 10.1038/sj.jp.7210860.
14. Maastrup R, Hansen BM, Kronborg H, Bojesen SN, Hallum K, Frandsen A, et al. Factors associated with exclusive breastfeeding of preterm infants. Results from a prospective national cohort study. *PLoS One*. 2014;9(2):e89077. doi: 10.1371/journal.pone.0089077.
15. Fugate K, Hernandez I, Ashmeade T, Miladinovic B, Spatz DL. Improving Human Milk and Breastfeeding Practices in the NICU. *J Obstet Gynecol Neonatal Nurs*. 2015;44(3):426-38; quiz E14-5. doi: 10.1111/1552-6909.12563.
16. Hilditch C, Howes A, Dempster N, Keir A. What evidence-based strategies have been shown to improve breastfeeding rates in preterm infants? *Journal of paediatrics and child health*. 2019;55(8):907-14. doi: 10.1111/jpc.14551.
17. Renfrew MJ. Breastfeeding in the 21st century. *The Lancet*. 2016;387(10033):2089. doi: 10.1016/S0140-6736(16)30537-2.
18. Survive and Thrive Transforming Care for Every Small and Sick Newborn Report. Geneva: World Health Organization; 2019 (<https://apps.who.int/iris/bitstream/handle/10665/326495/9789241515887-eng.pdf?ua=1>, accessed 11 December 2019).
19. Shin H, White-Traut R. The conceptual structure of transition to motherhood in the neonatal intensive care unit. *J Adv Nurs*. 2007;58(1):90-8. doi: 10.1111/j.1365-2648.2006.04194.x.
20. Lasiuk GC, Comeau T, Newburn-Cook C. Unexpected: an interpretive description of parental traumas' associated with preterm birth. *BMC pregnancy and childbirth*. 2013;13 Suppl 1:S13. doi: 10.1186/1471-2393-13-s1-s13.
21. Greene MM, Rossman B, Patra K, Kratovil AL, Janes JE, Meier PP. Depression, anxiety, and perinatal-specific posttraumatic distress in mothers of very low birth weight infants in the neonatal intensive care unit. *Journal of developmental and behavioral pediatrics : JDBP*. 2015;36(5):362-70. doi: 10.1097/dbp.0000000000000174.

22. Kavanaugh K, Meier P, Zimmermann B, Mead L. The rewards outweigh the efforts: breastfeeding outcomes for mothers of preterm infants. *J Hum Lact.* 1997;13(1):15-21. doi: 10.1177/089033449701300111.
23. Spanier-Mingolelli SR, Meier PP, Bradford LS. „Making the difference for my baby“: A powerful breastfeeding motivator for mothers of preterm and high risk infants *Pediatr Res.* 1998;43:269. doi: doi.org/10.1203/00006450-199804001-01595.
24. Rossman B, Kratovil AL, Greene MM, Engstrom JL, Meier PP. „I have faith in my milk“: the meaning of milk for mothers of very low birth weight infants hospitalized in the neonatal intensive care unit. *J Hum Lact.* 2013;29(3):359-65. doi: 10.1177/0890334413484552.
25. Alshaiikh B, Kostecky L, Blachly N, Yee W. Effect of a Quality Improvement Project to Use Exclusive Mother’s Own Milk on Rate of Necrotizing Enterocolitis in Preterm Infants. *Breastfeed Med.* 2015;10(7):355-61. doi: 10.1089/bfm.2015.0042.
26. Lee HC, Kurtin PS, Wight NE, Chance K, Cucinotta-Fobes T, Hanson-Timpson TA, et al. A quality improvement project to increase breast milk use in very low birth weight infants. *Pediatrics.* 2012;130(6):e1679-87. doi: 10.1542/peds.2012-0547.
27. Parker MG, Patel AL. Using quality improvement to increase human milk use for preterm infants. *Seminars in perinatology.* 2017;41(3):175-86. doi: 10.1053/j.semperi.2017.03.007.
28. Bixby C, Baker-Fox C, Deming C, Dhar V, Steele c. A Multidisciplinary Quality Improvement Approach Increases Breastmilk Availability at Discharge from the Neonatal Intensive Care unit for the Very-Low-Birth-Weight Infant. *Breastfeed Med.* 2016;11(2):75-9. doi: 10.1089/bfm.2015.0141.
29. Dall’Oglio I, Salvatori G, Bonci E, Nantini B, D’Agostino G, Dotta A. Breastfeeding promotion in neonatal intensive care unit: impact of a new program toward a BFHI for high-risk infants. *Acta Paediatr.* 2007;96(11):1626-31. doi: 10.1111/j.1651-2227.2007.00495.x.
30. Merewood A, Philipp BL, Chawla N, Cimo S. The baby-friendly hospital initiative increases breastfeeding rates in a US neonatal intensive care unit. *J Hum Lact.* 2003;19(2):166-71. doi: 10.1177/0890334403252475.
31. Parker M, Burnham L, Cook J, Sanchez E, Philipp BL, Merewood A. 10 years after baby-friendly designation: breastfeeding rates continue to increase in a US neonatal intensive care unit. *J Hum Lact.* 2013;29(3):354-8. doi: 10.1177/0890334413489374.
32. Paes Pedras CT, Mezzacappa MA, da Costa-Pinto EA. Breastfeeding of very low-weight infants before and after implementation of the baby-friendly hospital initiative. *J Tropical Pediatrics.* 2012;58(4):324-6. doi: 10.1093/tropej/fmr075.
33. Lang S. *Breastfeeding Special Care Babies*: Bailliere Tindall; 2002.
34. Nyqvist KH, Haggkvist AP, Hansen MN, Kylberg E, Frandsen AL, Maastrup R, et al. Expansion of the baby-friendly hospital initiative ten steps to successful breastfeeding into neonatal intensive care: expert group recommendations. *J Hum Lact.* 2013;29(3):300-9. doi: 10.1177/0890334413489775.
35. Maastrup R, Haiek LN. Compliance with the „Baby-friendly Hospital Initiative for Neonatal Wards“ in 36 countries. *Matern Child Nutr.* 2019;15(2):e12690. doi: 10.1111/mcn.12690.
36. Victora CG, Bahl R, Barros AJ, Franca GV, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet.* 2016;387(10017):475-90. doi: 10.1016/S0140-6736(15)01024-7.
37. American Academy of Pediatrics Section on Breastfeeding. Policy Statement: Breastfeeding and the Use of Human Milk. *Pediatrics.* 2012;129(3):e827-e41. doi: 10.1542/peds.2011-3552.
38. WHO, UNICEF. *Global Strategy for Infant and Young Child Feeding*. Geneva: World Health Organization; 2003 (<http://whqlibdoc.who.int/publications/2003/9241562218.pdf>, accessed 15 August 2019).
39. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, et al. Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment No. 153. (Prepared by Tufts-New England Medical Center Evidence-based Practice Center, under Contract No. 290-02-0022). AHRQ Publication No. 07-E007. Rockville, MD: Agency for Healthcare Research and Quality; April 2007.
40. Horta BL, Bahl R, Martines JC, Victora CG. Evidence on the long-term effects of breastfeeding. Geneva: World Health Organization, 2007.
41. Kramer M, Chalmers B, Hodnett E, Sevkovskaya Z, Dzikovich I, Shapiro S, et al. Promotion of breastfeeding intervention trial (PROBIT): a cluster-randomized trial in the republic of Belarus. *JAMA.* 2001;285(4):1-15. doi: 10.1001/jama.285.4.413.
42. Meier P, Engstrom J, Patel A, et al. Improving the use of human milk during and after the NICU stay. *Clin Perinatol.* 2010;37(1):217-45. doi: 10.1016/j.clp.2010.01.013.
43. Wight NE, Morton JA, Kim JH. *Best Medicine: Human Milk in the NICU*. Amarillo: Hale Publishing, L.P.; 2008. 303 p.
44. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the Sustainable Development Goals. *Lancet.* 2016;388(10063):3027-35. doi: 10.1016/S0140-6736(16)31593-8.

