

Ten Steps for Promoting and Protecting Breastfeeding for Vulnerable Infants

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Human milk is the preferred food for infants, including ill and preterm infants. Ensuring skilled and comprehensive breastfeeding support for these vulnerable infants requires a specialized approach. The author outlines 10 steps for promoting and protecting breastfeeding in vulnerable infants. The steps include providing the parents with information necessary to make an informed decision to breastfeed; assisting the mother with the establishment and maintenance of a milk supply; ensuring correct breast milk management (storage and handling) techniques; developing procedures and approaches to feeding the infant breast milk; providing skin-to-skin care (kangaroo care) and opportunities for nonnutritive sucking at the breast; managing the transition to the breast; measuring milk transfer; preparing the infant and the family for infant hospital discharge; and providing appropriate follow-up care. Material and examples are drawn from the author's research and clinical work at the Children's Hospital of Philadelphia. Current research is utilized, and the role of the nurse is emphasized throughout. **Key words:** *breastfeeding, human milk, nonnutritive sucking, skin-to-skin care*

THE American Academy of Pediatrics recommends exclusive breastfeeding for the first 6 months of life, with continued breastfeeding for 1 year or more.¹ The American Academy of Pediatrics, the World Health Organization, and many other professional groups promote breastfeeding and/or the use of human milk (HM) as the ideal form of infant nutrition for the first year of life or longer.^{1,2} In addition, the World Health Organization and the United Nations Children's Fund launched the Baby-Friendly Hospital Initiative to address the role of maternity services in protecting, promoting, and supporting breastfeeding.^{2,3}

The United Nations Children's Fund's Baby-Friendly Hospital Initiative recommends that hospitals

- have a written policy regarding breastfeeding that is routinely communicated to all healthcare staff;
- train all healthcare staff in skills necessary to implement this policy;
- inform all pregnant women about the benefits and management of breastfeeding;
- help mothers initiate breastfeeding within 30 minutes after birth;
- show mothers how to breastfeed and maintain lactation even if they should be separated from their infants;
- give newborn infants no food or drink other than breast milk, unless medically indicated;
- practice rooming-in to allow mothers and infants to remain together 24 hours a day;
- encourage breastfeeding on demand;
- give no artificial teats or pacifiers to breastfeeding infants; and
- foster the establishment of breastfeeding support groups and refer mothers to

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them on discharge from the hospital or clinic.

While these recommendations are important steps for the successful initiation of breastfeeding in a birth hospital setting, they focus only on healthy, full-term infants. The author proposes the following 10 steps to promote and protect breastfeeding in vulnerable infants:

- Informed decision
- Establishment and maintenance of milk supply
- Breast milk management
- Feeding of breast milk
- Skin-to-skin care (SSC)
- Nonnutritive sucking at the breast
- Transition to breast
- Measuring milk transfer
- Preparation for discharge
- Appropriate follow-up

INFORMED DECISION

Although many individuals are aware that breastfeeding is good for infants, few women and their families are knowledgeable of the actual risks associated with not breastfeeding. In fact, focus groups conducted in preparation for the Department of Health and Human Services national advertising campaign on breastfeeding found that most Americans did not know how long an infant should be breastfed or the consequences of not breastfeeding.⁴ Benefits of HM are even more profound for sick or preterm infants. All women should be educated about the benefits of breastfeeding; however, a woman experiencing a known high-risk pregnancy should receive special education and guidance about specific benefits of HM and how to get the best start on lactation after delivery. Families should be aware of the very specific components of HM that can help and protect their infants.

Human milk is specific for babies. Preterm HM contains more proteins, lipids, and calories than term milk, differences that persist through at least 29 days of lactation.⁵ In addition to providing complete nutrition, HM offers protections. Human milk contains

live white blood cells (macrophages, neutrophils, T cells, and B cells) that assist the infant in fighting infection.⁶ Immunoglobulin A, lactoferrin, lysozyme, oligosaccharides, and growth factors in HM enhance host defenses in sick infants.⁶

