Human Milk and the Prevention of NEC: Promotion of Mother’s Own Milk

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The NEC Society

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Disclosures

• I’m a neonatologist that works in a US urban safety-net NICU
• I serve on a research board of a local HMBANA milk bank; the Mother’s Milk Bank Northeast (volunteer)
• I’m the education chairperson for the American Academy of Pediatrics Section on Breastfeeding and lead author of an upcoming clinical report, “Promoting Human Milk and Breastfeeding for the VLBW Infant”

• Funding
  – W.K. Kellogg Foundation P0231665
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• Mother’s own milk and NEC
• Top 6 evidenced-based hospital practices to support mother’s in making milk
• Health Equity: racial/ethnic disparities in mother’s milk and potential solutions
• Team approaches to success for your NICU: involve families!
Mother’s Milk for VLBW (≤ 1,500 grams) Infants

- Multitude of health benefits
  - Reduction in NEC and blood stream infections
  - Improved feeding tolerance, neurodevelopment
  - Maternal health benefits

- Dose-dependent relationship

Meinzen-Derr et al. J. Perinatol 2009

What do mother’s want?

• Mothers of very preterm infants are more likely to initiate lactation compared to mothers of term infants
• Mothers of very preterm infants often do NOT reach their lactation goals

• Key Barriers:
  – Pre-existing and pregnancy related medical morbidities
  – Prolonged mother-infant separation
  – Pump-dependence vs. direct breastfeeding
  – Competing demands that impede frequent milk expression and NICU visitation

Colaizy, TT et al. *Public Health Nutr* 2012
Hoban R et al. *Breastfeeding Medicine* 2015
Top 6 Evidenced-Based Hospital Approaches to Support Mothers of Preterm Infants in Making Milk
1. The Pump Matters

- Not all breast pumps are created equal

- Mothers need effective and efficient double electric breast pumps for hospital and home

- There are 100s of pumps on the market of variable quality
  - Variable insurance reimbursement
  - Vary in suction power, size, sound, hands free vs. not

- Examples of “hospital-grade” pumps used in US hospitals
  - Medela symphony (~$2,000)
  - Ameda elite (~$1,200)
1. The Pump Matters

• Even if the mother has a pump, she won’t succeed unless she knows what to do with it

• Mothers should be trained in use of her home pump prior to discharge if all possible

• Mothers should have all the equipment they need
  – Flages (correct size), tubing, etc
  – Storage containers with labels

• NICU staff should be trained in navigating the basics:
  – Use of the pump
  – Suction strength
  – Pain with pumping
  – Proper flange fit
2. Milk Expression: Timing

• Current expert opinion is to initiate first milk expression within 6 hours after birth
  – WHO 10 Steps guideline for separated mother-infant dyads
  – Expansion of Baby-Friendly hospital initiative 10 steps to NICU expert recommendations (*Journal of Human Lactation* 2013)

• Data supporting this recommendation based on reports from single centers and pilot RCTs with small numbers
Data Driven Approach to Determine Optimal Timing of First Milk Expression among 1,157 mother-VLBW infant dyads

Predicted Probability of Any/Exclusive Mother's Milk at Discharge/Transfer

Hour After Birth of First Milk Expression

- Any MM
- Exclusive MM

Optimal cut point?

Parker et al, Obstetrics and Gynecology, 2019
2. Milk Expression: Timing

- No large RCTs examining optimal timing of first milk expression
  - But coming soon from Leslie Parker and colleagues!

- It is unclear if first milk expression from a pump or hand expression is superior

<table>
<thead>
<tr>
<th>Pump</th>
<th>Hand Expression</th>
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<tbody>
<tr>
<td>Pump must be accessible</td>
<td>Minimal equipment needed</td>
</tr>
<tr>
<td>Can take longer for set up and use</td>
<td>Fast</td>
</tr>
<tr>
<td>More comfort</td>
<td>Some staff may feel less comfortable</td>
</tr>
<tr>
<td>Requires staff training</td>
<td>Requires staff training</td>
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2. Milk Expression: Timing

• There are important barriers to consider to achieve the goal of early milk expression

  – There are a lot of competing demands regarding maternal care in the immediate postpartum period
    • Medications
    • Assessments
    • Hand-offs