45. Blencowe H, Krusevec J, de Onis M, Black RE, An X, Stevens GA, et al. National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: a systematic analysis. *Lancet Glob Health*. 2019;7(7):e849-e60. doi: 10.1016/S2214-109X(18)30565-5.
46. Raiten DJ, Steiber AL, Hand RK. Executive summary: evaluation of the evidence to support practice guidelines for nutritional care of preterm infants-the Pre-B Project. *Am J Clin Nutr*. 2016;103(2):599S-605S. doi: 10.3945/ajcn.115.124222.
47. Lewis ED, Richard C, Larsen BM, Field CJ. The Importance of Human Milk for Immunity in Preterm Infants. *Clin Perinatol*. 2017;44(1):23-47. doi: 10.1016/j.clp.2016.11.008.
48. Lonnerdal B. Bioactive Proteins in Human Milk-Potential Benefits for Preterm Infants. *Clin Perinatol*. 2017;44(1):179-91. doi: 10.1016/j.clp.2016.11.013.
49. Wight N, Kim J, Rhine W, Morris M, Sey R, Nisbet C. Nutritional Support of the Very Low Birth Weight (VLBW) Infant: A Quality Improvement Toolkit 2018 (<https://www.cpqcc.org/resources/nutritional-support-vlbw-infant>, accessed 15 August 2019).
50. Johnson TJ, Patra K, Greene MM, Hamilton M, Dabrowski E, Meier PP, et al. NICU human milk dose and health care use after NICU discharge in very low birth weight infants. *J Perinatol*. 2019;39(1):120-8. doi: 10.1038/s41372-018-0246-0.
51. Cacho NT, Parker LA, Neu J. Necrotizing Enterocolitis and Human Milk Feeding: A Systematic Review. *Clin Perinatol*. 2017;44(1):49-67. doi: 10.1016/j.clp.2016.11.009.
52. Boo NY, Goh ES. Predictors of breastfeeding in very low birthweight infants at the time of discharge from hospital. *J Trop Pediatr*. 1999;45(4):195-201. doi: 10.1093/tropej/45.4.195.
53. Schanler RJ, Shulman RJ, Lau C. Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula. *Pediatrics*. 1999;103(6 Pt 1):1150-7. doi: 10.1542/peds.103.6.1150.
54. Lucas A, Cole TJ. Breast milk and neonatal necrotising enterocolitis. *Lancet*. 1990;336:1519-23. doi: 10.1016/0140-6736(90)93304-8.
55. Assad M, Elliott MJ, Abraham JH. Decreased cost and improved feeding tolerance in VLKBW infants fed an exclusive human milk diet. *J Perinatol*. 2016;36(3):216-20. doi: 10.1038/jp.2015.168.
56. Furman L, Taylor G, Minich N, Hack M. The effect of maternal milk on neonatal morbidity of very low-birth-weight infants. *Arch Pediatr Adolesc Med*. 2003;157(1):66-7. doi: 10.1001/archpedi.157.1.66
57. Patel AL, Johnson TJ, Engstrom JL, Fogg LF, Jegier BJ, Bigger HR, et al. Impact of early human milk on sepsis and health-care costs in very low birth weight infants. *J Perinatol*. 2013;33(7):514-9. doi: 10.1038/jp.2013.2.
58. Ronnestad A, Abrahamsen TG, Medbo S, Reigstad H, Lossius K, Kaaresen PI, et al. Late-onset septicemia in a Norwegian national cohort of extremely premature infants receiving very early full human milk feeding. *Pediatrics*. 2005;115(3):e269-76. doi: 10.1542/peds.2004-1833.
59. Schanler RJ, Lau C, Hurst NM, Smith EO. Randomized Trial of Donor Human Milk Versus Preterm Formula as Substitutes for Mothers' Own Milk in the Feeding of Extremely Premature Infants. *Pediatrics*. 2005;116(2):400-6. doi: 10.1542/peds.2004-1974.
60. Cortez J, Makker K, Kraemer DF, Neu J, Sharma R, Hudak ML. Maternal milk feedings reduce sepsis, necrotizing enterocolitis and improve outcomes of premature infants. *J Perinatol*. 2018;38(1):71-4. doi: 10.1038/jp.2017.149.
61. Bharwani SK, Green BF, Pezzullo JC, Bharwani SS, Bharwani SS, Dhanireddy R. Systematic review and meta-analysis of human milk intake and retinopathy of prematurity: a significant update. *J Perinatol*. 2016;36(11):913-20. doi: 10.1038/jp.2016.98.
62. Vohr BR, Poindexter BB, Dusick AM, McKinley LT, Higgins RD, Langer JC, et al. Persistent beneficial effects of breast milk ingested in the neonatal intensive care unit on outcomes of extremely low birth weight infants at 30 months of age. *Pediatrics*. 2007;120(4):e953-9. doi: 10.1542/peds.2006-3227.
63. Isaacs EB, Fischl BR, Quinn BT, Chong WK, Gadian DG, Lucas A. Impact of breast milk on intelligence quotient, brain size, and white matter development. *Pediatr Res*. 2010;67(4):357-62. doi: 10.1203/PDR.0b013e3181d026da.
64. Blesa M, Sullivan G, Anblagan D, Telford EJ, Quigley AJ, Sparrow SA, et al. Early breast milk exposure modifies brain connectivity in preterm infants. *Neuroimage*. 2019;184:431-9. doi: 10.1016/j.neuroimage.2018.09.045.
65. Schneider J, Fischer Fumeaux CJ, Duerden EG, Guo T, Foong J, Graz MB, et al. Nutrient Intake in the First Two Weeks of Life and Brain Growth in Preterm Neonates. *Pediatrics*. 2018;141(3). doi: 10.1542/peds.2017-2169.
66. Patra K, Hamilton M, Johnson TJ, Greene M, Dabrowski E, Meier PP, et al. NICU Human Milk Dose and 20-Month Neurodevelopmental Outcome in Very Low Birth Weight Infants. *Neonatology*. 2017;112(4):330-6. doi: 10.1159/000475834.
67. Singhal A, Cole TJ, Fewtrell M, Lucas A. Breastmilk feeding and lipoprotein profile in adolescents born preterm: follow-up of a prospective randomised study. *Lancet*. 2004;363(9421):1571-8. doi: 10.1016/S0140-6736(04)16198-9.
68. Singhal A, Cole TJ, Lucas A. Early nutrition in preterm infants and later blood pressure: two cohorts after randomised trials. *Lancet*. 2001;357(9254):413-9. doi: 10.1016/S0140-6736(00)04004-6.



69. Moles L, Manzano S, Fernandez L, Montilla A, Corzo N, Ares S, et al. Bacteriological, biochemical, and immunological properties of colostrum and mature milk from mothers of extremely preterm infants. *J Pediatr Gastroenterol Nutr.* 2015;60(1):120-6. doi: 10.1097/MPG.0000000000000560.
70. Gephart SM, Newnam KM. Closing the Gap Between Recommended and Actual Human Milk Use for Fragile Infants: What Will It Take to Overcome Disparities? *Clin Perinatol.* 2019;46(1):39-50. doi: 10.1016/j.clp.2018.09.003.
71. Mai V, Young CM, Ukhanova M, Wang X, Sun Y, Casella G, et al. Fecal microbiota in premature infants prior to necrotizing enterocolitis. *PLoS One.* 2011;6(6):e20647. doi: 10.1371/journal.pone.0020647.
72. Neu J, Walker WA. Necrotizing enterocolitis. *N Engl J Med.* 2011;364(3):255-64. doi: 10.1056/NEJMra1005408.
73. Jain L. We Need to Stamp Out Necrotizing Enterocolitis. *Clin Perinatol.* 2019;46(1):xv-xvi. doi: 10.1016/j.clp.2018.12.002.
74. Rogier EW, Frantz AL, Bruno ME, Wedlund L, Cohen DA, Stromberg AJ, et al. Secretory antibodies in breast milk promote long-term intestinal homeostasis by regulating the gut microbiota and host gene expression. *Proc Natl Acad Sci U S A.* 2014;111(8):3074-9. doi: 10.1073/pnas.1315792111.
75. Narayanan I, Prakash K, Bala S, Verma RK, Gujral VV. Partial supplementation with expressed breast-milk for prevention of infection in low-birth-weight infants. *Lancet.* 1980;2(8194):561-3. doi: 10.1016/s0140-6736(80)91994-7.
76. Sisk PM, Lovelady CA, Dillard RG, Gruber KJ, O'Shea TM. Early human milk feeding is associated with a lower risk of necrotizing enterocolitis in very low birth weight infants. *J Perinatol.* 2007;27(7):428-33. doi: 10.1038/sj.jp.7211758.
77. Corpeleijn WE, de Waard M, Christmann V, van Goudoever JB, Jansen-van der Weide MC, Kooi EM, et al. Effect of Donor Milk on Severe Infections and Mortality in Very Low-Birth-Weight Infants: The Early Nutrition Study Randomized Clinical Trial. *JAMA Pediatr.* 2016;170(7):654-61. doi: 10.1001/jamapediatrics.2016.0183.
78. Chowning R, Radmacher P, Lewis S, Serke L, Pettit N, Adamkin DH. A retrospective analysis of the effect of human milk on prevention of necrotizing enterocolitis and postnatal growth. *J Perinatol.* 2016;36(3):221-4. doi: 10.1038/jp.2015.179.
79. Corpeleijn WE, Kouwenhoven SM, Paap MC, van Vliet I, Scheerder I, Muizer Y, et al. Intake of own mother's milk during the first days of life is associated with decreased morbidity and mortality in very low birth weight infants during the first 60 days of life. *Neonatology.* 2012;102(4):276-81. doi: 10.1159/000341335.
80. Abrams S, Schanler RJ, Lee ML, Rechtman DJ, and the Prolacta Study Group. Greater Mortality nad Morbidity in Extremely Preterm Infants Fed a Diet Containing Cow Milk Protein Products. *Breastfeed Med.* 2014;9(6):281-5. doi: 10.1089/bfm.2014.0024.
81. Meizen-Derr J, Poindexter B, Wrage L, Morrow AL, Stoll B, Donovan EF. Role of human milk in extremely low birth weight infants' risk of necrotizing enterocolitis or death. *J Perinatol.* 2009;29(1):57-62. doi: 10.1038/jp.2008.117.
82. Kimak KS, de Castro Antunes MM, Braga TD, Brandt KG, de Carvalho Lima M. Influence of Enteral Nutrition on Occurrences of Necrotizing Enterocolitis in Very-Low-Birth-Weight Infants. *J Pediatr Gastroenterol Nutr.* 2015;61(4):445-50. doi: 10.1097/MPG.0000000000000835.
83. Montjoux-Regis N, Cristini C, Arnaud C, Glorieux I, Vanpee M, Casper C. Improved growth of preterm infants receiving mother's own raw milk compared with pasteurized donor milk. *Acta Paediatr.* 2011;100(12):1548-54. doi: 10.1111/j.1651-2227.2011.02389.x.
84. Meier P, Patel A, Esquerra-Zwiers A. Donor Human Milk Update: Evidence, Mechanisms, and Priorities for Research and Practice. *The Journal of pediatrics.* 2017;180:15-21. doi: 10.1016/j.jpeds.2016.09.027.
85. Morgan J, Bombell S, McGuire W. Early trophic feeding versus enteral fasting for very preterm or very low birth weight infants. *The Cochrane database of systematic reviews.* 2013(3):Cd000504. doi: 10.1002/14651858.CD000504.pub4.
86. Salas AA, Kabani N, Travers CP, Phillips V, Ambalavanan N, Carlo WA. Short versus Extended Duration of Trophic Feeding to Reduce Time to Achieve Full Enteral Feeding in Extremely Preterm Infants: An Observational Study. *Neonatology.* 2017;112(3):211-6. doi: 10.1159/000472247.
87. Patel AL, Meier PP, Engstrom JL. The Evidence for Use of Human Milk in Very Low-birthweight Preterm Infants. *NeoReviews.* 2007;8(11):e459-66. doi: 10.1542/neo.8-11-e459.
88. Buescher ES. Host defense mechanisms of human milk and their relations to enteric infections and necrotizing enterocolitis. *Clin Perinatol.* 1994;21(2):247-62. doi: 10.1016/S0095-5108(18)30344-0.
89. Groer MW, Walker WA. What is the role of preterm human milk supplement in the host defenses of the preterm infant? *Science vs. Fiction. Adv Pediatr.* 1996;43:335-58. doi.
90. Rollins NC, Bhandari N, Hajeerhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? *Lancet.* 2016;387(10017):491-504. doi: 10.1016/S0140-6736(15)01044-2.
91. Victora CG, Horta BL, Loret de Mola C, Quevedo L, Pinheiro RT, Gigante DP, et al. Association between breastfeeding and intelligence, educational attainment, and income at 30 years of age: a prospective birth cohort study from Brazil. *Lancet Glob Health.* 2015;3(4):e199-205. doi: 10.1016/S2214-109X(15)70002-1.

