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Potentially Better Practices

Tools

Human Milk/ Breastfeeding

Introduction

The benefits of human milk for term and preterm infants are well recognized[1-3] Human milk provides not only optimal nutrition, but also key digestive enzymes, direct immunologic protective factors, immunomodulators, anti-inflammatory factors, anti-oxidants, growth factors, hormones and other bioactive factors, prebiotics, probiotics and multiple cellular elements, with new components and interactions being discovered regularly.

While there are rarely medical contraindications to the use of a mother's breast milk, the most likely reason given for not providing human milk to VLBW infants is lack of availability. Mothers of VLBW infants should be educated and supported to ensure that their milk is available for their baby. A mother's successful commitment to supplying her milk is likely to have significant medical benefit for her VLBW infant in both the short and long-term. Human milk is more than nutrition. It is medicine for both the infant and the mother: the milk for the infant, and the provision of it for the mother.[4]

The World Health Organization (WHO), American Academy of Pediatrics (AAP), and the US Surgeon General's "Call to Action to Support Breastfeeding" all call for use of donor human milk (DHM) as the feeding of choice if mother's own milk (MOM) is unavailable or contraindicated.[5-7] Donor human milk has become a standard of care for VLBW infants over the last 10 years, primarily because of its proven reduction in NEC, among other morbidities.[8,9] A recent analysis of only three papers concluded that DHM did not reduce the risk of surgical NEC, and declared it was not cost-effective.[10] However several other studies have looked at any NEC and cost, and found DHM to be very effective.[11-17] In fact, a very recent meta-analysis of 18 studies concluded that DHM protected against bronchopulmonary dysplasia (BPD) in very preterm infants.[18]

Holder pasteurized donor human milk (PDHM) has been in use in some US NICUs for over 40 years. The use of PDHM, especially in Level 3 and 4 NICUs is increasing significantly, as is the number of non-profit human milk banks. In addition, there are several for-profit companies offering different forms of screened and processed DHM and DHM products (eg. fortifiers, cream) with some research showing that an exclusive human milk diet can further improve outcomes for VLBW infants.[15,16] There is current evidence that some forms of human milk processing (retort-processed; shelf stable) greatly reduce the immunologic protective factors in donor milk.[19]

As DHM is almost always used in conjunction with MOM, it is difficult to separate the protective effects of each. Concern has been raised about blurring the effects of MOM and DHM, especially within quality improvement and research efforts.[20] Another criticism of DHM is that mothers will likely abdicate their efforts to produce their own milk in favor of using DHM. Of the studies that have looked at this, all but 1 have seen some increase in the proportion of MOM used and only 1 has shown a decrease.[21-23]

POTENTIALLY BETTER PRACTICE #17

Human milk, should be used whenever possible as the enteral feeding of choice for VLBW infants.

Background, Rationale, and Goals

- Current research confirms that human milk (with appropriate fortification for the very low birth weight infant) is the standard of care for preterm, as well as term infants.[24]
- The AAP recommends:
  - All preterm infants should receive human milk;
  - Human milk should be fortified with protein, minerals, and vitamins to ensure optimal nutrient intake for infants weighting < 1500g at birth.
  - Pasteurized donor human milk, appropriately fortified, should be used if MOM is unavailable or its use contraindicated.[1,6]
- Evidence-based benefits of human milk feeding for preterm infants (beyond those already shown for term infants) include:[25]
  - Dose-related decreases in NICU length of stay
    - The use of breastmilk results in less residuals and faster realization of full enteral feedings.[26-28]
    - Reaching full feedings faster with the use of human milk means fewer days of IV's, less side effects from TPN, less infections and infiltrations from IV's, and less costly and fewer hospital days.[26,29]
  - Lower morbidity including risk of the following:
    - Sepsis[30]
    - Necrotizing enterocolitis[31]
    - Urinary tract infection[32]
    - Retinopathy of prematurity[33]
    - Chronic lung disease[34]
  - Improved gastrointestinal function and integrity via the following[35-37]
    - Decreased gastric pH
    - Increased gastrointestinal motility
    - Accelerated mucosal immunity
    - Improved gut microflora
    - Decreased mucosal permeability leading to reduced bacterial translocation
  - Enzymes in breastmilk help immature infants absorb and utilize nutrients more efficiently[38] and may also improve absorption of nutrients when breastmilk and artificial milks are combined.[39]
  - Human milk has anti-oxidant properties that assist the preterm infant in coping with increased oxidative stress.[40-42]
  - VLBW infants receiving breastmilk have improved visual development and less retinopathy of prematurity.[29,43-49]
  - Improvement in indexes of neurodevelopment that persist into at least adolescence.[50]
- Benefits of a human milk diet persist beyond NICU stay.
- Donor human milk is cost-effective.[14,16,17]
- Exclusive human milk feedings (human milk plus fortifiers made from human milk) may be an additional step to prevent NEC and other morbidities, and to optimize outcomes for VLBW infants.[13,15]

Recommendations, Guidelines and Algorithms

- Create a supportive environment to maximize milk production in the early postpartum period.
- Teach every mother hand expression and collection techniques to maximize colostrum availability. (See Jane Morton MD DVDs: "Combining Hand techniques with Electric Pumping to Increase Milk Production" and "Making Enough Milk, The Key to Successful Breastfeeding…Planning for Day One", available from www.breastmilksolutions.com).
- Establish a relationship with a milk bank and procedures for obtaining heat-treated donor milk quickly or maintain a reserve supply in the NICU. (www.hmbana.org, www.prolacta.com).
- Retort processed (shelf-stable) donor human milk products cannot be recommended at this time because of the lack of research as to safety, growth, infectious morbidity and other outcomes. Limited research to date suggests immunologic factors are significantly reduced.[19]

Quality and Process Improvement

- The first feeding for VLBW infants should always be colostrum or breastmilk (EBM or PDHM).
- Mothers should have education on manual expression, breast massage and colostrum collection in addition to pump use and safe handling of human milk.
- Establish policies and procedures for obtaining, storing, handling and using DHM products.

Outcome/Process Measures

- If colostrum or breastmilk is not available in the NICU, are there documented efforts to contact the mother before providing alternatives?
- Survey of NICU staff attitudes and knowledge regarding human milk and breastfeeding
- For VLBW infants is the first feeding EBM or PDHM or formula?

POTENTIALLY BETTER PRACTICE #18

Obstetric, perinatal and neonatal professionals should counsel mothers when breastmilk may be of concern or contraindicated.

Background, Rationale, and Goals

- As important as breastmilk is to the VLBW infant, prenatal, perinatal, and neonatal care providers should be aware there are cautions and contraindications regarding use of an individual mother's breastmilk for her infant. The physician will need to weigh the risks of using breastmilk from a mother with potentially transmittable diseases or medications against both the short-term and long-term risks of withholding breastmilk from the VLBW infant.
- Pharmaceutical manufacturers' inserts typically discourage breastmilk use, often due to lack of medication safety data and legal concerns.
- Similarly, discontinuing breastfeeding for a self-limited or treatable maternal illness deprives the infant of the maternal antibodies after having been exposed to that illness.

Current contraindications to receiving breastmilk in the USA:[51]

- Certain maternal illnesses
  - HIV/AIDS
  - Human T-Lymphotropic Virus Type I & II
  - Active tuberculosis in mother prior to treatment. Pumped milk may be used.
- Certain maternal medications[52]
  - Anti-metabolite or cytotoxic medications (e.g. anti-cancer)
  - Drugs of abuse: heroin, cocaine, amphetamine, and phencyclidine.
- Infants with classical galactosemia should not receive breastmilk. Infants with the Duarte variant may receive some of their nutrition via human milk with careful metabolic monitoring.
- The use of marijuana while breastfeeding remains controversial, especially for VLBW infants.