Infants who are fed HM achieve enteral feedings faster than infants who receive formula, and gastric emptying time is faster following HM feedings.^{7,8} Human milk feedings protect preterm infants against necrotizing enterocolitis and sepsis, both of which increase mortality risk.^{9,10} Preterm infants fed fortified HM have been noted to have shorter hospital stays.¹¹ If preterm infants received HM, decreases could be expected in the incidence of necrotizing enterocolitis and sepsis, hospital costs, length of stay, and infant mortality.¹²

Breastfed babies also have decreased rates of respiratory illness, ear infections, urinary tract infections, and diarrhea.^{13,14} In addition, breastfeeding may be protective against respiratory syncytial virus.¹⁵ Compelling research also finds that HM enhances infant intelligence, including in preterm infants.^{16,17} Visual acuity is also improved in preterm infants who receive HM and the incidence and severity of retinopathy of prematurity may be lower.¹⁸⁻²⁰

Breastfed infants may also benefit in adult life. Breastfeeding is associated with decreased total cholesterol levels in adult life and may be associated with lower blood pressure later in life.²¹⁻²³ Breastfeeding may also protect against inflammatory bowel disease and result in a decreased risk of and later onset of celiac disease.²⁴

Nurses have the responsibility to serve as patient advisors; informing families about why HM is important for vulnerable infants should be standard nursing practice. The author recommends providing specific examples to families about how mother's milk will help the infant. One example is nosocomial infections. Explaining that HM helps to protect infants from pathogens they may be exposed to helps parents understand and appreciate the difference that HM can make in their infant's experience.

ESTABLISHMENT AND MAINTENANCE OF MILK SUPPLY

Ideally, an infant should be breastfed within the first 2 hours after birth. When infants are born with complications, lactation must be initiated via pumping using a hospital-grade electric breast pump, if possible, within the first 6 to 12 hours after birth. Pumping must mimic the pattern of a healthy breastfed infant; thus, it needs to occur 8 to 12 times per 24 hours.

During the first few days, many women get discouraged because they get little or no milk when they pump. This is expected. During the first 3 to 4 days, colostrum is produced in small amounts; it is extremely important to the infant; however, because it contains proteins, amino acids, and secretory immunoglobulin A.⁶ The nurse must explain to the mother that pumping stimulates prolactin levels, which contributes to the onset of copious milk production. By day 6, mothers who deliver term infants and breastfeed on demand produce an average of 556 to 705 g of milk per day, with a normal range of milk production of 440 to 1220 g/d until 6 months of lactation.^{25,26} In addition, evidence suggests that the degree of breast emptying is a crucial stimulus for milk synthesis and continued milk production.²⁷ Mothers should therefore be encouraged to pump every 2 to 3 hours around the clock with complete breast emptying at each pumping session. More than 8 breastfeeding sessions in a 24-hour period prevents the decline of prolactin before the next feeding.²⁸ Maternal serum prolactin levels decline slowly over the course of lactation but remain elevated for as long as the mother breastfeeds.²⁹

Many mothers find it a daunting experience to initiate lactation by pumping. It is the author's experience that if breastfeeding is explained as a 10-step process, as outlined in this article, women are better able to understand the process of lactation and the steps that eventually will lead to breastfeeding their child. Mothers often believe that it is not necessary to pump right after delivery when their

infant is separated from them owing to prematurity or other complications. It is important to convey that early and frequent pumping is vital to establishing and maintaining an adequate milk supply. At the Children's Hospital of Philadelphia (CHOP), mothers are provided with a pumping log so they can monitor daily milk volume as well as the number of pumping sessions per day.³⁰ The logs allow mothers to be aware of subtle changes in their milk supply.

Neonatal nurses should assess the milk supply of the infant's mother daily. Assessment should include asking the mother to describe how often she is pumping or doing a 24-hour recall of the prior day's pumping schedule if a log is not being maintained. The nurse should also assess for any differences in milk production between the breasts and whether or not both breasts are completely emptied at each session. Nursing assessment should determine if the mother is experiencing any engorgement or plugged milk ducts. It is important to remember that the mother is the infant's food source.