92. Colchero MA, Contreras-Loya D, Lopez-Gatell H, Gonzalez de Cosio T. The costs of inadequate breastfeeding of infants in Mexico. *Am J Clin Nutr.* 2015;101(3):579-86. doi: 10.3945/ajcn.114.092775.
93. Bartick MC, Schwarz EB, Green BD, Jegier BJ, Reinhold AG, Colaizy TT, et al. Suboptimal breastfeeding in the United States: Maternal and pediatric health outcomes and costs. *Matern Child Nutr.* 2017;13(1). doi: 10.1111/mcn.12366.
94. Dadhich JP, Smoth J, Iellamo A, Suleiman A. A report on carbon footprints due to milk formula: a study from selected countries of the Asia-Pacific Region. Delhi: BPNI/IBFAN Asia; 2015 (<https://www.babymilkaction.org/wp-content/uploads/2014/10/Carbon-Footprints-Due-to-Milk-Formula.pdf>, accessed 15 August 2019).
95. Ahrabi A, Schanler R. Human milk is the only milk for premies in the NICU! *Early Hum Dev.* 2013;89 (Suppl 2):S51-3. doi: 10.1016/j.earlhumdev.2013.08.006.
96. United States Office of the Surgeon General, United States Centers for Disease Control and Prevention, United States Office on Women's Health. The Surgeon General's Call to Action to Support Breastfeeding. U.S. Dept. of Health and Human Services Office of the Surgeon General, 2011.
97. Edmond K, Bahl R. Optimal feeding of low-birth-weight infants: Technical Review. World Health Organization, Geneva, Switzerland, 2006.
98. ESPGHAN Committee on Nutrition, Arslanoglu S, Corpeleijn W, Moro G, Braegger C, Campoy C, et al. Donor human milk for preterm infants: current evidence and research directions. *J Pediatr Gastroenterol Nutr.* 2013;57(4):535-42. doi: 10.1097/MPG.0b013e3182a3af0a.
99. PATH. Strengthening Human Milk Banking: A Resource Toolkit for Establishing and Integrating Human Milk Bank Programs-A Global Implementation Framework. Version 2.0. Seattle 2019 (<https://www.path.org/programs/maternal-newborn-child-health-and-nutrition/strengthening-human-milk-banking-resource-toolkit/>, accessed 8 October 2019).
100. DeMarchis A, Israel-Ballard K, Mansen KA, Engmann C. Establishing an integrated human milk banking approach to strengthen newborn care. *J Perinatol.* 2017;37(5):469-74. doi: 10.1038/jp.2016.198.
101. Israel-Ballard K. Strengthening Systems to Ensure All Infants Receive Human Milk: Integrating Human Milk Banking into Newborn Care and Nutrition Programming. *Breastfeed Med.* 2018;13(8):524-6. doi: 10.1089/bfm.2018.0133.
102. Israel-Ballard K, Cohen J, Mansen K, Parker M, Engmann C, Kelley M, et al. Call to action for equitable access to human milk for vulnerable infants. *Lancet Glob Health.* 2019;7(11):e1484-e6. doi: 10.1016/S2214-109X(19)30402-4.
103. Brandstetter S, Mansen K, DeMarchis A, Nguyen Quynh N, Engmann C, Israel-Ballard K. A Decision Tree for Donor Human Milk: An Example Tool to Protect, Promote, and Support Breastfeeding. *Front Pediatr.* 2018;6:324. doi: 10.3389/fped.2018.00324.
104. Bertino E, Giuliani F, Baricco M, DiNicola P, Peila C, Vassia C, et al. Benefits of donor milk in the feeding of preterm infants. *Early Hum Dev.* 2013;89:S3-S6. doi: 10.1016/j.earlhumdev.2013.07.008.
105. Parker MG, Burnham L, Mao W, Philipp BL, Merewood A. Implementation of a Donor Milk Program Is Associated with Greater Consumption of Mothers' Own Milk among VLBW Infants in a US, Level 3 NICU. *J Hum Lact.* 2016;32(2):221-8. doi: 10.1177/0890334415598305.
106. Vazquez-Roman S, Bustos-Lozano G, Lopez-Maestro M, Rodriguez-Lopez J, Orbea-Gallardo C, Samaniego-Fernandez M, et al. [Clinical impact of opening a human milk bank in a neonatal unit]. *An Pediatr (Barc).* 2014;81(3):155-60. Impacto en la practica clinica de la apertura de un banco de leche en una unidad neonatal. doi: 10.1016/j.anpedi.2013.11.011.
107. Bertino E. IX. Effect of A Human Milk Bank on Breast-feeding Rate in Very-Low-Birth-Weight Infants. *J Pediatr Gastroenterol Nutr.* 2015;61 Suppl 1:S12-3. doi: 10.1097/01.mpg.0000471457.16415.ec.
108. Arslanoglu S, Moro GE, Bellu R, Turolì D, De Nisi G, Tonetto P, et al. Presence of human milk bank is associated with elevated rate of exclusive breastfeeding in VLBW infants. *J Perinat Med.* 2013;41(2):129-31. doi: 10.1515/jpm-2012-0196.
109. Lund AM, Lofqvist C, Pivodic A, Lundgren P, Hard AL, Hellstrom A, et al. Unpasteurised maternal breast milk is positively associated with growth outcomes in extremely preterm infants. *Acta Paediatr.* 2019. doi: 10.1111/apa.15102.
110. Hoban R, Schoeny ME, Esquerra-Zwiers A, Kaenkumchorn TK, Casini G, Tobin G, et al. Impact of Donor Milk on Short- and Long-Term Growth of Very Low Birth Weight Infants. *Nutrients.* 2019;11(2). doi: 10.3390/nu11020241.
111. Lloyd ML, Malacova E, Hartmann B, Simmer K. A clinical audit of the growth of preterm infants fed predominantly pasteurised donor human milk v. those fed mother's own milk in the neonatal intensive care unit. *Br J Nutr.* 2019;1-8. doi: 10.1017/S0007114519000357.
112. Brownell EA, Matson AP, Smith KC, Moore JE, Esposito PA, Lussier MM, et al. Dose-response Relationship Between Donor Human Milk, Mother's Own Milk, Preterm Formula, and Neonatal Growth Outcomes. *J Pediatr Gastroenterol Nutr.* 2018;67(1):90-6. doi: 10.1097/MPG.0000000000001959.