Most medications are safe for breastfeeding mothers and their infants.[52] Most common maternal post-partum medications are not contraindications to breastfeeding or the use of expressed breastmilk for VLBW infants (e.g. magnesium sulfate, tocoloytics, most antihypertensives, pain medications, antibiotics). Some medications may be preferred over others due to decreased excretion into milk, or experience with preterm infants. A drug that is not compatible with breastfeeding can often be changed to another drug that is compatible.

- **Methadone** in any dosage is compatible with breastfeeding.
- **Smoking** should be discouraged. Nicotine is present in human milk of women who smoke, but there is no evidence nicotine presents a health risk to the nursing infant.
- **Alcohol** in large quantities may have potential effects on the VLBW infant and maternal milk supply. More than occasional consumption should be discouraged.
- **Psychotropic Drugs** are not contraindicated for breastfeeding mothers. Because concentrations in breastmilk differ, some medications are preferred over others
- **Radioactive medications** should be approached with caution. Most, but not all, radioactive substances can be used in breastfeeding mothers after withholding the milk for an appropriate period.
- Radiocontrast agents such as gadolinium for

magnetic resonance imaging (MRI) and iodinated compounds for computed tomography (CT) are safe.

Immunizations: Lactating women may be immunized as recommended for adults to protect against measles, mumps, rubella, tetanus, diphtheria, influenza, Streptococcus pneumonia infection, Hepatitis A, Hepatitis B, and Varicella. [51]

Certain maternal infectious diseases may pose challenges to breastfeeding or the utilization of expressed milk in the NICU.[51]

- **Hepatitis A:** Immunoglobin may be given if maternal symptoms start 2 weeks before to 1 week after infant delivered. Breastfeeding is encouraged.
- **Hepatitis B:** Infants of women with Hepatitis B Virus (HBV) should receive HBIG and HB Vaccine within the recommended time. The medications do not need to be given before breastfeeding is initiated.
- **Hepatitis C:** Transmission of HCV by breastfeeding is theoretically possible but has not been documented. According to current guidelines of the US Public Health Service, maternal HCV infection is not a contraindication to breastfeeding. The decision to breastfeed should be based on informed discussion between a mother and her health care professional.
- **Varicella-Zoster Virus:** Infants of mothers with active Varicella-Zoster Virus (VZV) may breastfeed after mothers are no longer infectious. The infant may require VZIG. Expressed breastmilk may be given to the infant if no skin lesions involve the breasts and the infant has received VZIG. 51 Milk supply should be established and maintained while mother and infant are isolated.
- **Measles:** Infants of mothers with measles should be given IG and may breastfeed when the mother is no longer infectious (72 hrs after onset of the rash). The breastmilk may be pumped and given to the infant.
- **Women with Herpes Simplex Type 1** lesions on their breasts should refrain from breastfeeding or feeding expressed breastmilk from the affected breast until the lesions have healed. Active lesions elsewhere should be covered during breastfeeding, and careful hand hygiene should be used. Women should be encouraged to pump until lesions are clear, so milk supply is not interrupted.
- **Cytomegalovirus (CMV):** Refer to **PBP #32**

Recommendations, Guidelines and Algorithms

- A current, reliable reference for drugs and breastfeeding and maternal and infant illnesses should be immediately available in all antepartum, perinatal and post-partum areas, especially the NICU. The PDR is NOT a reliable reference. Recommended references are:
  - US Drugs and Lactation Database: LactMed, available at: http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT
  - Thomas W. Hale R.Ph, PhD, Medications and Mother's Milk available at https://medsmilk.com/
  - Lawrence and Lawrence, Breastfeeding: A Guide for the Medical Profession 8th Ed, 2016
  - Briggs, G.G., Freeman, R.K., Yaffe, S.J.Drugs in Pregnancy and Lactation, 11th Ed, 2017, Baltimore, MD, Williams-Wilkins
  - LactMed website - https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm
  - LactMed app - https://toxnet.nlm.nih.gov/help/lactmedapp.htm
- The current edition of the Report of the AAP Committee on Infectious Diseases[51] should also be available in the NICU or on-line, and/or Lawrence & Lawrence[53]

- Nursing competencies should include information on maternal illnesses and medications and human milk.
- Infection control policies and procedures should include information and recommendations regarding breastfeeding and expressed human milk.

Quality Improvement: Outcome/ Process Measures

- Inventory available resources: Are appropriate references available in key antepartum, perinatal, post-partum and NICU areas and/or easily on line?
- Survey staff to assess their awareness of resources.
- Are infectious disease/isolation policies consistent with current breastfeeding policies, and up to date with current references?
- Is there a consistent policy as to when breastmilk should be discarded, and are those reasons documented?

POTENTIALLY BETTER PRACTICE #19

Educate health care professionals & and encourage advocacy for human milk for NICU infants.

Background, Rationale, and Goals

Obstetric, perinatal, neonatal and pediatric professionals should have the knowledge, skills and attitudes necessary to effectively support the provision of breastmilk to the VLBW infant. Inconsistent, inaccurate information and lack of support by health care professionals have been cited as reasons for breastfeeding failure among many groups of mothers.[54,55] Unfortunately, some healthcare providers may not have not had the opportunity during training to gain the knowledge and skills needed to assess, support, and assist women reach their breastfeeding goals.[54-56]

Obstetric and perinatal professionals should screen for risk factors for insufficient lactation or breastfeeding problems. As with any physiologic process, historical or physical findings may signal potential or actual barriers to breastfeeding success.[57,58]

Recommendations, Guidelines and Algorithms

- Hold regular CME, CEU and other in-service education, both multidisciplinary and physician-only, regarding lactation issues.
- Make key resources (e.g. drugs & breastfeeding information, basic text or handbook) available in all care areas (hard copy and/or digital).
- Develop/test for competencies regarding breastfeeding knowledge and skills. http://www.usbreastfeeding.org/p/cm/ld/fid=170
- Subsidize utilization of on-line breastfeeding management courses.
- Develop "scripts" for common or difficult situations.
- Designate a Medical Director of Lactation as a resource person.
- The advantage to having a physician in this position is the added medical knowledge base, prescriptive ability and credibility of physician-to-physician communication.
- Women should be screened for risk factors at the first prenatal visit by history and physical exam using a standardized format.
- Continued risk screening (history and physical exam) should occur as appropriate during prenatal visits, especially if the pregnancy becomes complicated and/or early delivery is anticipated.
- Risk factors for insufficient lactation or other breastfeeding problems should be communicated to the perinatal and postpartum staff as well as the infant's physician.
- Explore BFHI and Neo-BFHI Certification. http://www.ilca.org/main/learning/resources/neo-bfhi
- https://www.babyfriendlyusa.org

Quality Improvement: Outcome/ Process Measures

- Use nursing /physicians' surveys of lactation knowledge, skills and attitudes to guide incremental program planning.
- Is there a Medical Director of Lactation?
- Are key resources immediately available to physicians and nursing staff?
- Is there a risk-screening tool in the prenatal record?
- Patient survey regarding breastfeeding support by MDs and RNs and others

POTENTIALLY BETTER PRACTICE #20

Mothers and families should be given accurate information about human milk for VLBW infants, and their decisions respected.