  – *Anecdotally:* Mothers feel that first milk expression is substantially less invasive than giving birth
Tips on Improving Early Initiation of Milk Expression

• Supplies must be readily available
  – Expression kits and pumps
• Must collaborate with OB nursing staff on post-partum and labor and delivery
• Incorporate the first milk expression into the existing staff work flow
  – Example: part of postpartum admission bundle
• Get the family involved
  – Example: PACU pump
3. Milk Expression: Frequency

• Current expert opinion is to pump 8 times in 24 hours, or every 2-3 hours
  – WHO guideline for separated mother-infant dyads per 10 Steps
  – Expansion of Baby-Friendly hospital initiative 10 steps to NICU expert recommendations
    (Journal of Human Lactation 2013)

• Existing data suggest that many mothers do not comply with this recommendation

• Published cut-points for pumping frequency ≥ 4 to 7 times a day
  – More frequent pumping is associated with greater milk production
    Hoban et al, Breastfeeding Med 2018

• Pumping next to the infant bedside or after skin-to-skin care yields greater milk production
  – Acuna-Muga et al, JHL 2014
3. Milk Expression: Frequency

• **In reality, different mothers make different amounts of milk when they pump**
  – Ideally, we would ask mothers to pump enough to reach a certain volume, but most mothers don’t keep track of this

• **Production of milk ≥ 500 ml/day by day 14 is associated with longer lactation in mothers of VLBW Infants**
  – Hoban R et al. *Breastfeeding Medicine* 2018

• **Take home:**
  – Mothers should pump as often as they can, particularly in the first 2 weeks when milk supply is being established
Tips on Improving On-going Pumping and Milk Production

- Peer-support (breastfeeding peer counselors)
- Transportation/Parking
- Pumping Logs
- Scheduled check-ins
4. Skin to Skin care

- Skin to skin care should be encouraged as much as possible and for as long as the family desires

- Many benefits, including improved milk production
  - Boundy EO *Pediatrics* 2016

- Controversy occurs regarding which infants are “eligible” for STS
  - Tremendous hospital variation

- STS can occur safely with infants:
  - On a ventilator
  - On CPAP
  - With securely placed central lines
Tips on Improving Skin to Skin Care

- Need proper reclining, supportive chairs
- Inclusive policies/guidelines on skin to skin care
- Kangaroo-a-thon!
- Use family voices

I’m eligible for Skin-to-Skin Care!

- Skin-to-Skin Care is when you hold your baby when he or she is naked, with only a diaper, on your bare chest
- Skin to Skin Care can help premature babies keep the right body temperature, breathe and sleep better and help mothers make more breast milk

*Ask your medical team for more information*

Goal population: premature infants < 44 weeks corrected gestational age
5. Direct Breastfeeding

• Longer duration of lactation associated with:
  – Initial oral feedings at the breast
  – More frequent direct breastfeeding
  – Earlier gestational age at time of first breastfeeding attempt

• Initiate oral feedings according to feeding cues
  – 31-33 weeks in existing studies

• Oral feedings on CPAP or hi-flow can lead to aspiration

Pinchevski-Kadir, et al. Nutrients 2017
Briere, et al. JHL 2015
5. Direct Breastfeeding

• Why is this so hard?

  1) In the NICU we focus on measuring volumes consumed
  2) We want to ensure that infants receive fortified milk
  3) Preterm infants’ feeding ability evolves quickly
  4) Mothers can’t come to the NICU as often as we/they want
Tips on Improving Direct Breastfeeding

• First 5-7 days of oral feedings only at the breast
• Guidelines for non-nutritive sucking
• Introduce this idea as early as possible to families
• Post-discharge feeding plans should incorporate maternal lactation goals
  – Consider both maternal lactation goals and fortification needs
  – Concrete plan for post-discharge lactation support
6. Education: Staff and Families

• Staff lactation education in:
  – 1) mother’s milk benefits, strategies to maximize lactation, proper milk storage
  – 2) Technical expertise in using pumps, hand expression, assessing latch

• ALL STAFF!
  – Only lactation consultants are not enough
  – Only nurses and lactation consultants are not enough
  – Only female staff are not enough