113. Quigley M, Embleton ND, McGuire W. Formula versus donor breast milk for feeding preterm or low birth weight infants. *The Cochrane database of systematic reviews*. 2019;7:Cd002971. doi: 10.1002/14651858.CD002971.pub5.
114. Moro GE, Arslanoglu S, Bertino E, Corvaglia L, Montirosso R, Picaud JC, et al. XII. Human Milk in Feeding Premature Infants: Consensus Statement. *J Pediatr Gastroenterol Nutr*. 2015;61 Suppl 1:S16-9. doi: 10.1097/01.mpg.0000471460.08792.4d.
115. Colaizy TT, Bartick MC, Jegier BJ, Green BD, Reinhold AG, Schaefer AJ, et al. Impact of Optimized Breastfeeding on the Costs of Necrotizing Enterocolitis in Extremely Low Birthweight Infants. *The Journal of pediatrics*. 2016;175:100-5 e2. doi: 10.1016/j.jpeds.2016.03.040.
116. Villamor-Martinez E, Pierro M, Cavallaro G, Mosca F, Kramer BW, Villamor E. Donor Human Milk Protects against Bronchopulmonary Dysplasia: A Systematic Review and Meta-Analysis. *Nutrients*. 2018;10(2). doi: 10.3390/nu10020238.
117. Hair AB, Peluso AM, Keli M, Hawthorne KM, Perez J, Smith DP, et al. Beyond Necrotizing Enterocolitis Prevention: Improving Outcomes with an Exclusive Human Milk-Based Diet. *Breastfeed Med*. 2016;11(2):70-4. doi: 10.1089/bfm.2015.0134.
118. Trang S, Zupancic JAF, Unger S, Kiss A, Bando N, Wong S, et al. Cost-Effectiveness of Supplemental Donor Milk Versus Formula for Very Low Birth Weight Infants. *Pediatrics*. 2018;141(3). doi: 10.1542/peds.2017-0737.
119. Seigel JK, Tanaka DT, Goldberg RN, Smith PB, Cotten CM, Bidegain M. Economic impact of human milk on medical charges of extremely low birth weight infants. *Breastfeed Med*. 2014;9(4):233-4. doi: 10.1089/bfm.2013.0059.
120. Sullivan S, Schanler RJ, Kim J, et al. An exclusively human milk-based diet is associated with a lower rate of necrotizing enterocolitis than a diet of human milk and bovine milk-based products. *The Journal of pediatrics*. 2010;156(4):562-7. doi: 10.1016/j.jpeds.2009.10.040.
121. Herrmann K, Carroll K. An Exclusively Human Milk Diet Reduces Necrotizing Enterocolitis. *Breastfeed Med*. 2014;9(4):1-7. doi: 10.1089/bfm.2013.0121.
122. Cristofalo EA, Schanler RJ, Blanco CL, Sullivan S, Trawoeger R, Kiechl-Kohlendorfer U, et al. Randomized Trial of Exclusive Human Milk versus Preterm Formula Diets in Extremely Premature Infants. *The Journal of pediatrics*. 2013;163:1592-5. doi: 10.1016/j.jpeds.2013.07.011.
123. Ghandehari H, Lee ML, Rechtman DJ, for the 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. doi: 10.1186/1756-0500-5-188.
124. Ganapathy V, Hay J, Kim J. Costs of Necrotizing Enterocolitis and Cost-Effectiveness of Exclusively Human Milk-Based Products in Feeding Extremely Premature Infants. *Breastfeeding Medicine*. 2012;7(1):29-37. doi: 10.1089/bfm.2017.0057.
125. Carroll K, Herrmann K. The cost of using donor human milk in the NICU to achieve exclusively human milk feeding through 32 weeks postmenstrual age. *Breastfeeding Medicine*. 2013;8(3):286-90. doi: 10.1089/bfm.2012.0068.
126. Johnson TJ, Patel AL, Bigger HR, Engstrom JL, Meier PP. Cost savings of human milk as a strategy to reduce the incidence of necrotizing enterocolitis in very low birth weight infants. *Neonatology*. 2015;107(4):271-6. doi: 10.1159/000370058.
127. O'Connor DL, Kiss A, Tomlinson C, Bando N, Bayliss A, Campbell DM, et al. Nutrient enrichment of human milk with human and bovine milk-based fortifiers for infants born weighing <1250 g: a randomized clinical trial. *Am J Clin Nutr*. 2018;108(1):108-16. doi: 10.1093/ajcn/nqy067.
128. Davanzo R, Monasta L, Ronfani L, et al. Breastfeeding at NICU Discharge: A Multicenter Italian Study. *J Hum Lact*. 2013;29(3):374-80. doi: 10.1177/0890334412451055.
129. Campbell AG, Miranda PY. Breastfeeding Trends Among Very Low Birth Weight, Low Birth Weight, and Normal Birth Weight Infants. *The Journal of pediatrics*. 2018;200:71-8. doi: 10.1016/j.jpeds.2018.04.039.
130. Chiang KV, Sharma AJ, Nelson JM, Olson CK, Perrine CG. Receipt of Breast Milk by Gestational Age - United States, 2017. *MMWR Morb Mortal Wkly Rep*. 2019;68(22):489-93. doi: 10.15585/mmwr.mm6822a1.
131. Furman L, Minich NM, Hack M. Breastfeeding of very low birth weight infants. *J Hum Lact*. 1998;14(1):29-34. doi: 10.1177/089033449801400112.
132. Spittle A, Treyvaud K. The role of early developmental intervention to influence neurobehavioral outcomes of children born preterm. *Seminars in perinatology*. 2016;40(8):542-8. doi: 10.1053/j.semperi.2016.09.006.
133. Hodek JM, von der Schulenburg JM, Mittendorf T. Measuring economic consequences of preterm birth - Methodological recommendations for the evaluation of personal burden on children and their caregivers. *Health Econ Rev*. 2011;1(1):6. doi: 10.1186/2191-1991-1-6.
134. McInnes RJ, Chambers J. Infants admitted to neonatal units--interventions to improve breastfeeding outcomes: a systematic review 1990-2007. *Matern Child Nutr*. 2008;4(4):235-63. doi: 10.1111/j.1740-8709.2008.00150.x.
135. Boykova M, Kenner C. Transition from hospital to home for parents of preterm infants. *J Perinat Neonatal Nurs*. 2012;26(1):81-7; quiz 8-9. doi: 10.1097/JPN.0b013e318243e948.

136. Callen J, Pinelli J, Atkinson S, Saigal S. Qualitative analysis of barriers to breastfeeding in very-low-birthweight infants in the hospital and postdischarge. *Adv Neonatal Care*. 2005;5(2):93-103. doi: 10.1016/j.adnc.2004.12.005.
137. Meier PP. Breastfeeding in the special care nursery. Prematures and infants with medical problems. *Pediatr Clin North Am*. 2001;48(2):425-42. doi: 10.1016/s0031-3955(08)70035-x.
138. Hale TW. Medications in breastfeeding mothers of preterm infants. *Pediatr Ann*. 2003;32(5):337-47. doi: 10.3928/0090-4481-20030501-10.
139. Cregan MD, De Mello TR, Kershaw D, McDougall K, Hartmann PE. Initiation of lactation in women after preterm delivery. *Acta Obstet Gynecol Scand*. 2002;81(9):870-7. doi: 10.1034/j.1600-0412.2002.810913.x.
140. Henderson JJ, Hartmann PE, Newnham JP, Simmer K. Effect of preterm birth and antenatal corticosteroid treatment on lactogenesis II in women. *Pediatrics*. 2008;121(1):e92-100. doi: 10.1542/peds.2007-1107.
141. Patel AL, Schoeny ME, Hoban R, Johnson TJ, Bigger H, Engstrom JL, et al. Mediators of racial and ethnic disparity in mother's own milk feeding in very low birth weight infants. *Pediatr Res*. 2019;85(5):662-70. doi: 10.1038/s41390-019-0290-2.
142. Scott JA, Binns CW, Aroni RA. The influence of reported paternal attitudes on the decision to breast-feed. *Journal of paediatrics and child health*. 1997;33(4):305-7. doi: 10.1111/j.1440-1754.1997.tb01605.x.
143. Arora S, McJunkin C, Wehrer J, Kuhn P. Major factors influencing breastfeeding rates: Mother's perception of father's attitude and milk supply. *Pediatrics*. 2000;106(5):E67. doi: 10.1542/peds.106.5.e67.
144. Flacking R, Nyqvist KH, Ewald U, Wallin L. Long-term duration of breastfeeding in Swedish low birth weight infants. *J Hum Lact*. 2003;19(2):157-65. doi: 10.1177/0890334403252563.
145. Meier PP, Johnson TJ, Patel AL, Rossman B. Evidence-Based Methods That Promote Human Milk Feeding of Preterm Infants: An Expert Review. *Clinics in Perinatology*. 2017;44(1):1-22. doi: 10.1016/j.clp.2016.11.005.
146. Ellis DJ, Hewat RJ. Do nurses help or hinder mothers who breastfeed? *J Adv Nurs*. 1983;8(4):281-8. doi: 10.1111/j.1365-2648.1983.tb00327.x.
147. Humenick SS, Hill PD, Spiegelberg PL. Breastfeeding and health professional encouragement. *J Hum Lact*. 1998;14(4):305-10. doi: 10.1177/089033449801400414.
148. Freed GL, Clark SJ, Sorenson J, Lohr JA, Cefalo R, Curtis P. National assessment of physicians' breastfeeding knowledge, attitudes, training, and experience. *Jama*. 1995;273(6):472-6. doi: 10.1001/jama.1995.03520300046035.
149. Semenic S, Childerhose JE, Lauzière J, Groleau D. Barriers, facilitators, and recommendations related to implementing the Baby-Friendly Initiative (BFI): an integrative review. *J Hum Lact*. 2012;28(3):317-34. doi: 10.1177/0890334412445195.
150. Framework on integrated people-centred health services. In: Sixty-ninth World Health Assembly, Provisional agenda item 16.1. Geneva: World Health Organization; 2016 ([http://apps.who.int/gb/ebwha/pdf\\_files/wha69/a69\\_39-en.pdf?ua=1](http://apps.who.int/gb/ebwha/pdf_files/wha69/a69_39-en.pdf?ua=1), accessed 15 August 2019).
151. Donnelly A, Snowden H, Renfrew M, Woolridge M. Commercial hospital discharge packs for breastfeeding women. *Cochrane Database of Systematic Reviews*. 2003. doi: 10.1002/14651858.CD002075.
152. Dusdieker LB, Dungy CI, Losch ME. Prenatal Office Practices Regarding Infant Feeding Choices. *Clin Pediatr (Phila)*. 2006;45(9):841-5. doi: 10.1177/0009922806294220.
153. Rosenberg KD, Eastham CA, Kasehagen LJ, Sandoval AP. Marketing infant formula through hospitals: the impact of commercial hospital discharge packs on breastfeeding. *Am J Public Health*. 2008;98(2):290-5. doi: 10.2105/AJPH.2006.103218.
154. Wazana A. Physicians and the Pharmaceutical Industry: Is a gift ever just a gift? *JAMA*. 2000;283(3):373-80. doi: DOI: 10.1001/jama.283.3.373.
155. Maternal, infant and young child feeding. Guidance on ending the inappropriate promotion of foods for infants and young children. In Sixty-ninth World Health Assembly, Provisional agenda item 12.1. Geneva: World Health Organization; 2016 ([http://apps.who.int/gb/ebwha/pdf\\_files/WHA69/A69\\_R9-en.pdf?ua=1](http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_R9-en.pdf?ua=1), accessed 22 August 2019).
156. Merten S, Dratva J, Ackermann-Liebrich U. Do baby-friendly hospitals influence breastfeeding duration on a national level? *Pediatrics*. 2005;116(5):e702-8. doi: 10.1542/peds.2005-0537.
157. Rosenberg KD, Stull JD, Adler MR, Kasehagen LJ, Crivelli-Kovach A. Impact of hospital policies on breastfeeding outcomes. *Breastfeed Med*. 2008;3(2):110-6. doi: 10.1089/bfm.2007.0039.
158. Perrine CG, Galuska DA, Dohack JL, Shealy KR, Murphy PE, Mlis, et al. Vital Signs: Improvements in Maternity Care Policies and Practices That Support Breastfeeding - United States, 2007-2013. *MMWR Morb Mortal Wkly Rep*. 2015;64(39):1112-7. doi: 10.15585/mmwr.mm6439a5.
159. Johnson MJ, Leaf AA, Pearson F, Clark HW, Dimitrov BD, Pope C, et al. Successfully implementing and embedding guidelines to improve the nutrition and growth of preterm infants in neonatal intensive care: a prospective interventional study. *BMJ Open*. 2017;7(12):e017727. doi: 10.1136/bmjopen-2017-017727.
160. Ellsbury DL. Crossing the quality chasm in neonatal-perinatal medicine. *Clin Perinatol*. 2010;37(1):1-10. doi: 10.1016/j.clp.2010.01.001.