Background, Rationale, and Goals

The decision to breastfeed is usually made early in the pregnancy if not before.[59,60] Provider encouragement significantly increases breastfeeding initiation among women of all social and ethnic backgrounds. [61-63] Obstetric and family practice physicians, nurses and other staff are especially well placed to begin education, risk screening and anticipatory guidance regarding lactation.[64,65] Antepartum hospital stays are opportunities for dispelling myths (e.g. "I can't breastfeed because I have a premature infant.") and for providing anticipatory guidance regarding procedures to ensure a full milk supply and safe storage and use of pumped milk. A mother's perceptions of her prenatal physician's and hospital staff's attitudes on infant feeding is a strong predictor of later breastfeeding.[66]

Obstetricians, pediatricians, family practitioners and hospital staffs often unintentionally undermine breastfeeding by providing formula company access to patients via commercial literature and formula marketing strategies such as baby clubs, "gift" bags and free formula. Despite strong evidence to the contrary, breastfeeding is still perceived by some as a lifestyle choice, not a healthcare issue. Health care providers are afraid to "push" breastfeeding for fear of making mothers feel "guilty" if they do not breastfeed.[67] The AAP's policy statement encourages "physicians to work actively toward eliminating hospital practices that discourage breast feeding (e.g. infant formula discharge packs…").[6]

Recommendations, Guidelines and Algorithms

- Patient education should begin during routine pre-pregnancy obstetric/gynecologic visits and continue through the pregnancy, delivery & postpartum.
  - If a mother indicates a choice not to breastfeed, the reasons for that decision should be explored, as they may be based on misunderstanding of the value and challenges of breastfeeding.
  - Continued education should occur during prenatal visits, especially if the pregnancy is complicated and early delivery anticipated.
  - Specific anticipatory guidance should be provided if problems are discovered.
  - Mothers hospitalized with preterm labor or other complications should receive additional encouragement and education about breastfeeding.
  - Patients should be referred to appropriate, culturally competent, breastfeeding resources: breastfeeding classes; lactation consultants; mother-to-mother support groups.
  - Toward the latter part of pregnancy, patients should be instructed regarding potential barriers to breastfeeding that routine hospital care may place in their path, and suggested ways to resolve these barriers.
  - Remove formula company influence from the office and hospital.
    - Use non-formula company materials.
    - Remove formula "baby-club" materials in office and clinics.

    - No discharge formula company marketing bags should be distributed. See http://banthebags.org
  - No donation or sale of patient lists/contact information to formula or marketing companies (HIPPA).
- Provide visual cues (artwork, posters, calendars) that actively support breastfeeding,
- Support breastfeeding patients and staff by providing space and supplies for pumping and breastfeeding.
- Nurses, physicians and other staff caring for either hospitalized or outpatient high-risk antepartum mothers should communicate the importance of breastfeeding to the mother and infant.
  - Hospitals should have videotapes, DVDs or closed-circuit television programs delineating the "why" and "how" of providing breastmilk for preterm or ill NICU infants.
  - Neonatal prenatal consults should include discussion of the importance of a mother's own milk and the steps to be taken to assure a good milk supply.
  - Prenatal lactation consults should be available for both inpatient and outpatient high-risk patients.
  - The physician(s) in charge of the mother's care should reinforce the importance of breastmilk by inquiring about the mother's pumping or breastfeeding progress during routine post-partum care.
  - The first visit in the NICU with the neonatologist or pediatrician should include discussion of the value and benefits of human milk for the VLBW infant (with documentation in the medical record). Care should be taken to separate the decision to provide a few weeks of pumped breastmilk from the commitment to long-term, exclusive breastfeeding.
  - Physicians should find opportunities to praise mother's efforts to provide this "liquid gold" for their VLBW infant.
  - Standing admission orders should include "Lactation Consultation for all NICU infants."

Quality Improvement: Outcome/ Process Measures

- Inventory all current educational materials (written, audio, video, DVD, etc.) for content and bias. Establish a mechanism for periodic review.
  - Have a plan to regularly inventory your educational materials, artwork calendars in the environment and office/hospital surroundings
  - Office and hospital scavenger hunt for formula logos, materials.
- Does the prenatal record or admission record have a specific check box or blank regarding intention to breastfeed and education given?
- Survey of staff regarding attitudes towards breastfeeding as a health care issue.
- Review of policies and procedures regarding vendors and vendor materials in the environment.
  - Survey staff awareness of corporate compliance issues regarding vendor gifts.
- Chart audit of antepartum consults by neonatal service to determine if breastmilk use was discussed.
- Is a Lactation Consult routinely ordered on antepartum high-risk patients?
- Chart audit of breastfeeding education for mothers during the antepartum period.
- Documentation of such discussions in the medical record by chart review.
- Presence of LC order on standing postpartum or NICU admission orders.

POTENTIALLY BETTER PRACTICE #21

Hospital policies and practice should support breastfeeding in a coordinated, consistent manner.

Background, Rationale, and Goals

Mothers of VLBW infants are less likely to breastfeed than mothers of healthy, term infants.[68] Family members and health care professionals sometimes discourage these mothers from initiating lactation feeling that providing milk will be an added stress. Mothers may be advised, in error, that their medications preclude the use of their milk. Similarly, mothers may be inappropriately advised that their high-risk conditions may interfere with adequate volumes or composition of milk.

Mothers of VLBW infants often feel a loss of control of their lives and a loss of role as a mother. The infant is in the hands of strangers and she is the outsider. Studies indicate that providing milk for their infants helps mothers cope with the emotional stresses surrounding the NICU experience and gives them a tangible claim on their infants.[69,70]

Recommendations, Guidelines and Algorithms

- All post-partum and NICU nurses should have a basic level of knowledge re lactation physiology and breastfeeding support, as evidenced by "competencies".
- Breastfeeding supportive postpartum and nursery breastmilk policies and procedures should be in place for:
  - Collection, storage and handling of mothers' own milk for hospitalized infants

    (Refer to **TOOL #13** on page 74 for an example of a Human Milk Storage and Handling Protocol.)

  - Accidental feeding of the wrong mother's milk to an infant. https://www.cdc.gov/breastfeeding/recommendations/other_mothers_milk.htm
  - Use of fresh and pasteurized donor human milk, as appropriate.
  - Skin-to-skin (kangaroo care) https://health.ucsd.edu/specialties/obgyn/maternity/newborn/nicu/spin/staff/Pages/policies.aspx
  - Peer counselors and Mother-to-Mother Support groups
- A NICU breastfeeding support committee or task force should be multidisciplinary, including physicians, nurses, dietitians, occupational therapists, pharmacists, lactation consultants, and breastfeeding mothers.

Quality Improvement: Outcome/ Process Measures

Regular review of policies, procedures and competencies will assist in focusing attention toward areas for possible improvement.

- Do appropriate policies exist? How often are they reviewed and updated?
- Are all caregivers competent to provide needed education and support?
- Assessment and measurement of competencies

POTENTIALLY BETTER PRACTICE #22

Mothers' milk supply should be established and maintained.