• Staff education changes knowledge and attitudes toward breastfeeding

6. Education: Staff and Families

• Education for families optimally should include
  – Health benefits
  – Need for early and frequent milk expression
  – Role of non-nutritive sucking and oral feedings at the breast
  – Technical expertise on using pumps, milk storage and transport

• Begin prenatally

• Education increases intent to breastfeed and reduces anxiety

• Provide education in conjunction with an assessment of maternal lactation goals

Meier, J *Obstet Gynecol Neonatal Nurs*, 2004
Multilingual Education Materials for Families

- Translation into 8 languages

Breastfeeding your Premature Baby in the Hospital and at Home

**Babies born very early need to stay in the neonatal intensive care unit. While they are there they will start learning to breastfeed, and they will continue to learn even after they go home.**

**When can I start breastfeeding my baby in the hospital?**
- You can start breastfeeding when you hold your baby skin-to-skin. Your baby will be comforted, and it will help you make more milk. At first, your baby will only be strong enough to drink a little milk. He or she will then get the rest of your breast milk through a bottle or feeding tube.
- At about 34 to 36 weeks, most babies are strong enough to breastfeed more. Babies that need extra help breathing while in the hospital may take longer to start breastfeeding.
- Your baby’s doctors and nurses can tell you when your baby is ready to start breastfeeding.

**How do I breastfeed my baby in the hospital?**
- Learning to breastfeed your baby is hard work. At first, your baby may only breastfeed 1-2 times per day. Keep practicing!
- Your baby will be able to breastfeed more as time goes by.
- Your baby may need to take breaks during breastfeeding when they are first learning.
- Using a nipple shield can make it easier for your baby to get milk when he or she is learning to breastfeed. Nipple shields can be used in the hospital and for the first few weeks after your baby goes home.
- Remember to keep using a breast pump and do skin-to-skin care when your baby is learning to breastfeed to keep making enough milk.

**Extra nutrients:**
- When your premature baby is in the hospital and even after you go home, your baby may need extra nutrients added to the bottles of your breast milk to help your baby grow.
- As your baby grows stronger and bigger, he or she will need less extra nutrients.
- You can ask your baby’s doctor about how long extra nutrients are needed in your breast milk.

Breastfeeding your baby at home:
- When your baby goes home, feed your baby the same way he or she was fed in the hospital. Talk to your baby’s doctor about when to change your feeding routine.
- If you want, as your baby grows you can start to breastfeed more and pump and give the bottle less.
- Talk to a lactation consultant (these are experts specially trained to help you breastfeed) about any questions you have about breastfeeding.

Skin-to-Skin Care for Your Premature Baby

**Babies born very early usually need to stay in the neonatal intensive care unit. You can stay close to your baby by doing skin-to-skin or “kangaroo” care. Holding your baby skin-to-skin is healthy for your baby and you!**

**What is skin-to-skin or kangaroo care?**
- Skin-to-skin or kangaroo care is when you hold your baby on your bare chest. Your baby will be naked, wearing only a diaper.
- Direct contact with your skin without clothing or blankets in the way is what keeps your baby warm and healthy.
- You should do skin-to-skin care as much as possible while your baby is in the hospital and keep doing it at home after your baby leaves the hospital.

**Skin-to-skin can help premature babies:**
- Stay warm
- Breathe and sleep better
- Feel more connected to their mothers
- Get ready for breastfeeding

**Skin-to-skin can help mothers:**
- Make more breast milk
- Feel more connected to their babies
- Learn about their babies needs

**Who can do skin-to-skin care?**
- Holding your premature baby in a skin-to-skin position is safe. Even the tiniest babies can do it.
- Mothers, fathers, or other caregivers can all do skin-to-skin care.
- You can do skin-to-skin together
- Ask your nurse or doctor if skin-to-skin care is okay for your baby or babies.

**How do I do skin-to-skin care?**
- Your baby’s nurse will help you move and position your baby.
- Wearing a low-cut or button-down shirt can be helpful to make it easier to place the baby on your chest.
- Plan to spend at least 60 minutes holding your baby.
- You can use a breast pump after you finish doing skin-to-skin. Many mothers find after doing skin-to-skin they make more milk.