If a mother experiences a decrease in milk supply, early intervention is needed to improve the milk supply. Production of less than 500 mL of milk per day is a risk for lactation failure. The nurse should first ensure that the mother is pumping using a hospital-grade pump and maintaining an adequate pumping regimen as described. Observation of pumping technique is also important to ensure that the mother is using the proper-size flange. The standard flange size on Medela pump kits is 24 mm. Mothers with larger nipples need to use a large (27 mm) or extra large (30 mm) flange. The nurse can determine proper size by observing pumping or using the PersonalFit[®] breastshield sizer made by Medela. Skin-to-skin care should be initiated if the infant is stable, as some research indicates that it improves milk production.³¹

The next step is to consider medication. Metoclopramide is the drug of choice for increasing milk supply, although it can cause sedation and depression because it crosses the blood-brain barrier.³² The recommended

dosage is 10 mg every 8 hours with a dose taper prior to stopping use completely.³²

Domperidone is also effective in increasing milk supply and has fewer side effects than does metoclopramide. Domperidone must be obtained from a compounding pharmacist, because it is not manufactured in the United States. Access <http://www.iacprx.org> to find a compounding pharmacist. Domperidone is approved for use for breastfeeding mothers by the American Academy of Pediatrics, although there is now controversy over its use because of a Food and Drug Administration warning. The Food and Drug Administration states concern about health risks associated with the drug when it is used in intravenous form, but lists no health risks for the oral dosage that is the recommended form for use as a galactagogue. The International Academy of Compounding Pharmacists has issued a brief in response to the Food and Drug Administration warning.³³ It is also important to remember that some medications decrease milk supply (eg, birth control pills containing estrogen) so a complete assessment of the mother is imperative. The best technique for maintenance of milk supply is early, frequent pumping with complete breast emptying. Stressing the importance of pumping and critically evaluating maternal milk supply, especially during the first week or so after delivery, can make a long-term difference on the mother's overall lactation success.

Breast milk management

Breast milk management and safety are of concern for mothers with vulnerable infants who pump and store breast milk for long periods of time. Breast milk should be stored in a glass or food-grade plastic container. At CHOP, Medela sterile breast milk bottles are used. Each bottle is completely labeled by the mother at the time of pumping (infant's name, medical record number, and date and time of pumping). Bottles are stored in individual sealed bins in both the refrigerator and the freezer. Each bin is labeled with the infant's name and medical record number. Hospital-wide tracking is carried out by trained re-

search assistants (nursing students) who visit each unit daily to assess compliance with policies for storage of breast milk. Unit-based tracking is the responsibility of breast milk management team leaders on each unit. A comprehensive description and pictures of the breast milk management system can be found elsewhere.³⁴ The CHOP storage policy is 48 hours for fresh (refrigerated) milk. Milk that has been frozen and thawed must be used within 24 hours.

Nurses are integral to breast milk management. Nurses must work with the family on a daily basis to ensure milk safety and prevent unnecessary wastage of breast milk. The author also recommends developing a unit-based continuous quality improvement approach to track overall numbers of pumping mothers and compliance with policies and procedures. These data can be useful to advocate for more breastfeeding support services and resources. An example of such tracking is shown in Figure 1. At CHOP, the number of infants who have mothers pumping or breastfeeding is tracked on a monthly basis. This number is then compared to the unit's average daily census for that month so that an estimated percentage can be obtained for the month. During 2003, the newborn infant center at CHOP had approximately 73% of mothers either pumping milk or breastfeeding their infants. While this number does not reflect the actual number of infants receiving HM on any given day (because mothers can be pumping for weeks while their infants are n.p.o.), it provides a consistent method for tracking the approximate unit rate for pumping/breastfeeding.

Feeding of breast milk

Human milk directly from the breast is obviously best. For most vulnerable infants, however, this may not be an option for several weeks or months. When enteral feedings are initiated, colostrum should be fed for the first 24 to 48 hours to mimic the natural process. At CHOP, mothers are instructed to place orange dots on all bottles of milk pumped during the first 4 days after delivery. This makes