Background, Rationale, and Goals

- ***The Decision to Provide Milk.*** For a mother, the decision to provide milk for a VLBW infant is quite different from the decision to breastfeed a healthy, term infant.
  - The decision is usually made based on health-related issues (i.e. The vulnerability of the infant puts him at greater risk of diseases from which breastmilk may protect him).
  - Mothers who did not intend to breastfeed, often decide to pump, while not planning to feed at the breast.[71,72]
  - Mothers are highly influenced by the advice of professionals who care for the infant, feeling thankful for (not coerced by) their guidance and even resentful if misinformed about formula being equally acceptable[73]

- ***Contact with Infant.*** Visual and tactile contact with her infant allows the mother to recognize the "reality" of the birth and the need for provision of breastmilk.
  - Early maternal-infant contact is associated with increased initiation and duration of breastfeeding.[74]
  - Skin-to-skin care is associated with increased amounts of milk.[29,75]
  - Contact with her infant stimulates the maternal entero-mammary system and helps to establish the infant's normal gut microbiome.
  - Skin to skin care has been shown to be safe and effective in promoting physiologic stability and breastfeeding in premature infants.[76,77]
  - Contact may also facilitate bonding and attachment.[76]

- ***Non-Pharmacologic Milk Stimulation***. Non-pharmacological means to stimulate milk production include expressing milk while relaxed at the bedside (or in proximity to the infant), skin-to-skin care (see above) and non-nutritive tasting at the breast. These interventions may stimulate both prolactin and oxytocin as mothers become conditioned to readily let down with psychological and tactile stimuli.
  - Psychological inhibitors of the neuroendocrine let-down reflex include fear, pain and embarrassment, while positive stimuli include the sight, sound or feel of the infant.
  - The average pumped milk yield without let-down is less than 4% of available milk.[78,79] The key to milk production is milk removal, which is largely dependent on the let-down reflex.

- ***Early Use of Expressed Milk.*** The use of human milk for trophic feeds in VLBW infants is associated with improved milk production[26] and sends the important message to staff that preterm formula is not equivalent to human milk for this vulnerable population.

- ***Expressing Milk.*** Early, frequent, and effective breastfeeding or pumping appears to be the most important factor in establishing full lactation/ "coming to volume".[80] **The object is to maximize each mother's milk supply while minimizing the number of minutes per day she needs to spend on milk expression.[81]**
  - Prolactin bursts associated with suckling or breast pumping support the continued growth of secretory tissue in the maternal breast for several weeks or months after birth.[82]

- Initiating early pumping (within the first few hours) is associated with higher levels of milk production. Even pumping 1 hr post-delivery results in a higher milk yield than at 6 hrs.[80]
- Recommendations for the ideal frequency of pumping (8-10 times every 24 hours) are based on the frequency of breastfeeding a term infant, but research has demonstrated most mothers pump 5-6 times per 24 hrs.[83,84]
- An individual mother may need to pump more or less frequently depending on her breast storage capacity and rate of milk synthesis.[85,86]
- The hospital staff is integral to the initiation of pumping and establishment of a regular pumping schedule.

- The most important determinant of the exclusivity and duration of breastfeeding for the mother-infant dyad is the volume of milk produced which typically plateaus by 2 weeks postpartum.[87] The average baseline milk production on days 6-7 postpartum is highly predictive of adequacy of milk volume (defined as ≥ 500 mL/d) at 6 weeks post-partum.[80]

- It is not clear to what extent preterm birth contributes to limitation of milk supply in mothers of VLBW infants. Lactogenesis I/Secretary Differentiation (the hormonal preparation and growth of breast tissue) starts during pregnancy.[87] Some experts suggest that the mother of an extremely preterm infant may be at a disadvantage regarding milk production as she has not had the full time for breast growth and development. Also, Lactogenesis II/Secretory Activation may be delayed in mothers of very preterm infants and affected by maternal steroid administration.[88]

- Mothers of VLBW infants typically must express milk for several weeks before the infant can be put to breast, and for several weeks after discharge, before full exclusive breastfeeding is achieved, if ever.

- The initiation and maintenance of lactation for mothers of VLBW infants is best accomplished with a hospital grade, automatic-cycling electric "double" pump. "Double" electric pumps, enabling a mother to pump both breasts simultaneously, should be consistently available to the mother during her hospital stay and at discharge. In addition, staff should be available and committed to helping the mother establish a regular pumping schedule with this equipment. In contrast to sequential pumping, the double pump results in higher milk yield, reduced time, and a higher prolactin level.80

- Because of lactation physiology, a full milk supply must be established for the tiny preterm infant, just as it is for a full term healthy infant. Just "keeping up" with the VLBW infant's needs is not sufficient, as the mother may be unable to call upon a larger milk supply when the infant's needs increase.

- ***Massage & Manual Expression.*** Breast massage has been shown to improve milk production[89,90] Effective emptying is critical to maximizing milk production and preventing engorgement and mastitis.
  - Massage of the areolar-nipple area, immediately prior to pumping, may help stimulate a let-down reflex, a prerequisite to effective emptying.
  - Manual expression, used in conjunction with electric pumping, facilitates the collection of small volumes of colostrum and helps initiate milk flow when the breasts are engorged.
  - Later, manual expression, when practiced synchronously with breastfeeding, may improve

milk transfer from the breast to the baby.
- Hand expression several times a day along with hands-on pumping can increase milk output significantly.[91]

- ***Increasing Milk Supply.*** It is very common for a mother of a VLBW infant to have her milk supply decrease after 4-6 weeks of pumping, as she resumes her normal daily routine or returns to work. Even if a full milk supply was never established, every effort should be made to help mothers of VLBW infants to maintain the supply they have.
  - Returning to an increased pumping schedule (including night-time expression) may be useful after evaluation of the mother's situation.
  - If impaired let-down is a problem, relieving pain with analgesics and topical treatment of sore nipples may help.
  - Forcing fluids has been shown to have no benefit in increasing a milk supply.[92,93]
  - Mothers also need to be educated that they do not need to drink milk to make milk.

- ***Galactogogues***. Many medications and herbal therapies have been recommended as galactogogues (a material that stimulates the production of milk), but few have been subjected to rigorous randomized controlled trials.
  - Metoclopramide (Reglan®) is no longer recommended due to the risks of depression and tardive dyskinesia with prolonged use.
  - Domperidone (Motilium™) is widely used in Australia, Canada, Mexico and Europe with a good safety record[94,95] but is not FDA approved for increasing milk supply in the US at present.
  - More than thirty herbs are considered to be galactogogues.96 Fenugreek (Trigonella Foenum-graecum) is one of the oldest medicinal plants, dating back to Hippocrates and ancient Egyptian times. As Fenugreek is a food additive, it is felt to be safe, although mothers' perspiration and milk often smells like maple syrup and may decrease blood glucose in mother and/or infant.
  - Galactogogues are generally prescribed along with recommendations regarding the frequency and thoroughness of expression.

- ***Monitoring Milk Supply.*** Ongoing monitoring of a mother's milk supply via a pumping log can provide opportunity for intervention before the milk supply is irretrievably low.
  - A NICU-designed diary-log for mothers to record their pumping history cues mothers to visit, pump and hold their infants frequently.[97] (Refer to **TOOL #14** on page 82 and https://health.ucsd.edu/specialties/obgyn/maternity/newborn/nicu/spin/parents/Pages/default.aspx)
  - Emerging technology (Apps/volume-measuring pumps) may enable easier monitoring of milk supply both in the hospital and at home.
    - Refer to **Tool #15** on page 83 for examples of pumping apps for smartphones.
  - Each mothers' milk supply should be reported and discussed on rounds.

