Human Milk for Small and/or Sick Newborns

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Dual Appointment

- University of Pennsylvania
  - Teach and mentor students across the curricula-BSN, MSN, PhD
  - Entire semester undergraduate course on human milk & breastfeeding
- Children’s Hospital of Philadelphia
  - Direct all human milk and breastfeeding activities
Lancet 2016 Series

• The deaths of 823,000 children and 20,000 mothers each year could be averted through universal breastfeeding, along with economic savings of US$300 billion.
Lancet 2016 Series

• Not breastfeeding is associated with lower intelligence & economic losses of about $302 billion annually or 0.49% of world gross national income
WHO states all infants need exclusive human milk feeds for 6 months—yet < 40% of infants actually are!

10 good things you need to know about exclusive* breastfeeding

1. saves life and protects baby against disease with antibacterial agents.
2. provides all nutrients baby needs for the first 6 months.
3. ensures clean and safe source of food, especially in emergencies.
4. makes child grow strong and intelligent.
5. breaks the cycle of diarrhea and malnutrition.
6. bonds mother and child.
7. reduces the mother's risk of ovarian and breast cancer.
8. helps space pregnancies, a natural method of birth control.
9. saves money by not having to buy infant formula and feeding equipment.
10. protects the environment with no need for packaging and disposal.

*exclusive means 100% breastmilk, no water, no solid food, nothing else.
ILCA Position Statement

• Spatz & Lessen (2011)
The Risks of Not Breastfeeding-position statement for the International Lactation Consultant Association
• www.ilca.org
Formula Marketing is Pervasive

- Thailand
- Germany
NEW REPORT FROM WHO HAS CONCERNING NEWS ABOUT BFHI
Is BFHI Really Working?

• Many countries have not been able to establish effective reassessment procedures
• Most facilities do not have internal monitoring systems to ensure that staff continue to adhere to standards but instead wait for external assessments to identify problems
• Since most facilities do not have internal monitoring systems to ensure that staff continue to adhere to standards, baby-friendly practices are not maintained over time
• Many countries have not been able to establish effective reassessment procedures, partly due to lack of funding and partly due to a focus on trying to get more facilities designated for the first time
• When reassessments are conducted, many facilities fail to qualify for designation
• In some countries, particularly higher income countries, the costs of BFHI are largely borne by facilities that choose to participate
Is BFHI Really Working?

- Of the 78 countries with an active BFHI programme, only half (39 countries) have put in place a reassessment process
  - Of these, 21 countries reported that reassessment occurs less often than every five years
  - Only 14 countries reported that they reassess facilities at least every five years
- One-third of the countries implementing BFHI (33 countries) had not designated or reassessed any facilities in the past five years and 36 did not know how many
- **After 25 years of implementation, the percent of facilities that have been designated as Baby-friendly remains quite low**
- **Globally, only 10% of births occur in facilities that are still designated as Baby-friendly**
Mothers of NICU Infants Need Different Care than BFHI

<table>
<thead>
<tr>
<th>Healthy Infants</th>
<th>NICU infants</th>
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<tbody>
<tr>
<td>• BFHI has been well implemented in world but has only recently gained momentum in United States</td>
<td>• Hospitals that care for NICU infants need multiple policies to ensure infants receive human milk &amp; breastfeed</td>
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<tr>
<td>• <em>Focus is on healthy term infants</em></td>
<td>• Pumping initiation</td>
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<td></td>
<td>• Label &amp; storage</td>
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<td>• Skin to skin</td>
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<td>• Oral care</td>
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<td></td>
<td>• Transition to at breastfeeds</td>
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<td>• Need for technology!</td>
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How do you get from here to there?
NICU INFANTS NEED A DIFFERENT MODEL TO ENSURE RECEIPT OF HUMAN MILK
Ten Steps for Promoting and Protecting Breastfeeding for Vulnerable Infants

Diane L. Spatz, PhD, RNC

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

Ten Steps for Promoting/Protecting Breastfeeding in the Vulnerable Infant

- Step 1: Informed decision
- Step 2: Establishment & maintenance of milk supply
- Step 3: Human milk management
- Step 4: Feeding the infant the milk
- Step 5: Skin-to-skin care
- Step 6: Non-nutritive sucking
- Step 7: Transition to breast
- Step 8: Measuring milk transfer
- Step 9: Preparation for discharge
- Step 10: Appropriate follow-up