161. Agency for Healthcare Research and Quality, United States Department of Health and Human Services. Failure Mode and Effects Analysis (FMEA). 2020 (<https://digital.ahrq.gov/health-it-tools-and-resources/evaluation-resources/workflow-assessment-health-it-toolkit/all-workflow-tools/fmea-analysis>, accessed 01 May 2020).
162. Vermont-Oxford Network [website]. 2020 (<https://public.vtoxford.org/>, accessed 26 March 2020).
163. United States Agency for International Development, Maternal and Child Health Program. Comprehensive Breastfeeding Support and Feeding of Small and Sick Newborns in Low- and Middle-Income Countries: Programmatic Considerations. Technical Summary Brief. 2019, [https://www.mcsprogram.org/resource/comprehensive-breastfeeding-support-and-feeding-of-small-and-sick-newborns-in-low-and-middle-income-countries-programmatic-considerations/?sf\\_s=breastfeeding&sfm\\_resource\\_topic=nutrition](https://www.mcsprogram.org/resource/comprehensive-breastfeeding-support-and-feeding-of-small-and-sick-newborns-in-low-and-middle-income-countries-programmatic-considerations/?sf_s=breastfeeding&sfm_resource_topic=nutrition)
164. Weddig J, Baker SS, Auld G. Perspectives of hospital-based nurses on breastfeeding initiation best practices. *J Obstet Gynecol Neonatal Nurs*. 2011;40(2):166-78. doi: 10.1111/j.1552-6909.2011.01232.x.
165. Jones L, Taylor T, Watson B, Fenwick J, Dordic T. Negotiating Care in the Special Care Nursery: Parents' and Nurses' Perceptions of Nurse-Parent Communication. *J Pediatr Nurs*. 2015;30(6):e71-80. doi: 10.1016/j.pedn.2015.03.006.
166. Hauck YL, Graham-Smith C, McInerney J, Kay S. Western Australian women's perceptions of conflicting advice around breast feeding. *Midwifery*. 2011;27(5):e156-62. doi: 10.1016/j.midw.2010.02.003.
167. Bernaix LW, Schmidt CA, Arrizola M, Iovinelli D, Medina-Poelinez C. Success of a lactation education program on NICU nurses' knowledge and attitudes. *J Obstet Gynecol Neonatal Nurs*. 2008;37(4):436-45. doi: 10.1111/j.1552-6909.2008.00261.x.
168. Siddell E, Marinelli K, Froman R, Burke G. Evaluation of an Educational Intervention on Breastfeeding for NICU Nurses. *J Hum Lact*. 2003;19(3):293-302. doi: 10.1177/0890334403255223.
169. Bernaix LW. Nurses' attitudes, subjective norms, and behavioral intentions toward support of breastfeeding mothers. *J Hum Lact*. 2000;16(3):201-9. doi: 10.1177/089033440001600304.
170. Ekstrom A, Widstrom AM, Nissen E. Process-oriented training in breastfeeding alters attitudes to breastfeeding in health professionals. *Scand J Public Health*. 2005;33(6):424-31. doi: 10.1080/14034940510005923.
171. Renfrew MJ, Craig D, Dyson L, McCormick F, Rice S, King SE, et al. Breastfeeding promotion for infants in neonatal units: a systematic review and economic analysis. *Health Technol Assess*. 2009;13(40):1-146, iii-iv. doi: 10.3310/hta13400.
172. Guideline: Counselling of Women to Improve Breastfeeding Practices. Geneva: World Health Organization, 2018 (<https://www.who.int/publications-detail/9789241550468>, accessed 15 August 2019).
173. Lu M, Lange L, Slusser W, Hamilton J, Halfon N. Provider encouragement of breast-feeding: Evidence from a national survey. *Obstet Gynecol*. 2001;97(2):290-5. doi: 10.1016/s0029-7844(00)01116-9.
174. Miracle DJ, Meier PP, Bennett PA. Mothers' decisions to change from formula to mothers' milk for very-low-birth-weight infants. *J Obstet Gynecol Neonatal Nurs*. 2004;33(6):692-703. doi: 10.1177/0884217504270665.
175. Sikorski J, Renfrew M, Pindoria S, Wade A. Support for breastfeeding mothers: a systematic review *Paediatric and Perinatal Epidemiology*. 2003;17:407-17. doi: 10.1046/j.1365-3016.2003.00512.x.
176. Junior WS, Martinez FE. Effect of intervention on the rates of breastfeeding of very low birth weight newborns. *J Pediatr (Rio J)*. 2007;83(6):541-6. doi: 10.2223/JPED.1724.
177. Rodriguez NA, Miracle DJ, Meier PP. Sharing the science on human milk feedings with mothers of very-low-birth-weight infants. *J Obstet Gynecol Neonatal Nurs*. 2005;34(1):109-19. doi: 10.1177/0884217504272807.
178. Hurst N, Meier P. Chapter 13: Breastfeeding the Preterm Infant. In: Riordan J, editor. *Breastfeeding and Human Lactation*, 3rd Ed. Boston: Jones and Bartlett; 2005. p. 367-408.
179. Meier P. Supporting Lactation in Mothers with Very Low Birth Weight Infants. *Pediatric Annals*. 2003;32(5):317-25. doi: 10.3928/0090-4481-20030501-08.
180. Hannula L, Kaunonen M, Tarkka MT. A systematic review of professional support interventions for breastfeeding. *J Clin Nurs*. 2008;17(9):1132-43. doi: 10.1111/j.1365-2702.2007.02239.x.
181. Jones H, Santamaria N. An Observational Cohort Study Examining the Effect of the Duration of Skin-to-Skin Contact on the Physiological Parameters of the Neonate in a Neonatal Intensive Special Care Unit. *Adv Neonatal Care*. 2018;18(3):208-14. doi: 10.1097/ANC.0000000000000485.
182. Rodriguez NA, Meier PP, Groer MW, Zeller JM. Oropharyngeal administration of colostrum to extremely low birth weight infants: theoretical perspectives. *J Perinatol*. 2009;29(1):1-7. doi: 10.1038/jp.2008.130.
183. Smith ER, Hurt L, Chowdhury R, Sinha B, Fawzi W, Edmond KM, et al. Delayed breastfeeding initiation and infant survival: A systematic review and meta-analysis. *PLoS One*. 2017;12(7):e0180722. doi: 10.1371/journal.pone.0180722.
184. Group NS. Timing of initiation, patterns of breastfeeding, and infant survival: prospective analysis of pooled data from three randomised trials. *Lancet Glob Health*. 2016;4(4):e266-75. doi: 10.1016/S2214-109X(16)00040-1.
185. Conde-Agudelo A, Diaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *The Cochrane database of systematic reviews*. 2016(8):Cd002771. doi: 10.1002/14651858.CD002771.pub4.