Available: www.neoqicma.org

neoQIC
Neonatal Quality Improvement Collaborative of Massachusetts

BOSTON MEDICAL CENTER
EXCEPTIONAL CARE. WITHOUT EXCEPTION.
Family Education Videos

- 5 key topics
- Parent voice only
- English and Spanish
- Educational and motivational
- View on smart phones
- www.neoqicma.org
Health Equity
Racial/Ethnic Disparities in Mother’s Milk Among VLBW Infants in the US

Any Human Milk at Discharge Among VLBW Infants According to Maternal Race/Ethnicity

$p$ for trend $= <0.01$

Parker et al. JAMA Pediatrics, 2019
How to address this problem?

• Local NICU-level
  – Collect and examine data
    • When do disparities emerge?
    • What kind of disparities?
  – Devise interventions accordingly
When do racial/ethnic disparities emerge?

Any Mother’s Milk According to Day of Hospitalization

- Day 7: p = 0.43
- Day 14: p = 0.76
- Day 21: p = 0.08
- Day 28: p = 0.002
- Day 42: p < 0.001
- Day 56: p < 0.001
- Disch/Transfer: p < 0.001

Racial/ethnic disparities emerged after day 21

Parker et al, Pediatrics 2019
Potential Strategies

• NICU-level family engagement practices
  – Transportation/parking
  – Meals for breastfeeding mothers
  – Sibling visitation guidelines
  – Family support groups

• Individual-level interventions
  – Peer-counselors
  – Pump rentals
How to address this problem?

• Local NICU-level
  – Collect and examine data
    • When do disparities emerge?
    • What kind of disparities?
  – Devise interventions accordingly

• State/region/national-level
  – Policies that support maternal lactation
Policy Efforts to Support Lactation

VON NICU by the Numbers Sept 2009

Team Based Approaches
Team Based Approaches

- Team based approaches are successful at improving lactation during the hospital time period for mothers of preterm infants

- **Elements of effective teams:**
  - Multi-disciplinary
  - Consistent communication to families across team members
  - Integration of lactation support practices into daily work flow
  - On-going data-driven feedback
  - Physician buy-in
Team Based Approaches

• Use local and statewide quality improvement structures
  – Data tracking
  – Key driver diagram
  – Plan Do Study Act cycles
  – Sharing interventions

• Materials available: www.neoqicma.org

• Articles:
  – Parker, et al. Massachusetts Pediatrics 2019
  – Parker and Patel. Seminars in Perinatology, 2017 “Using QI to Increase Human Milk Use for Preterm Infants.”
    • Summary of all statewide QI projects and published local QI projects to date
    • Summary of possible interventions
What did I leave out? A lot!

• Oral Colostrum Care:
  – Data emerging regarding benefits
  – Little risk

• Fortification: (see Dr. O’Connor’s talk)
  – Needed for hospital time period
  – Post-discharge fortification less clear

• Informal milk sharing
  – Generally discouraged for preterm infants because of possible safety risks

• Contraindications to mother’s milk
  – See American Academy of Pediatrics statements and LactMed
What did I leave out? A lot!

**CMV:**
- Consider breast milk acquired CMV for symptoms of late onset sepsis
- Controversy about freezing:
  - Freezing milk reduces, but does not eliminate CMV in mother’s milk
  - Freezing milk reduces “good” bioactive properties of milk
  - Meta-analysis showed that freezing milk didn’t change risk of CMV sepsis-like syndrome
  - Thus, most NICUs do not routinely freeze or pasteurize mother’s milk
- Large cohort studies examining long-term risks of postnatal breast milk acquired CMV emerging
  - Among a cohort of 356 infants <32 weeks followed to age 6 in the Netherlands; no difference in neurodevelopmental outcomes in the 14% with postnatally acquired CMV infection vs. 86% without

What did I leave out? A lot!

- **Galactogogues**
  - Domperidone associated with increased milk production among mothers of preterm infants in RCTs
    - 2004 Federal Drug Administration issued warning against domperidone use (in any form) for breastfeeding women because of case reports of cardiac arrest and arrhythmias in IV forms
    - Some hospitals use oral domperidone and some don’t
  - Paucity of RCTs examining efficacy and safety of herbal galactogogues

Asztalos et al. *JHL* 2017
Grzeskowiak et al. *BJOG* 2018
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Questions?

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