- ***Lactation Experts.*** Although all healthcare professionals who care for mothers and infants should have a general knowledge of lactation physiology and breastfeeding management, supporting the mother of a NICU infant often requires special knowledge, skill and experience.
  - International Board-Certified Lactation Consultants (IBCLC) are one method to assist in increasing breastfeeding rates in the NICU through staff and mother education, clinical consultation and support. [98,99]
  - Lactation counseling by health care professionals for mothers of VLBW infants

has been shown to increase the incidence of lactation initiation and breastmilk feeding without increasing maternal stress and anxiety.[100]
- In some units, well-trained NICU RNs may have the knowledge and experience to counsel and manage complicated NICU breastfeeding issues.[71,97]
- NICU peer counselors have been shown to significantly increase the odds of breastfeeding at 2, 4, 8 and 12 weeks after birth.[101]
- Postnatal peer counseling was also found to increase both exclusive and any breastfeeding of term LBW infants at 6 months.[102]

Recommendations, Guidelines and Algorithms

- Peripartum caretakers should begin a discussion, as appropriate, of provision of breastmilk as something only the mother can do.
- Develop practices and policies to encourage skin-to-skin contact for ALL infants, not just breastfed ones. Such contact should be an expectation for the development of the parental-VLBW baby relationship.
  - Those infants without immediate problems (e.g. borderline preemie, Infant of a Diabetic Mother, asymptomatic congenital anomalies) should be allowed skin-to-skin care and immediate post-partum breastfeeding, before being removed to the NICU for diagnostic or therapeutic procedures.
  - All awake mothers should be given the opportunity to see, and if possible, touch, their ill infants prior to transfer to the NICU.
  - Identify knowledgeable personnel who can assist positioning and supporting mother and baby
  - Provide chairs (semi-reclining), space, and screens for privacy as requested.
  - Educate staff re the physiological and psychological benefits of skin-to-skin care.
- Provision should be made for every mother separated from her infant to have access to an appropriate breast pump both at home and in the NICU post maternal discharge.
  - Secure sufficient number of pumps to ensure access.
  - Hospital staff should be trained in acquiring pumps for women.
  - Develop a breast pump loan program for the first few weeks for those mothers with no other resources.
  - Adjust the postpartum nurse/patient ratio to support breastfeeding care and to physically assist with pumping whenever needed.
  - Nursing staff should determine who will be responsible for assisting the mother to initiate pumping (post-partum RN? NICU RN?) and who will be consistently available to assist a newly delivered mother with pumping (NICU RN, postpartum RN?)
- Teach mother the adjunctive skills of manual expression and breast massage
  - Identify skilled staff to demonstrate hand expression and breast massage to mothers.
  - Utilize available handouts or videos which demonstrate this technique J. Morton: https://med.stanford.edu/newborns/professional-education/breastfeeding/hand-expressing-milk.html
  - Identify tools and methods of assuring complete collection and transport of small volumes of colostrum.
  - Improve staff and MD awareness of the importance of the numerous gastrointestinal and immunological effects of the use of colostrum.

- Establish policies and ordering practices that limit early feeds to colostrum/human milk. (Avoid orders such as: "maternal breastmilk or preterm formula…")
- Each mother's 24 hour milk supply should be monitored frequently.
  - Use a pumping log (Refer to **TOOL #14** on page 82.)
  - Identify responsible care providers to assist mother with initiation and maintenance of pumping record.
  - Approach milk supply as a "vital sign" to be monitored by the RN.
- NICU staff members should be familiar with galactogogues which may be used or requested by NICU mothers
  - Establish communication and education with the mother's Obstetrician or primary care provider around issues of lactation.
- Provide appropriately educated and experienced experts to assist mothers and train staff.
  - Hire or contract with an appropriately experienced IBCLC, OR
  - Train an existing NICU RN or RD to be an IBCLC or lactation resource person, OR
  - Train all NICU personnel to manage complicated lactation problems and issues.
  - Utilize peer counselors to support pumping and breastfeeding
- Develop guidelines for IBCLC/lactation resource person interaction as part of the multidisciplinary care team.
  - Participation in multidisciplinary rounds and teaching rounds
  - Consultations and systematic follow-up
  - Creation and evaluation of patient literature
  - Education for other NICU staff
  - NICU breastfeeding support committee or program
  - Research as appropriate
  - Key lactation facts as part of RN "Kardex" or separate lactation "Kardex" (Plan of Care).
- If lactation consultants (LC) are used, LC's should "bill" (i.e. keep records of services performed) even if their services are not directly reimbursed at present.
- Develop and use a maternal discharge educational and skills checklist.

Quality and Process Improvement

- Is maternal-infant contact documented in nursing or medical record?
- Regular review of availability of appropriate pumps and supplies (including loaner pumps)
- Is there a facility in or near the NICU for mothers to use for pumping when they are visiting or is provision made for mothers to pump at their infant's bedside?
- Review all policies regarding human milk in the NICU – what is missing?
- One person designated to monitor discussion of milk supply on rounds.
- Hours of availability of lactation support in the NICU and for mothers of NICU infants on the post-partum unit.
- Reimbursement for LC services
- Presence and utilization of a lactation documentation tool
- Availability of a personalized breastmilk pumping diary-log for mother
- Review infant's chart for notation of milk production
- Maternal education on manual expression, breast massage and colostrum collection documented?
- Are post-partum providers competent in helping mothers collect colostrum?
- Are NICU staff encouraging and willing to use even small volumes?

- If colostrum is not available in the NICU, is there an effort to contact the mother before providing alternatives?
- Review policies for visitation, skin-to-skin care, etc.
- Assess adequacy of bedside pumping equipment and appropriate chairs

Outcome/Process Measures

- What percent of informed mothers initiated pumping?
- What is the "dosage" of mother's own milk and donor milk an infant is getting daily? Over the first 28 days? Over the hospital course?
- What percentage of mothers are providing breastmilk at any given time?
- What percentage of infants are getting any/exclusive human milk at discharge?
- What percentage of VLBW infants receive colostrum as their first feed?
- What percentage of charts have mother's milk supply documented?
- Survey of maternal satisfaction with lactation education and support.
- Incidence and extent of skin-to-skin care.
- Periodic assessment of number (%) of mothers with inadequate milk supply after day 14 (< 350 mL/24 hrs)
- All mothers who need them have appropriate pumps?
- Time of mother's first pumping.

POTENTIALLY BETTER PRACTICE #23

Human milk should be handled to ensure safety and maximal nutritional benefit to the infant.

Background, Rationale, and Goals

Although human milk has remarkable antibacterial properties, it is not sterile and should be handled and stored properly to maintain its nutritional and immunological potential, and to prevent transmission of infection.[103] Storage in a monitored, appropriately controlled hospital freezer is preferred over storage at home whenever possible.