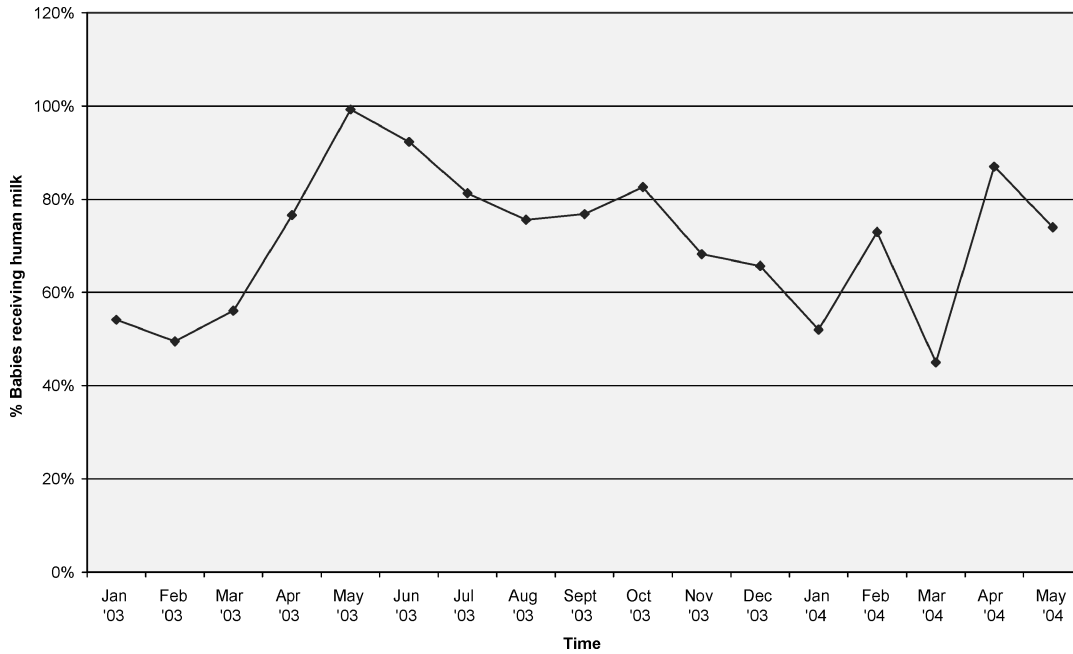


Figure 1. Percentage NICU infants with mother's pumping or breastfeeding.

identification by the nurse simple even if milk is frozen. Once the infant's gut has been "primed" with colostrum, fresh milk feeds should be initiated. Freezing destroys the live white blood cells in breast milk so frozen milk should be used only if fresh milk is not available.

It is important to establish a plan with the family as to how much milk the infant requires in a 24- to 48-hour period of time so that fresh milk can be provided whenever possible. The nurse should also coordinate with other hospital staff to ensure that everyone knows when the mother or other family members normally visit and deliver fresh milk. A sample card is shown in Figure 2. At CHOP, this card is placed at the infant's bedside and updated daily or as needed. The card can be laminated so that a wipe-off marker can be used for easy updating.

Mothers can also be instructed on fractionating their milk into low-calorie fore milk and high-calorie hind milk. Hind milk can be used to improve short-term weight gain of infants.^{35,36} The procedure for evaluating the lipid and calorie content of breast milk

is called the creatocrit.³⁷ This procedure is easy to do and mothers can also be taught to perform it accurately, thus increasing maternal involvement even further.³⁸

Trophic feeding with HM initiated within 48 hours of birth at 10 to 15 mL kg⁻¹ day⁻¹ has been shown to improve later tolerance to graded increments of enteral feeding volumes without increased risk of necrotizing

<p>Baby _____ is fed breast milk</p> <p>Today is _____</p> <p>Every day my baby needs _____mL</p> <p>I usually come in _____</p> <p>I bring in around _____mL</p> <p>I won't be in on _____ So please use my frozen milk.</p> <p>Thanks, _____'s Mom</p>

Figure 2. A sample card.

enterocolitis.³⁹ For breast milk gavage feedings, the bolus method is preferred over the continuous-feeds method. Continuous feeds lead to an increase in fat loss so the infant receives fewer calories, and the milk is also at risk for bacterial contamination.⁴⁰ Bolus tube-feeding is also associated with significantly less feeding intolerance and greater rate of weight gain than is the continuous method.⁴¹

Feeding intolerance can be related to a contaminated feeding tube. Mehall and colleagues found that bacterial contamination of enteral feeding occurs frequently and causes significant feeding intolerance in formula-fed infants and may contribute to necrotizing enterocolitis.⁴² In this study, breast milk was shown to be protective against feeding intolerance, regardless of bacterial contamination of feeding tubes.