186. Boundy EO, Dastjerdi R, Spiegelman D, Fawzi WW, Missmer SA, Lieberman E, et al. Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis. *Pediatrics*. 2016;137(1). doi: 10.1542/peds.2015-2238.
187. Smith ER, Locks LM, Manji KP, McDonald CM, Kupka R, Kisenge R, et al. Delayed Breastfeeding Initiation Is Associated with Infant Morbidity. *The Journal of pediatrics*. 2017;191:57-62 e2. doi: 10.1016/j.jpeds.2017.08.069.
188. Casper C, Sarapuk I, Pavlyshyn H. Regular and prolonged skin-to-skin contact improves short-term outcomes for very preterm infants: A dose-dependent intervention. *Arch Pediatr*. 2018;25(8):469-75. doi: 10.1016/j.arcped.2018.09.008.
189. Head LM. The effect of kangaroo care on neurodevelopmental outcomes in preterm infants. *J Perinat Neonatal Nurs*. 2014;28(4):290-9; quiz E3-4. doi: 10.1097/JPN.0000000000000062.
190. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, et al. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry*. 2015;56(11):1202-11. doi: 10.1111/jcpp.12405.
191. Johnston CC, Filion F, Campbell-Yeo M, Goulet C, Bell L, McNaughton K, et al. Enhanced kangaroo mother care for heel lance in preterm neonates: a crossover trial. *J Perinatol*. 2009;29(1):51-6. doi: 10.1038/jp.2008.113.
192. Johnston CC, Filion F, Campbell-Yeo M, Goulet C, Bell L, McNaughton K, et al. Kangaroo mother care diminishes pain from heel lance in very preterm neonates: a crossover trial. *BMC Pediatr*. 2008;8:13. doi: 10.1186/1471-2431-8-13.
193. Ludington-Hoe SM, Johnson MW, Morgan K, Lewis T, Gutman J, Wilson PD, et al. Neurophysiologic assessment of neonatal sleep organization: preliminary results of a randomized, controlled trial of skin contact with preterm infants. *Pediatrics*. 2006;117(5):e909-23. doi: 10.1542/peds.2004-1422.
194. Scher MS, Ludington-Hoe S, Kaffashi F, Johnson MW, Holditch-Davis D, Loparo KA. Neurophysiologic assessment of brain maturation after an 8-week trial of skin-to-skin contact on preterm infants. *Clin Neurophysiol*. 2009;120(10):1812-8. doi: 10.1016/j.clinph.2009.08.004.
195. Feldman R, Eidelman AI. Skin-to-skin contact (Kangaroo Care) accelerates autonomic and neurobehavioural maturation in preterm infants. *Dev Med Child Neurol*. 2003;45(4):274-81. doi: 10.1017/s0012162203000525.
196. Acuna-Muga J, Ureta-Velasco N, de la Cruz-Bertolo J, Ballesteros-Lopez R, Sanchez-Martinez R, Miranda-Casabona E, et al. Volume of milk obtained in relation to location and circumstances of expression in mothers of very low birth weight infants. *J Hum Lact*. 2014;30(1):41-6. doi: 10.1177/0890334413509140.
197. Jayaraman D, Mukhopadhyay K, Bhalla AK, Dhaliwal LK. Randomized Controlled Trial on Effect of Intermittent Early Versus Late Kangaroo Mother Care on Human Milk Feeding in Low-Birth-Weight Neonates. *J Hum Lact*. 2017;33(3):533-9. doi: 10.1177/0890334416685072.
198. Meijssen D, Wolf MJ, van Bakel H, Koldewijn K, Kok J, van Baar A. Maternal attachment representations after very preterm birth and the effect of early intervention. *Infant Behav Dev*. 2011;34(1):72-80. doi: 10.1016/j.infbeh.2010.09.009.
199. Vittner D, Butler S, Smith K, Makris N, Brownell E, Samra H, et al. Parent Engagement Correlates With Parent and Preterm Infant Oxytocin Release During Skin-to-Skin Contact. *Adv Neonatal Care*. 2019;19(1):73-9. doi: 10.1097/ANC.0000000000000558.
200. Cartwright J, Atz T, Newman S, Mueller M, Demirci JR. Integrative Review of Interventions to Promote Breastfeeding in the Late Preterm Infant. *J Obstet Gynecol Neonatal Nurs*. 2017;46(3):347-56. doi: 10.1016/j.jogn.2017.01.006.
201. Oras P, Thernstrom Blomqvist Y, Hedberg Nyqvist K, Gradin M, Rubertsson C, Hellstrom-Westas L, et al. Skin-to-skin contact is associated with earlier breastfeeding attainment in preterm infants. *Acta Paediatr*. 2016;105(7):783-9. doi: 10.1111/apa.13431.
202. Blomqvist YT, Rubertsson C, Kylberg E, Joreskog K, Nyqvist KH. Kangaroo Mother Care helps fathers of preterm infants gain confidence in the paternal role. *J Adv Nurs*. 2012;68(9):1988-96. doi: 10.1111/j.1365-2648.2011.05886.x.
203. Provenzi L, Santoro E. The lived experience of fathers of preterm infants in the Neonatal Intensive Care Unit: a systematic review of qualitative studies. *J Clin Nurs*. 2015;24(13-14):1784-94. doi: 10.1111/jocn.12828.
204. World Health Organization, UNICEF, World Bank Group. Nurturing care for early childhood development: a framework for helping children survive and thrive to transform health and human potential. Geneva: World Health Organization; 2018, (<https://www.who.int/publications-detail/nurturing-care-for-early-childhood-development>, access 15 August 2019).
205. DiCioccio HC, Ady C, Bena JF, Albert NM. Initiative to Improve Exclusive Breastfeeding by Delaying the Newborn Bath. *Journal of Obstetric, Gynecologic & Neonatal Nursing*. 2019;48(2):189-96. doi: 10.1016/j.jogn.2018.12.008.
206. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: World Health Organization, 2018, (<https://www.who.int/reproductivehealth/publications/intrapartum-care-guidelines/en/>, accessed 15 August 2019).
207. Katheria AC. Umbilical Cord Milking: A Review. *Front Pediatr*. 2018;6:335. doi: 10.3389/fped.2018.00335.



208. Nyqvist KH, Expert Group of the International Network on Kangaroo Mother C, Anderson GC, Bergman N, Cattaneo A, Charpak N, et al. State of the art and recommendations. Kangaroo mother care: application in a high-tech environment. *Acta Paediatr.* 2010;99(6):812-9. doi: 10.1111/j.1651-2227.2010.01794.x.
209. Nyqvist KH, Anderson GC, Bergman N, Cattaneo A, Charpak N, Davanzo R, et al. State of the art and recommendations. Kangaroo mother care: application in a high-tech environment. *Breastfeed Rev.* 2010;18(3):21-8. doi: 10.1111/j.1651-2227.2010.01794.x
210. Kangaroo mother care: a practical guide. Geneva World Health Organization; 2003 (<http://apps.who.int/iris/bitstream/10665/42587/1/9241590351.pdf?ua=1>, accessed 15 August 2019).
211. Nyqvist KH. Early attainment of breastfeeding competence in very preterm infants. *Acta Paediatr.* 2008;97(6):776-81. doi: 10.1111/j.1651-2227.2008.00810.x.
212. Nyqvist KH, Farnstrand C, Eeg-Olofsson KE, Ewald U. Early oral behaviour in preterm infants during breastfeeding: an electromyographic study. *Acta Paediatr.* 2001;90(6):658-63. doi: 10.1080/080352501750258739.
213. Nyqvist KH, Sjoden PO, Ewald U. The development of preterm infants' breastfeeding behavior. *Early Hum Dev.* 1999;55(3):247-64. doi: 10.1016/s0378-3782(99)00025-0.
214. Rodriguez NA, Meier PP, Groer MW, Zeller JM, Engstrom JL, Fogg L. A pilot study to determine the safety and feasibility of oropharyngeal administration of own mother's colostrum to extremely low-birth-weight infants. *Adv Neonatal Care.* 2010;10(4):206-12. doi: 10.1097/ANC.0b013e3181e94133.
215. Garofalo NA, Caplan MS. Oropharyngeal Mother's Milk: State of the Science and Influence on Necrotizing Enterocolitis. *Clin Perinatol.* 2019;46(1):77-88. doi: 10.1016/j.clp.2018.09.005.
216. Bonet M, Blondel B, Agostino R, Combier E, Maier RF, Cuttini M, et al. Variations in breastfeeding rates for very preterm infants between regions and neonatal units in Europe: results from the MOSAIC cohort. *Arch Dis Child Fetal Neonatal Ed.* 2011;96(6):F450-2. doi: 10.1136/adc.2009.179564.
217. Wooldridge J, Hall W. Posthospitalization Breastfeeding Patterns of Moderately Preterm Infants. *J Perinat Neonat Nurs* 2003. 2003;17(1):50-64. doi: 10.1097/00005237-200301000-00005.
218. Kavle JA, LaCroix E, Dau H, Engmann C. Addressing barriers to exclusive breast-feeding in low- and middle-income countries: a systematic review and programmatic implications. *Public health nutrition.* 2017;20(17):3120-34. doi: 10.1017/s1368980017002531.
219. Every Premie SCALE, United States Agency for International Development, Project Concern International, Global Alliance to Prevent Prematurity and Stillbirth, American College of Nurse-Midwives. Family Participation in the Care of the Inpatient Newborn; Do No Harm Technical Brief. 2018 ([https://www.everypreemie.org/?smd\\_process\\_download=1&download\\_id=1454](https://www.everypreemie.org/?smd_process_download=1&download_id=1454), accessed 15 August 2019).
220. Standards for Improving Quality of Maternal and Newborn Care in Health Facilities. Geneva: World Health Organization; 2016, ([https://www.who.int/maternal\\_child\\_adolescent/documents/improving-maternal-newborn-care-quality/en/](https://www.who.int/maternal_child_adolescent/documents/improving-maternal-newborn-care-quality/en/), accessed 18 June 2020).
221. Maastrup R, Hansen BM, Kronborg H, Bojesen SN, Hallum K, Frandsen A, et al. Breastfeeding progression in preterm infants is influenced by factors in infants, mothers and clinical practice: the results of a national cohort study with high breastfeeding initiation rates. *PLoS One.* 2014;9(9):e108208. doi: 10.1371/journal.pone.0108208.
222. Furman L, Minich N, Hack M. Correlates of Lactation in Mothers of Very Low Birth Weight Infants. *Pediatrics.* 2002;109(4):e57 doi: 10.1542/peds.109.4.e57.
223. Hill PD, Aldag JC. Milk volume on day 4 and income predictive of lactation adequacy at 6 weeks of mothers of nonnursing preterm infants. *J Perinat Neonatal Nurs.* 2005;19(3):273-82. doi: 10.1097/00005237-200507000-00014.
224. Murphy L, Warner DD, Parks J, Whitt J, Peter-Wohl S. A quality improvement project to improve the rate of early breast milk expression in mothers of preterm infants. *J Hum Lact.* 2014;30(4):398-401. doi: 10.1177/0890334414544124.
225. 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. *J Perinatol.* 2012;32(3):205-9. doi: 10.1038/jp.2011.78.
226. Wight NE. Breastfeeding the borderline (near-term) preterm infant. *Pediatr Ann.* 2003;32(5):329-36. doi: 10.3928/0090-4481-20030501-09.
227. Meier PP, Furman LM, Degenhardt M. Increased Lactation Risk for Late Preterm Infants and Mothers: Evidence and Management Strategies to Protect Breastfeeding. *J Midwifery and Women's Health.* 2007;52(6):579-87. doi: DOI: 10.1016/j.jmwh.2007.08.003.
228. Raju TN, Higgins RD, Stark AR, Leveno KJ. Optimizing care and outcome for late-preterm (near-term) infants: a summary of the workshop sponsored by the national institute of child health and human development. *Pediatrics.* 2006;118(3):1207-14. doi: 10.1542/peds.2006-0018.
229. Altuntas N, Turkyilmaz C, Yildiz H, Kulali F, Hirfanoglu I, Onal E, et al. Validity and reliability of the infant breastfeeding assessment tool, the mother baby assessment tool, and the LATCH scoring system. *Breastfeed Med.* 2014;9(4):191-5. doi: 10.1089/bfm.2014.0018.