- The California Tissue Bank Licensing Act does not apply to the storage of a mother's own milk for use for her infant in the hospital (Ca Health & Safety Code §1648) but is needed for storage and use of donor human milk.
- Appropriate steps should be taken to ensure an individual mother's milk is given only to her own child, unless the milk has been heat-treated under standardized conditions[103]. Although the risk of transmission of infectious agents with a few feedings of another mother's milk is incredibly small, many families are quite concerned and need careful explanations and to see action being taken.
- Mastitis is a complication for pump-dependent mothers and has been associated with irreversible compromise of milk production. In addition to increasing the frequency of emptying, prompt antibiotic treatment may protect milk production. Although usually not a problem for a healthy term infant or relatively healthy growing preterm infant, some extremely preterm or ill infants have been shown to acquire pathogens from human milk, usually streptococcus or staphylococcal species.[51]

Recommendations, Guidelines and Algorithms

- Every NICU should have a policy regarding safe storage, handling and administration of mothers' own milk and donor human milk. https://www.hmbana.org
  - Every NICU should have a policy regarding misadministration of human milk (i.e. a mother's milk given to the wrong infant). https://www.cdc.gov/breastfeeding/recommendations/other_mothers_milk.htm
- Mothers should be appropriately treated for mastitis should it occur.
- Although it is neither clinically necessary nor cost-effective to routinely culture all mothers' milk in the NICU,[51] appropriate evaluation of recurrent feeding intolerance, recurrent infection, or unusual infections should include a review of mothers' handling, storage and transport of milk, and possibly microbiologic assessment of the milk.
- Temperature controlled milk warmers should be used, whether water-bath or waterless variety.
- Barcoding has been shown to reduce misadministration errors and should be used for both MOM and DHM.[104]
- Dedicated space for nutrition preparation should be used [104,105] and such preparation should follow American Dietetic Association guidelines.[106]
- Dedicated, appropriately-trained milk technicians have been shown to reduce bedside RN workloads, reduce infant time to full feeds and reduce costs.[107]

Quality Improvement: Outcome/ Process Measures

- Is there a policy regarding safe storage and handling of human milk, including DHM?
- Is barcoding available for MOM and DHM?
- Is there a policy for misadministration of human milk?
- Monitor misadministration cases for number and appropriate handling of the case

EXAMPLE: Human Milk Storage and Handling Protocol

Title:	**BREASTMILK: Collection, Storage, and Preparation** [x] Policy [ ] Procedure [ ] Guideline [ ] Other
Patient Population:	[x] High Risk OB/Labor, Delivery and Recovery [x] Post-partum [ ] Low Risk Infant [ ] High Risk Infant
Unit(s) Affected:	[x] L&D/BC/Antepartum [x] NICU [x] Postpartum
Ancillary Services:	[ ] Pharmacy [ ] Nutrition [ ] Respiratory [x] Nutrition [x] Lactation
Effective Date:	10/92
Revision/Review Date(s):	8/94, 11/96, 3/98, 6/98, 7/01, 10/04, 10/05, 2/08, 3/08, 10/10, 9/11, 11/12, 8/15, 9/17, 2/18

POLICY STATEMENT

This policy provides guidelines for the safe collection, storage, and handling of breast milk outside of the Infant Feeding Prep Room to optimize nutritional and immunological protection as well as growth and development.

RESOURCES:

MOMS Milk System Tutorial Videos

RELATED POLICIES:

Women and Infant Services Policy

- Breast Pump
- Infant Feeding Prep Room Procedure
- Breastmilk: Misadministration
- Cleaning of Breast Pump Parts and Reusable Feeding Supplies (Medela Micro-Steam Bags)
- EVS policy 2.32
- Donor Human Milk

DEFINITIONS

Fresh Milk: Milk at room temperature at approximately 20° C (68 F) or refrigerated at 4°C

Frozen Milk: Milk held at approximately -20°C (14 F) or -70°C (-36 F)

Thawed Milk: Milk that has been previously frozen

Mothers' Own Milk System (MOMS): Bar-coded human milk tracking system capable of tracking individual specimens, labeling once fortified, and monitoring expiration. Provides a safe patient environment through positive identification of milk samples with the correct patient and assuring milk discharged with the patient. Creates reports for breast milk volume, available bottles for feeding, and feeding history.

Milk Warmer: Equipment that will warm or thaw breastmilk feedings without the use of water and holding the appropriate temperature for 30 minutes before feeding or the need to store in the refrigerator. These devices will be designated for individual patient use at the bedside.

DTR: Diet Technician, Registered

IFPR: Infant Feeding Prep Room

POLICY

A. Breastmilk is a bodily fluid and has been recognized as a potential source of transmission of HIV. There is a theoretical risk of transmission of other microbial pathogens, including but not limited to Cytomegalovirus (CMV), Hepatitis B virus (HBV), Hepatitis C virus (HBC), Rubella, Syphilis, and West Nile virus. The risk of transmission of microbial pathogens from a single breastmilk exposure has never been documented.

B. The Mother's Own Milk System bar-coded tracking system will be used to maximize patient safety.

C. Women and Infants Services RNs will be familiar with the MOMS system including printing labels, managing patient/mother profiles, managing orders, preparing/splitting milk, feeding, quick feed, disposal and discharge procedures.

D. Aseptic technique will be used during preparation of breastmilk.

E. Appropriate hand hygiene will be used during collection and handling breastmilk. Staff will wear non-sterile gloves when handling breastmilk or feeding infant's breastmilk.

F. The Infant Feeding Prep Room (IFPR), will operate for breast milk preparation between 0700 and 2300 at Jacobs Medical Center. At Hillcrest Medical Center all milk preparation will be completed by the Registered Nurses (RNs) in the designated milk preparation area. (see Infant Feeding Prep Room Procedure policy)

EQUIPMENT

Mothers' Own Milk System program on computer or handheld PDA with bar code scanner
Printer for printing of MOMS labels.

Collection:

- Dual electric breast pump
- Pump kit
- Sterile storage containers
- MOMS labels and pen to note date, time, and initials
- Dish soap and tub for cleaning pump parts between sessions with warm soapy water (on Postpartum)

Storage:

- Storage bin in freezer with patient's label for identification including name, MRN and date of birth as well as mother's first name.
- Storage bin in refrigerator with patient's label for identification and mother's name. Name alert stickers should be used as appropriate.
- Sterile containers
- Labels with patient identification and mothers' name
- Ink pen for labeling
- Hand held scanner or laptop with scanner and MOMS system program
- Printer to complete storage steps in MOMS with label stock

Preparation:

- Food grade disinfectant spray to clean preparation area
- Paper Towels
- Gloves, non-sterile
- Sterile containers
- Labels with complete patient identification (name, date of birth, MRN, Mothers' first name) and contents of prepared milk for sterile container.
- Handheld scanners or computer with MOMS program and scanner
- Printer to prepare labels and label stock
- Human Milk Fortifier packets

PROCEDURE

Collection

Mothers who are inpatient at UC San Diego Health are encouraged to supply breastmilk for their infant(s). If mother is separated from her infant, she should be assisted with milk expression within 1 hour of birth or at the time of separation.

A. RN should demonstrate breast pump use or hand expression to mother and give instruction on collection and storage of breast milk within 1 hour of the infant's birth; information should be reinforced on admission to Postpartum. If mother unstable, milk expression should start as soon as mother stable.
B. Initiation of milk expression in outside Women and Infants Services depends on maternal physiologic stability. Provider approval may be necessary depending on the maternal status.
C. Breastmilk will be collected and stored in enteral feeding syringes, colostrum containers or other sterile breastmilk storage containers.
D. Mother's may re-use pump bottles after appropriately cleaning but a new container or syringe should be used each time milk is stored. Mothers may collect a daily 24-hour collection in a larger 250 ml or 1 liter bottle provided once milk volume is established. The first pumping time should be noted on the bottle and used to determine expiration time of any feedings prepared.
E. In the hospital sample collections may be stored at room temperature up to 4 hours and then must be received into the MOMS system. RNs or DTRs can combine smaller quantities for batch feeding preparation simulating the 24-hr collection in the hospital. No ongoing collections may be placed in the refrigerator for 24-hrs in the hospital. Once placed in the refrigerator the sample and volume should be received into the MOMS system. No additional milk can be added to that container after received into the MOMS system.
F. Storage containers with breastmilk will be labeled with MOMS label including the date and time collected and mother's initials.
G. MOMS labels given to the family member will be verified by the family member including date of birth, infant's name, medical record number, and the mother's name prior to issuing them to the family member.
H. See Breast Pump policy for cleaning instructions for breast pumps and Cleaning of Breast Pump Parts and Re-useable Feeding Supplies policy for cleaning instructions for breast pumps parts and other feeding supplies.
    - RNs and Lactation Consultants will teach mothers proper collection and cleaning of pumps/pump parts and document education in EPIC as appropriate

Storage

Breast milk should be stored according to the following guideline:

A. MOMS system will apply the correct storage rules when the condition of the milk is selected upon logging it into the MOMS system for storage or applied automatically when the storage site is selected: freezer or refrigerator.