Breastfeeding at the breast will be covered in a separate section. Before an infant is ready for oral feeds at the breast, she or he should be afforded maximal opportunities for SSC and nonnutritive exposure to the breast as discussed in the next sections.

SKIN-TO-SKIN CARE

Skin-to-skin care is the practice of placing an infant clad only in a diaper chest-to-chest on the parent's bare skin. Over the past 20 years, many studies regarding the practice of SSC have been conducted and published. Skin-to-skin care (also referred to as "kangaroo care") has been shown to have numerous benefits for infants and parents. Research indicates that SSC helps improve the infant's immediate health status. It provides the infant with physiologic stability, including improvement in gas exchange,⁴³⁻⁴⁶ heart rate,⁴⁴⁻⁴⁷ and decreased episodes of apnea⁴⁵⁻⁴⁷ (although heart rate variability during transfer to SSC indicates that more research is needed in this area⁴⁸). Skin-to-skin care has not been shown to have adverse effects on infant thermoregulation^{43,44,46,47,49-51} and may have a positive impact on infant weight gain.⁵⁰

In several studies, infants who received SSC were compared to a control group not offered SSC.^{45,50,52,53,55} Infants who receive SSC experience more organized sleep/wakefulness behaviors, with more time in quiet sleep and alert wakefulness states.^{45,53} Skin-to-skin care appears to help infant neurological development.⁵²⁻⁵⁴ Infants who receive SSC are reported to have shorter hospital stays and decreased severity of infections.^{50,55} One study that evaluated infants who had received SSC noted that at age 12 months they exhibited enhanced mental and psychomotor development compared with controls.⁵⁴ From a breastfeeding perspective, SSC improves maternal breast milk production, aids in establishing breastfeeding, and increases breastfeeding duration.^{56,57} Skin-to-skin care may also help to decrease maternal stress.⁵⁷

The nurse is a key member of the health-care team in promoting SSC. At CHOP, a continuous quality improvement project was initiated to improve the practice of SSC. An 8-part implementation method was developed utilizing random chart audit, daily chart reviews, SSC patient packets, nursing staff education, SSC resource information binder, visual cues, parent education, and qualitative interviews of staff nurses. A more detailed description of this project has been submitted for publication and is under review. This ongoing project has resulted in a modest increase in the average frequency of SSC and consistently, at least a few infants receive SSC daily. Please refer to Figure 3. Two major lessons learned through this project are that (1) nurses do not document holding and SSC as often as it is done and (2) visual cues (such as bedside calendars) are effective in keeping SSC in the forefront of the plan of care.

NONNUTRITIVE SUCKING AT THE BREAST

Nonnutritive sucking at the breast should be initiated once an infant has been extubated. The mother should be instructed to use an electric pump to empty her breast just prior to the infant's gavage feeding time. The