230. Matthews MK. Developing an instrument to assess infant breastfeeding behaviour in the early neonatal period. *Midwifery*. 1988;4(4):154-65. doi: 10.1016/s0266-6138(88)80071-8.
231. Mulford C. The Mother-Baby Assessment (MBA): an «Apgar score» for breastfeeding. *J Hum Lact*. 1992;8(2):79-82. doi: 10.1177/089033449200800216.
232. Jensen D, Wallace S, Kelsay P. LATCH: A breastfeeding charting system and documentation tool. *J Obstetr Gynecol Neonatal Nurs*. 1994;23:27-32. doi: 10.1111/j.1552-6909.1994.tb01847.x.
233. World Health Organization, UNICEF. Breastfeeding counselling a training course. Participants Manual, p21, WHO/CDR/93.5 UNICEF/NUT/93.3. 1993.
234. Narayanan I. Sucking on the «emptied» breast--a better method of non-nutritive sucking than the use of a pacifier. *Indian Pediatr*. 1990;27(10):1122-4. doi.
235. Parker LA, Sullivan S, Krueger C, Mueller M. Association of timing of initiation of breastmilk expression on milk volume and timing of lactogenesis stage II among mothers of very low-birth-weight infants. *Breastfeed Med*. 2015;10(2):84-91. doi: 10.1089/bfm.2014.0089.
236. Mitoulas LR, Lai CT, Gurrin LC, Larsson M, Hartmann PE. Effect of vacuum profile on breast milk expression using an electric breast pump. *J Hum Lact*. 2002;18(4):353-60. doi: 10.1177/089033402237908.
237. Kent JC, Ramsay DT, Doherty D, Larsson M, Hartmann PE. Response of breasts to different stimulation patterns of an electric breast pump. *J Hum Lact*. 2003;19(2):179-86; quiz 87-8, 218. doi: 10.1177/0890334403252473.
238. Newton N, Newton M. Psychologic aspects of lactation. *N Engl J Med*. 1967;277(22):1179-88. doi: DOI: 10.1056/NEJM196711302772205
239. Morton J, Hall JY, Wong RJ, Thairu L, Benitz WE, Rhine WD. Combining hand techniques with electric pumping increases milk production in mothers of preterm infants. *J Perinatol*. 2009;29(11):757-64. doi: 10.1038/jp.2009.87.
240. Morton J, Wong R, Hall Y, OPang W, Lai C, Hartmann P, et al. Combining hand techniques with electric pumping increased the caloric content of milk in mothers of preterm infants. *J Perinatol*. 2012;32(10):791-6. doi: 10.1038/jp.2011.195.
241. Neville M. Lactogenesis in women. In: Jensen RG, editor. *Handbook of Milk Composition*. San Diego: Academic Press; 1995. p. 88.
242. America HMBAN. *Best Practice for Expressing, Storing and Handling Human Milk in Hospitals, Homes, and Child Care Settings*, 4th Ed. Fort Worth, Texas: HMBANA; 2019.
243. Centers for Disease Control and Prevention. *Breastfeeding Report Card*. Centers for Disease Control and Prevention. *Breastfeeding Report Card 2014* [May 1, 2016]; Available from: <http://www.cdc.gov/breastfeeding/pdf/2014breastfeedingreportcard.pdf>.
244. Eglash A, Simon L, Academy of Breastfeeding M. *ABM Clinical Protocol #8: Human Milk Storage Information for Home Use for Full-Term Infants*, Revised 2017. *Breastfeed Med*. 2017;12(7):390-5. doi: 10.1089/bfm.2017.29047.aje.
245. Meier PP, Patel A, Bigger H, Rossman B, Engstrom J. Supporting Breastfeeding in the Neonatal Intensive Care Unit - Rush Mother's Milk Club as a Case Study of Evidence-Based Care. *Pediatr Clin N Am*. 2013;60(1):209-26. doi: 10.1016/j.pcl.2012.10.007.
246. Meier PP, Engstrom JL, Fleming BA, Streeter PL, Lawrence PB. Estimating milk intake of hospitalized preterm infants who breastfeed. *J Hum Lact*. 1996;12(1):21-6. doi: 10.1177/089033449601200106.
247. Meier PP, Engstrom JL, Crichton CL, Clark DR, Williams MM, Mangurten HH. A new scale for in-home test-weighing for mothers of preterm and high risk infants. *J Hum Lact*. 1994;10(3):163-8. doi: 10.1177/089033449401000312.
248. Scanlon K, Alexander M, Serdula M, et al. . Assessment of Infant Feeding: The Validity of Measuring Milk Intake. *Nutrition Reviews*. 2002;60(8):235-51. doi: 10.1301/002966402320289368.
249. Goldstein GP, Sylvester KG. Biomarker Discovery and Utility in Necrotizing Enterocolitis. *Clin Perinatol*. 2019;46(1):1-17. doi: 10.1016/j.clp.2018.10.001.
250. Guaraldi F, Salvatori G. Effect of breast and formula feeding on gut microbiota shaping in newborns. *Front Cell Infect Microbiol*. 2012;2:94. doi: 10.3389/fcimb.2012.00094.
251. World Health Organization, United Nations Children's Fund. *Acceptable medical reasons for use of breastmilk substitutes*. Geneva, 2009 ([http://apps.who.int/iris/bitstream/10665/69938/1/who\\_fch\\_cah\\_09.01\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/69938/1/who_fch_cah_09.01_eng.pdf), accessed 15 August 2019).
252. Kellams A, Harrel C, Omage S, Gregory C, Rosen-Carole C. *ABM Clinical Protocol #3: Supplementary Feedings in the Healthy Term Breastfed Neonate*, Revised 2017. *Breastfeed Med*. 2017;12:188-98. doi: 10.1089/bfm.2017.29038.ajk.
253. Meier P, Lysakowski T, Engstrom JL ea. The accuracy of test weighing for preterm infants. *J Pediatr Gastroenterol Nutr*. 1990;10:62-5. doi: 10.1097/00005176-199001000-00012.
254. Seigel JK, Smith PB, Ashley PL, Cotten CM, Herbert CC, King BA, et al. Early administration of oropharyngeal colostrum to extremely low birth weight infants. *Breastfeed Med*. 2013;8(6):491-5. doi: 10.1089/bfm.2013.0025.
255. Thibeau S, Boudreaux C. Exploring the use of mothers' own milk as oral care for mechanically ventilated very low-birth-weight preterm infants. *Adv Neonatal Care*. 2013;13(3):190-7. doi: 10.1097/ANC.0b013e318285f8e2.