B. There will be a dedicated bin in both the refrigerator and the freezer for each patient as needed. The bins will be labeled with the infant's wristband label.
C. All breastmilk will be labeled when pumped with name, date, time, and initials. Maternal medications may also be listed if of concern.
   - If infant in couplet care, milk can stay in room at room temperature for up to 4 hours. If milk will not but used within 4 hours it will be appropriately labeled and received into MOMS system and placed in breastmilk refrigerator.
   - If mother is in the hospital and infant is in NICU, the milk will be brought to the NICU to be received into the MOMS system. MOMS labels will be printed on the mother's inpatient unit for correct labeling or obtained from the NICU by the mother's inpatient unit RN. Milk will not be accepted by the NICU staff without proper MOMS labeling.
D. Staff receiving breastmilk will verify that each container is labeled with mother's MOMS collection label and with date/time mother pumped and mother's initials.
E. Breastmilk should be transported from home in an insulated cooler with iced gel pack. Frozen breastmilk from home should be transported in a manner to maintain frozen state. Breastmilk may be refrozen as long as there are visible ice crystals present or otherwise will need to be received into the refrigerator as "thawed milk".
F. Breastmilk from home should be given to the RN, DTR or other designated staff with privileges to be received into the MOMS system placed in the refrigerator or freezer and relabeled as appropriate for the storage location and expiring rules. Families are not to enter refrigerators/freezers.
G. Milk collected in larger containers and fresh, not frozen, may need to be split into smaller containers based on rate of patient use to avoid waste in later preparation.
H. A yellow/gold sticker should be placed on milk collected in the first 2 weeks of life for NICU infants to help identify this milk in the freezer bin for earliest use over other samples collected. RNs in the NICU and Lactation Consultants will provide educaiotn on this and provide the yellow/gold stickers to the mothers for labeling. This will ensure that the first pumped milk will be used first when feeding is started.
I. Containers will be wiped down with food grade disinfectant prior to placement in the refrigerator or freezer. If removed from the refrigerator and replaced, also wipe down prior to replacement.
J. Breastmilk that will not be used fresh may be frozen within 4 days. DTRs will ensure milk is moved to the freezer if nearing the 4-day limit using fresh milk first whenever possible.
K. Jacobs Medical Center (JMC) HUSCs will monitor the breast milk refrigerators for variance from the required 2 degrees centigrade to 4 degrees centigrade for both Hillcrest and JMC breastmilk storage refrigerators and freezers. A pager at Jacobs Medical Center is alerted if there is a variance requiring validation in the wireless temperature monitoring system. A system of escalating pager and phone alerts to the HUSCs and Charge RN are used to identify to the HUSC staff any temperature variance outside the set range. HUSCs will document in the wireless temperature monitoring system each shift with any variances requiring correction reviewed at shift handoff HUSC to HUSC. Variances in the refrigeration equipment in the IFPR is monitored the DTRs assigned to this task.

Breastmilk Storage Guidelines:

Room Temperature	4 hours
Refrigerator set to 2-4 degrees Centigrade	
Fresh milk (never frozen)	4 days
Thawed MBM and/or fortified milk	24 hours
Pasteurized thawed, unfortified milk	48 hours
Freezer (2 door refrigerator/freezer) - home or hospital	> 6 months
Deep Freezer (-20 degrees C)	12 months

Cleaning and Maintenance of the Milk Preparation Areas:

A. The designated milk preparation areas will be wiped down with a food grade disinfectant solution every 12 hours by the designated staff and as needed when soiled. Staff will disinfect the milk prep surface between patient preparations. Two bottles will be required and labeled Breast Milk Prep and Formula Prep.
B. Food grade disinfectant will be changed out daily by the day shift EVS worker assigned to the unit. A bottle will be provided to all areas in Women and Infants Services daily that require this disinfectant. This will also be provided to specific infant environments when the infant is on contact isolation.
C. The breast milk refrigerator will be cleaned weekly and more often if visibly soiled with a food grade disinfectant by the HUSC at JMC and the NICU RN at Hillcrest.. This is documented by the JMC NICU HUSC in the wireless temperature monitoring system for all breastmilk storage refrigerators upon notification at (858) 249-5800 by designated personnel generally HUSCs or Charge RN outside the JMC NICU. At Hillcrest, the NICU RN will clean the breaskmilk refrigerator weekly and report to the HUSC at JMC to record in the temperature monitoring system. CCPs on the10th floor at JMC and scrub techs on the 9th floor at JMC will clean the breastmilk refrigerator weekly and report to the NICU HUSC for documentation of this task. Unit managers in these areas will ensure the tasks are assigned and completed. The DTR will clean and document for the Infant Feeding Preparation Room (IFPR) where this applies.
D. Refrigerator drawers installed at JMC on the F Pod are individual breast milk storage devices monitored fro temperature wirelessly in the same manner with the same alert system and documentation as the other breastmilk storage refrigerators and freezers. The HUSCs will monitor the temperature every shift. The JMC HUSC staff are responsible to clean the inside of the drawers weekly with food grade disinfectant reporting to the JMC NICU HUSC to document in the wireless online tracking system. It is important that the inside is dried completely after the required wet time to avoid rapid frost overgrowth in these smaller devices. The dehumidifier packets are changed monthly by the NICU Manager labeled with the new expiration date. The vendor provides the new dehumidifier packets monthly. Care should be taken to not get these wet with weekly cleaning. It is recommended that they be removed temporarily when using the food grade disinfectant to protect against this issue and replaced once the drawer has been disinfected and dried.

Breastmilk Preparation:

A. Use fresh breast milk when available in chronological order.
B. When fresh breast milk is not available, use oldest frozen milk available. Samples with yellow/gold dots are the earliest umped samples after birth and should be used first.
C. If mother's breast milk not available, pasteurized donor milk may be used after parental consent and provider order. (see Donor Human Milk policy) The RN will enter into the infant's profile under "Manage Babies" in the MOMS system that written consent was obtained to provide donor milk prior to using donor breast milk for a patient. A provider order should follow in the electronic medical record.

Thawing Frozen/Warming Milk:

A. Thaw breast milk in an electric milk warmer at the patient's bedside according to manufacturer's instructions. There is a thawing/warming chart available with the device to determine the approximate length of time for the procedure. Depending on the size of the frozen container thawing can take 12-25 minutes.
    - The device is for individual patient use and will be cleaned between patients if shared or used in the IFPR.
    - Disposable plastic liners will be changed daily on the day shift and dated. The plastic liners may be recycled with the exception of the rubber gasket in the middle after personal patient information is removed.
B. After milk is thawed, create a new label in MOMS System. Ensure milk has been moved from the freezer bin to the refrigerator bin to set the new expiring rules for thawed milk.
C. Thawed milk will be used within 24 hours of thawing. Thawed, pasteurized donor milk will be used within 48 hours.