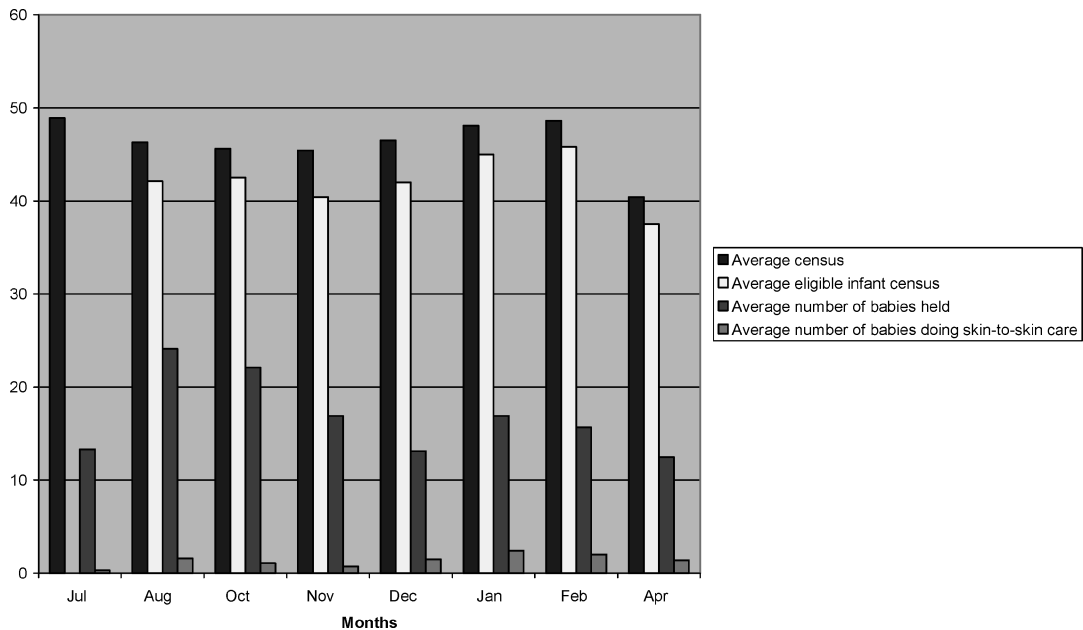


Figure 3. Kangaroo care (KC) compared over several months.

infant should be positioned skin-to-skin at the breast and the mother should manually express drops of milk onto the infant's lips. This allows the infant to taste the breast milk and become acquainted with the breast while receiving the gavage feed. Nonnutritive sucking at the breast improves transition to breastfeeding for nutritive purposes and is associated with longer breastfeeding duration.⁵⁸

Research by Nyquist and colleagues suggests that infants are able to root, latch, and have effective areolar grasp as early as 28 weeks when they have had maximal exposure time to the breast.⁵⁹ Infants in this study responded on the first occasion of contact with the mother's breast with rooting and sucking behavior regardless of birth gestational age or postmenstrual age. These researchers noted nutritive sucking from about 30 weeks gestation and repeated bursts of more than 10 sucks and maximum bursts of more than 30 sucks at 32 weeks.

The nurse should establish a plan with the mother for when nonnutritive sucking can be initiated. Ideally, the mother will have participated in daily SSC so nonnutritive sucking at

the empty breast will be the natural next step. In fact, the author has observed in her clinical practice that as an infant matures, she or he naturally migrates toward the breast when participating in SSC.

TRANSITION TO BREAST

As the infant matures and is able to latch and extract milk from the breast, the mother can switch from nonnutritive to nutritive breastfeeding sessions. There is no reason that an infant must be bottle-fed prior to breastfeeding. Breastfed term infants, preterm infants, and infants with cardiac defects are more physiologically stable while breastfeeding.⁶⁰ During breastfeeding, infants experience fewer deviations from baseline in heart rate, respiratory rate, and oxygen saturation, and have fewer episodes of apnea and bradycardia.⁶⁰ Airway closures while swallowing during bottle-feeding however interrupt breathing and can effect physiologic variable changes.⁶⁰

Several positioning techniques are recommended for ill or preterm infants. Head and neck support are very important and in

general the cross-cradle and football holds are most effective because the mother can support her breast and have good control of the infant's head at the same time. The mother should ensure that the infant is pulled in close to the breast. She should support her breast during the entire feeding so that the infant is less likely to fall away from the breast.

The nipple shield is a critical temporary device for improving milk intake at the breast. The nipple shield helps to compensate for poor suckling from the infant by concentrating negative pressures in the tip of the shield.⁶¹ The shield is effective in increasing milk intake from the breast and extending the duration of breastfeeding.⁶¹ The shield is most effective when utilized early in the breastfeeding process, not as a last resort, and should be used for all breastfeeding sessions. The nurse should allow the infant to attempt breastfeeding first without the shield, and if after a few attempts no milk transfer is noted, the shield should be utilized. If the mother has flat or inverted nipples, the shield should be used from the outset. The mother should use the nipple shield until the infant is able to take all feeds from the breast with the shield. Once the infant is fully breastfed at the breast with the shield, the mother can begin to wean the infant from the shield. This weaning process is likely to occur in the postdischarge period.