256. Lee J, Kim H-S, Jung Y, Choi K, Shin S, Kim E, et al. Oropharyngeal Colostrum Administration in Extremely Premature Infants: An RCT. *Pediatrics*. 2015;135(2):e357-e66. doi: doi.org/10.1542/peds.2014-2004.
257. Nasuf AWA, Ojha S, Dorling J. Oropharyngeal colostrum in preventing mortality and morbidity in preterm infants. *The Cochrane database of systematic reviews*. 2018;9:CD011921. doi: 10.1002/14651858.CD011921.pub2.
258. Brown JVE, Embleton ND, Harding JE, McGuire W. Multi-nutrient fortification of human milk for preterm infants. *Cochrane Database of Systematic Reviews*. 2016(5). doi: 10.1002/14651858.CD000343.pub3.
259. Flacking R, Dykes F. 'Being in a womb' or 'playing musical chairs': the impact of place and space on infant feeding in NICUs. *BMC pregnancy and childbirth*. 2013;13:179. doi: 10.1186/1471-2393-13-179.
260. Domanico R, Davis DK, Coleman F, Davis BO. Documenting the NICU design dilemma: comparative patient progress in open-ward and single family room units. *J Perinatol*. 2011;31(4):281-8. doi: 10.1038/jp.2010.120.
261. Wataker H, Meberg A, Nestaas E. Neonatal family care for 24 hours per day: effects on maternal confidence and breast-feeding. *J Perinat Neonatal Nurs*. 2012;26(4):336-42. doi: 10.1097/JPN.0b013e31826d928b.
262. Elander G, Lindberg T. Hospital routines in infants with hyperbilirubinemia influence the duration of breast feeding. *Acta Paediatr Scand*. 1986;75(5):708-12. doi: 10.1111/j.1651-2227.1986.tb10278.x.
263. Jones R, Jones L, Feary AM. The Effects of Single-Family Rooms on Parenting Behavior and Maternal Psychological Factors. *J Obstet Gynecol Neonatal Nurs*. 2016;45(3):359-70. doi: 10.1016/j.jogn.2015.12.015.
264. Murphy MR, Oellrich RG. A new method of phototherapy: nursing perspectives. *J Perinatol*. 1990;10(3):249-51. doi: 10.1016/j.jogn.2015.12.015.
265. McKnight S, Coe H, Davies G, Holmes B, Newman A, Newton L, et al. Rooming-in for Infants at Risk of Neonatal Abstinence Syndrome. *American journal of perinatology*. 2016;33(5):495-501. doi: 10.1055/s-0035-1566295.
266. Davanzo R, Brovedani P, Travan L, Kennedy J, Crocetta A, Sanesi C, et al. Intermittent kangaroo mother care: a NICU protocol. *J Hum Lact*. 2013;29(3):332-8. doi: 10.1177/0890334413489375.
267. Maastrup R, Greisen G. Extremely preterm infants tolerate skin-to-skin contact during the first weeks of life. *Acta Paediatr*. 2010;99(8):1145-9. doi: 10.1111/j.1651-2227.2010.01806.x.
268. McCormick FM, Tosh K, McGuire W. Ad libitum or demand/semi-demand feeding versus scheduled interval feeding for preterm infants. *The Cochrane database of systematic reviews*. 2010(2):CD005255. doi: 10.1002/14651858.CD005255.pub3.
269. Puckett B, Grover VK, Holt T, Sankaran K. Cue-based feeding for preterm infants: a prospective trial. *American journal of perinatology*. 2008;25(10):623-8. doi: 10.1055/s-0028-1090583.
270. Crowe L, Chang A, Wallace K. Instruments for assessing readiness to commence suck feeds in preterm infants: effects on time to establish full oral feeding and duration of hospitalisation. *Cochrane Database of Systematic Reviews*. 2016(8). doi: 10.1002/14651858.CD005586.pub3.
271. Nyqvist K. The development of preterm infants' milk intake during breastfeeding. *J Neonatal Nursing*. 2001;7(2):48-52. doi: 10.1016/s0378-3782(99)00025-0.
272. Flint A, New K, Davies MW. Cup feeding versus other forms of supplemental enteral feeding for newborn infants unable to fully breastfeed. *The Cochrane database of systematic reviews*. 2007(2):Cd005092. doi: 10.1002/14651858.CD005092.pub2.
273. Abouelfetoh AM, Dowling DA, Dabash SA, Elguindy SR, Seoud IA. Cup versus bottle feeding for hospitalized late preterm infants in Egypt: a quasi-experimental study. *Int Breastfeed J*. 2008;3:27. doi: 10.1186/1746-4358-3-27.
274. Collins CT, Gillis J, McPhee AJ, Sukanuma H, Makrides M. Avoidance of bottles during the establishment of breast feeds in preterm infants. *The Cochrane database of systematic reviews*. 2016;10:CD005252. doi: 10.1002/14651858.CD005252.pub4.
275. Collins CT, Ryan P, Crowther CA, McPhee AJ, Paterson S, Hiller JE. Effect of bottles, cups, and dummies on breast feeding in preterm infants: a randomised controlled trial. *Bmj*. 2004;329(7459):193-8. doi: 10.1136/bmj.38131.675914.55.
276. Rocha NM, Martinez FE, Jorge SM. Cup or bottle for preterm infants: effects on oxygen saturation, weight gain, and breastfeeding. *J Hum Lact*. 2002;18(2):132-8. doi: 10.1177/089033440201800204.
277. Chen CH, Wang TM, Chang HM, Chi CS. The effect of breast- and bottle-feeding on oxygen saturation and body temperature in preterm infants. *J Hum Lact*. 2000;16(1):21-7. doi: 10.1177/089033440001600105.
278. Marinelli KA, Burke GS, Dodd VL. A comparison of the safety of cupfeedings and bottlefeedings in premature infants whose mothers intend to breastfeed. *J Perinatol*. 2001;21(6):350-5. doi: 10.1038/sj.jp.7210539.
279. Penny F, Judge M, Brownell E, McGrath JM. Cup Feeding as a Supplemental, Alternative Feeding Method for Preterm Breastfed Infants: An Integrative Review. *Matern Child Health J*. 2018;22(11):1568-79. doi: 10.1007/s10995-018-2632-9.
280. Gupta A, Khanna K, Chattree S. Cup feeding: an alternative to bottle feeding in a neonatal intensive care unit. *J Trop Pediatr*. 1999;45(2):108-10. doi: 10.1093/tropej/45.2.108.
281. Pillai Riddell RR, Racine NM, Gennis HG, Turcotte K, Uman LS, Horton RE, et al. Non-pharmacological management of infant and young child procedural pain. *The Cochrane database of systematic reviews*. 2015;2015(12):Cd006275. doi: 10.1002/14651858.CD006275.pub3.
282. McKinney CM, Glass RP, Coffey P, Rue T, Vaughn MG, Cunningham M. Feeding Neonates by Cup: A Systematic Review of the Literature. *Matern Child Health J*. 2016;20(8):1620-33. doi: 10.1007/s10995-016-1961-9.

283. Zachariassen G, Faerk J, Grytter C, Esberg B, Juvonen P, Halken S. Factors associated with successful establishment of breastfeeding in very preterm infants. *Acta Paediatr.* 2010;99(7):1000-4. doi: 10.1111/j.1651-2227.2010.01721.x.
284. Pineda R. Direct breast-feeding in the neonatal intensive care unit: is it important? *J Perinatol.* 2011;31(8):540-5. doi: 10.1038/jp.2010.205.
285. Kim JH, Chan CS, Vaucher YE, Stellwagen LM. Challenges in the practice of human milk nutrition in the neonatal intensive care unit. *Early Hum Dev.* 2013;89 Suppl 2:S35-8. doi: 10.1016/j.earlhumdev.2013.08.002.
286. Mazumder S, Taneja S, Dube B, Bhatia K, Ghosh R, Shekhar M, et al. Effect of community-initiated kangaroo mother care on survival of infants with low birthweight: a randomised controlled trial. *The Lancet.* 2019;394(10210):1724-36. doi: 10.1016/S0140-6736(19)32223-8.
287. Merewood A, Chamberlain LB, Cook JT, Philipp BL, Malone K, Bauchner H. The effect of peer counselors on breastfeeding rates in the neonatal intensive care unit: results of a randomized controlled trial. *Arch Pediatr Adolesc Med.* 2006;160(7):681-5. doi: 10.1001/archpedi.160.7.681.
288. Meier PP, Engstrom JL, Rossman B. Breastfeeding Peer Counselors as Direct Lactation Care Providers in the Neonatal Intensive Care Unit. *J Hum Lact.* 2013;29(3):313-22. doi: 10.1177/0890334413482184.
289. Meier PP, Engstrom JL, Mingolelli SS, Miracle DJ, Kiesling S. The Rush Mothers' Milk Club: breastfeeding interventions for mothers with very-low-birth-weight infants. *J Obstet Gynecol Neonatal Nurs.* 2004;33(2):164-74. doi: 10.1177/0884217504263280.
290. Agrasda G, Gustafsson J, Kylberg E, Ewald U. Postnatal peer counselling on exclusive breastfeeding of low-birthweight infants: A randomized, controlled trial. *Acta Paediatrica.* 2005;94:1109-15. doi: doi.org/10.1111/j.1651-2227.2005.tb02053.x.
291. Spatz DL. Ten steps for promoting and protecting breastfeeding for vulnerable infants. *J Perinat Neonatal Nurs.* 2004;18(4):385-96. doi: 10.1097/00005237-200410000-00009.
292. Sinha B, Chowdhury R, Sankar MJ, Martines J, Taneja S, Mazumder S, et al. Interventions to improve breastfeeding outcomes: a systematic review and meta-analysis. *Acta Paediatr.* 2015;104(467):114-34. doi: 10.1111/apa.13127.



For more information, please contact:

**Department of Nutrition and Food Safety  
World Health Organization**

Avenue Appia 20  
CH-1211 Geneva 27  
Switzerland

Email: [nutrition@who.int](mailto:nutrition@who.int)  
[www.who.int/nutrition](http://www.who.int/nutrition)



**World Health  
Organization**

ISBN 978-92-4-000564-8