D. If fresh milk will not be used within the time frame before expiring, place in the patient's freezer bin for future use moving appropriately in the MOMS system and relabeling. DTRs will monitor this daily at Jacobs Medical Center. RNs will monitor daily at Hillcrest Medical Center.

Fortifying Breast Milk:

A. A medical provider order is required to fortify breast milk. Feeding orders are populated in the MOMS system and require RN information update prior to the preparation to include total volume, time needed, and any special instructions that may be neded by the DTRs should they be performing the preparation. RNs preparing does not exclude this step in the MOMS system.
B. All fortification should be done in the designated area, IFPR by the DTR at JMC or by an RN in the designated area at Hillcrest following the Infant Feeding Prep Room policy at Jacobs Medical Center. NICU RNs at Hillcrest will prepare and fortify breast milk in the designated area of the NICU. The IFPR may be used for formula prep by the Nutrition Department DTRs as needed at both JMC and Hillcrest.
C. Orders received after 2200 daily at Jacobs will be implemented the next business day with unfortified breast milk used for feeding in the interim. Provider will be notified and ensure an order is placed in the EMR... Hillcrest NICU RNs will prepare and fortify breast milk 24/7 in the designated area of the NICU.
D. Before using Human Milk Fortifier check the expiration date and note the lot number. The lot number is a required field in the MOMS system preparation process and will need to be entered to obtain an individual feeding label for scanning at the time of feeding by the RN.
E. If the feeding order requires Enfamil Human Milk Fortifier, obtain a 4-vial foil packet of Human Milk Fortifier. It should be stored at room temperature at all times, not in the refrigerator. Date and time the packet using only for 24 hours total from the time the packet is opened. Fortifier degrades once exposing the vials to room air causing a brown color change and negative effect on the taste often compromising infant feeding. Discard open packet afer 24 hours. Unused vials should be kept in the closed foil packet and not exposed to light as much as possible.
F. For Abbott Human Milk Fortifier use the required number of packets per volume of breastmilk as directed by the dietitian in the Breastmilk Recipe Book.
G. When transferring breast milk from the storage container to the delivery/feeding containers, print a label using the MOMS system and place on the delivery container. Label will be used to "feed" infant in MOMS.
H. Prepare only one infant's feeding at a time.

Administration of Feeding to Infant:

A. If infant in couplet care and fresh breast milk has not left the patient's room, mother can use the breast milk without scanning it into MOMS system. The RN will use the "Quick Feed" method of documentation and charting in the MOMS System.
B. Verify medical provider order in EMR and order in MOMS completing required fields marked by an asterisk (*) in the Manage Orders function
C. Remove infant's milk from refrigerator and warm using milk warmer. (see Thawing Frozen/Warming Milk "A." above)
D. Gently agitate the feeding container immediately prior to feeding. Ensure syringe for tube feedings is positioned to ensure the fat in the feeding is elevated above the remaining breast milk.
E. When transferring breast milk from the storage container to the delivery container, print a label using the MOMS system and place on the delivery container. Label will be used to "feed" infant in MOMS.
F. Using the MOMS system, scan milk and infant's ID immediately prior to feeding.
G. If MOMS system not available (downtime), 2 RN's will verify ID on milk and ID of infant being fed. Double verification will be documented in EMR as RN #1 verification and RN #2 verification.
    - Documentation should be completed by the 2nd RN within an hour of the double check and not later than the end of that shift by signing into EMR separately.

H. Document feeding in EMR under Intake & Output:

Management of Breast milk at Time of Infant's Discharge/Transfer/Demise:

When infant is discharged, transferred to another hospital, or has died, breastmilk will be "disposed" of in the MOMS system immediately prior to discharge. Mothers with excess volume of stored milk may be asked to take excess home for storage. Breast milk will be scanned right before it is being taken out of the hospital; not scanned for disposal and stored in the freezer. Reason for disposal should be selected in the drop down menu including noting hospital transferred to if patient being moved to a new hospital for continued care.

A. Using the MOMS system, select "Dispose".
B. Scan bottle of breast milk.
C. Select reason breast milk is being disposed of in the system.
D. Scan infant's bar code to match breast milk with infant.
E. Repeat steps with all bottles of breast milk in the refrigerator and freezer to be disposed.
F. Pack breastmilk for disposal/discharge in a cooler on ice/frozen cooler pack for appropriate transport.
G. Breastmilk may be donated by some mothers requiring transport to the Milk Bank. The Lactation Consultants will manage this process with the mothers. Make the needed referral to the Lactation Consultants as needed.

Breastmilk Culture Collection Procedure:

A. Use sterile pumping equipment, new from the packaging. A sterile flange and graduate cylinder container with snap lid are also suitable for this purpose.
B. Use hand hygiene prior to opening the package
C. Clean breast with soap and water
D. Express a few drops wasted milk prior to collection of the sample
E. A minimum of 1 ml is preferred for the culture.
F. The sterile breast flange can be screwed onto the sterile infant bottle or a colostrum container to collect the sterile specimen
G. Label container, print lab slip, and initial lab slip indicating the patient information matches on the label on the specimen as well as the lab slip. Notify HUSC to transport sample to the Rapid Response Lab.

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Adapted from: "Breastmilk - Collection, Storage, and Preparation" Policy from UC San Diego Health, Women and Infant Services via personal communication with toolkit authors.

EXAMPLE: NICU Pumping Log

Week _____

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 AM							
2 AM							
3 AM							
4 AM							
5 AM							
6 AM							
7 AM							
8 AM							
9 AM							
10 AM							
11 AM							
12 PM							
1 PM							
2 PM							
3 PM							
4 PM							
5 PM							
6 PM							
7 PM							
8 PM							
9 PM							
10 PM							
11 PM							
12 AM							
TOTAL							

Baby's Name: _____ **Date of Birth:** _____

Date Pumping Began: _____

Notes: _____

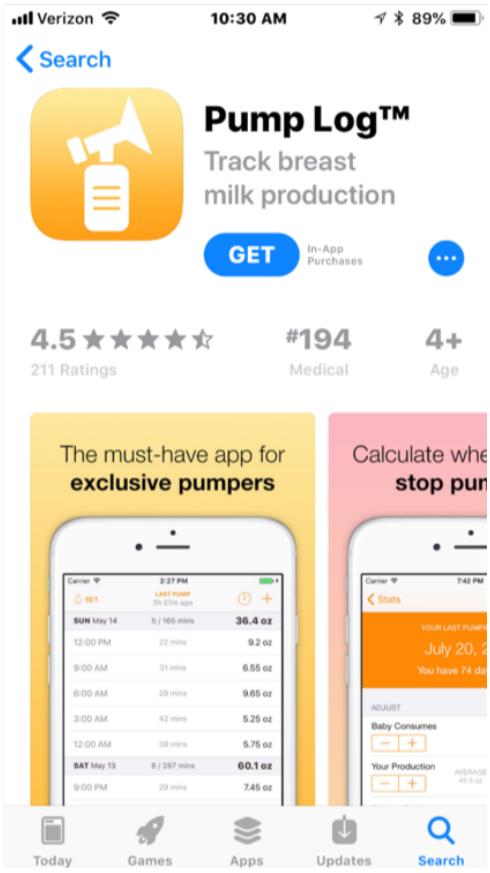
_____

Adapted from: https://health.ucsd.edu/specialties/obgyn/maternity/newborn/nicu/spin/parents/Pages/default.aspx

TOOL #15

Pumping Apps for Smartphones

iPhones



Android

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