Nurses are paramount in providing mothers with maximal breastfeeding attempts. Nurses control feedings in nurseries and can positively or negatively influence a mother's breastfeeding success. The nurse should always maintain positive verbal and nonverbal communication when assisting a mother with transitioning to breastfeeding. Breastfeeding is more work for nursing staff and does require more nursing time; however, provision of breastfeeding care and evidence-based support leads to improved outcomes for the infant and the mother.

MEASURING MILK TRANSFER

Test weighing is a simple and noninvasive technique for measurement of milk intake

during breastfeeding sessions. Test weighing is accurate when performed with an electronic scale.^{62,63} At CHOP, the BabyWeigh[®] Scale by Medela is used for performing test weights. The accuracy of this scale has been previously validated.⁶³ The following description of how to perform test weights using this scale is derived from CHOP's nursing procedure. The scale should be on a smooth, flat surface away from air conditioning and heat vents. Ensure that the scale is on a level surface and that the basket of the scale is not touching any other surface. The BabyWeigh Scale has a gauge to ensure that it is level and the feet of the scale can be adjusted until the bubble appears in the center of the level gauge. The scale should be wiped down with an antimicrobial agent prior to use and then turned on. The infant should be dressed in the clothes and/or blankets to be worn for breastfeeding. Do not put blankets on the scales or drape them over the sides as this can increase user error. If the infant has any tubing that cannot be disconnected, such as intravenous tubing or oxygen tubing, the tubing should be marked with a piece of tape so that the exact same amount of tubing is weighed before and after the feed. Pulse oximetry and cardiorespiratory leads can be disconnected and placed on top of the infant on the scale for the pre- and postfeed weights. Leads, tubing, or the like must not be held up in the air because this leads to user error. The infant's prefeed weight is then recorded. Our policy is that the prefeed weight is checked twice to ensure for accuracy before it is locked into the scale and recorded.

The infant is removed from the scale for breastfeeding. The scale is not turned off during breastfeeding. Once the breastfeeding session has ended or after the infant has finished one breast, the infant is placed on the scale for the postweight. The infant's diaper is not changed and all items of clothing remain the same to prevent user error. With the BabyWeigh[®] Scale, the preweight remains locked in and the scale can be zeroed. The infant is placed on the scale in the exact same conditions as for the preweight. If the

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infant had any tubing that could not be disconnected on preweight, measure the tubing at tape marking to assure that the same amount of tubing is weighed after the feed. Our policy is to check the postfeed weight twice as well to ensure for accuracy. The BabyWeigh Scale subtracts the preweight from the postweight and reports milk transfer in grams. One gram is equal to 1 mL of milk intake.

Test weighing is an effective method for measuring milk intake both in the hospital and after discharge. In one study, by Hurst and colleagues, mothers were randomized into intervention and control groups, on the basis of the ability to perform test weights at home.⁶⁴ Mothers who performed test weights had lower anxiety scores at the end of the first week than controls. Test weights are an accurate method for assessing milk transfer in the hospital and postdischarge period until effective breastfeeding is demonstrated at all feeding sessions. If a mother is using a nipple shield, milk transfer should be documented with test weights as well. As an infant is able to take more milk from the breast, the amount and frequency of complementary milk can be decreased.

The nurse is responsible for instructing the mother and family on the procedure for test weighing. It is the author's experience that mothers can be empowered to take full responsibility for the feeding process and are quite skilled in performing both test weights and managing the breastfeeding sessions with proper instruction. This decreases the time burden on the nurse and increases the mother's confidence in breastfeeding her infant at home.⁶⁴

PREPARATION FOR DISCHARGE

To prepare a mother for taking her infant home and being successful with breastfeeding, she should be afforded maximal opportunity to breastfeed her infant in the hospital. Encourage mothers to spend as much time at their infant's bedside as possible and learn their infant's behaviors and feeding cues. Preterm and vulnerable infants may not dis-

play the same feeding cues and behaviors that term infants do and therefore may be at risk for underconsumption of breast milk. Meier recommends that infants are transitioned to cue-based demand feedings when the infant is able to consume greater than or equal to 50% of their feeds orally (by breast or a combination of breastfeed and bottle-feed).⁶⁵

When assisting the mother with breastfeeding during this time, it is crucial to be knowledgeable about the mother's normal milk production pattern; assess total daily production as well as variations during the day and between each breast. This information allows the nurse to make decisions regarding which breast to attempt feeds with first and regarding whether or not a mother should pump prior to breastfeeding. For example, a mother with a copious milk supply who is producing 1000 mL/d could be producing anywhere between 100 and 200 mL milk per pumping session or between 50 and 100 mL milk per breast. If an infant is capable of consuming only 40 mL per feed or needs only 320 mL/d, the mother should be instructed to pump her breasts to remove some of the foremilk prior to each breastfeeding session. This allows the infant to obtain more of the high-lipid high-calorie hind milk that is excreted toward the end of a breastfeeding session.

As the infant is able to consume more breast milk orally, it is helpful if the mother can stay for an extended period of time to do on-demand feedings. The author recommends encouraging a mother to stay for an 8-hour period as many days as possible prior to discharge. Using the example above, if an infant requires a minimum of 320 mL in a 24-hour period, this equates to 140 mL in an 8-hour period. During the 8-hour period the mother is visiting, the infant is fed on demand and all feedings are measured via test weights. Very often, an infant will be breastfed frequently but take in small amounts at each feed. At the end of the 8-hour session, if the infant has not consumed the required minimum quantity of milk, he or she can be complemented with a tube or bottle-feeding, or if it is a small amount (eg, 10–20 mL), this can be divided up over

the next several feeds when the mother is not visiting. Again the nurse plays a critical role in encouraging and supporting the mother during this process. The mother should be welcomed at her infant's bedside and encouraged to play an active role in caregiving.

APPROPRIATE FOLLOW-UP

The need for appropriate follow-up for breastfeeding preterm or ill infants cannot be taken lightly. At CHOP, all breastfeeding mothers are recommended to go home with a BabyWeigh Scale at least for the first month after discharge on the basis of the infant's ability to transfer milk from the breast at time of discharge. BabyWeigh Scales can be rented in the community and can be found by using Medela's Breastfeeding National Network phone number (1-800-TELL-You or 1-800-835-5968). At CHOP, some of our mothers have been successful in obtaining insurance reimbursement for the cost of the scale.

Mothers are given a 24-hour minimum intake for their infants and instructed on appropriate supplementation (a feeding in place of a breastfeeding session) and complementation (a feeding given in conjunction with a breastfeeding session) based on their infant's breastfeeding abilities at time of discharge. The nurse should instruct the mother that all breastfeeding sessions should be monitored with the scale until the infant demonstrates the ability to take all feeds from the breast.

During the immediate postdischarge period, mothers also need to continue to pump using a hospital-grade electric pump. Few infants are able to provide the needed stimulation to the breast in the immediate postdischarge period, and without pumping a mother is at risk for decreased milk produc-

tion. Again, it is important to be aware of the mother's normal daily milk production and the infant's daily need. This allows appropriate guidance for frequency of pumping. It is the author's experience that many infants are routinely breastfed only from one breast a feeding session for several weeks postdischarge. If this is the case, the mother should be instructed to pump the breast that the infant did not feed from and store that milk for later use. That breast should then be used first for the next feeding session.

By having a scale at home, the mother can also monitor the infant's average weight gain. Daily weights are not necessary; the mother can weigh the infant twice a week to assess growth. Infants should have an average daily weight gain of 15 to 30 g.

Vulnerable infants do not have the same reserves as healthy term infants nor do they possess the sucking maturity required in the early discharge period. Merely using clinical cues such as weight, diapers, and stools can put the infant at great risk for underconsumption of milk.⁶⁶ Many healthcare providers are not aware of this risk and may ill-advise mothers to stop pumping or not to monitor milk intake. The mother must be equipped with evidence-based knowledge prior to hospital discharge, so that she can make safe choices for her infant postdischarge.

The breastfeeding process for a vulnerable infant is a long and often-challenging process. Nurses are critical to breastfeeding success for these infants. A science-based approach can improve the breastfeeding care and support provided to infants. Providing HM and breastfeeding is the one thing that only a mother can do for her infant(s). Nurses can make a difference by using the 10-step process to promote and protect breastfeeding for vulnerable infants.

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