Over 10 years of published clinical and research outcomes!
CHOP Human Milk Outcomes

• 99% of women who deliver in the Special Delivery Unit initiate pumping for their critically ill infants

• Over 86% of infants in the NICU go home on human milk (if they were born in the SDU or admitted to CHOP within 7 days)

• Average breastfeeding duration post discharge 8 months (Range 0.25 to 30 months)

Spatz 10 Steps at TGH

- Increase in number of mothers pumping < 6 hours post-delivery
- Increase in patient satisfaction
- Increase in # of infants receiving human milk as first feed
  - **Human milk at discharge rate increase 3 fold!**

Note: all were statistically significant findings!
THAILAND IMPLEMENTATION

Country-wide implementation:
Human milk rates at discharge have increased 3 to 6 fold!
Full Implementation in 25 Pioneer Hospitals

2013
6 Hospitals
1. Queen Sirikit Institute of Child Health
2. Charoenkrung Pracharak Hospital
3. Srinagarind Hospital
4. Maharaj Nakorn Chiang Mai Hospital
5. Maharaj Nakhonsithammarat Hospital
6. Phrapokklao Hospital Medical Education Center

2014
10 Hospitals
1. Mahasarakham Hospital
2. Somdet Phrasangkharat 17th Hospital Suphan Buri
3. Pattani Hospital
4. Phramongkutklao Hospital
5. Somdech Phra Debaratana Medical Center
6. Phra Na Khon Sri Ayutthaya Hospital
7. Saraburi Hospital
8. Surin Hospital
9. Thammasat University Hospital
10. BMA General Hospital

2015
9 Hospitals
1. Chonburi Hospital
2. Panyananthaphikkhu, Panyananthaphikkhu chonprathan Medical Center Srinakharinwirot University
3. Sakon Nakhon Hospital
4. Prachanukroh Rai Hospital
5. Somdej Phra Pin Klao Hospital
6. Vachira Phuket Hospital
7. Fort Surasinghanart Hospital
8. SONGKLANAGARIND HOSPITAL
9. Angthong Hospital
Country-Wide Scale-up!

- By 2020, all NICUs in Thailand will have implemented my model
- Teaching tools include practical flip chart with information for families on front-side and research data and citations on backside
2016-Implementation of Spatz 10 Steps in NICUs in India

• Delhi and Jaipur NICUs

• 10 hospitals representing over 100,000 births with a 25% NICU admission rate
  • Visited both government & private sector hospitals
  • Majority of NICUs were closed to mothers & families
  • Mothers were unable to see their infants until the infant was stable enough to go to KMC room
  • Not a single mother had a normal milk supply
  • Infants primarily received formula as the first feeding
2016-Implementation of Spatz 10 Steps in NICUs in India

- Education sessions varied from one day (Delhi) to one full week in Jaipur
  - Didactic
  - Skills fair
  - In the NICU
2016-Implementation of Spatz 10 Steps in NICUs in India

- Support of physician administrator (Dr. Sitaraman) to open NICUs to the mothers and fathers

- Neonatologist champion (Dr. Chetan) who participated in didactic education, skills fair training, and bringing families into the unit for the first time ever!
2016-Implementation of Spatz 10 Steps in NICUs in India

• Graduation ceremony
2016-Implementation of Spatz 10 Steps in NICUs in India

• Mothers are now doing oral care and holding their infants skin to skin in the NICU!

• Human milk & breastfeeding rates increased in just one year
  • 25% in January 2016 → 75% in December 2016
Many women do not initiate breastfeeding due to culture, lack of family support, lack of education & exposure to breastfeeding.

**STEP 1: INFORMED DECISION**
Informed Decision: Prenatal Lactation Consultation

• Focus-the provision of human milk
  • Exclusivity
  • Dose & exposure

• Every family deserves the right to make an informed choice

• Help family set goals related to human milk and breastfeeding
All available research tells us that infants are more likely to die and have morbidity if they are not fed human milk!


Top 5 Reasons
Human Milk = Medical Intervention

• Protection from infection
• NEC
• Feed tolerance
• Brain development & developmental outcomes
• Protection from both short & long term health illnesses
Top 7 Components of Human Milk

• Human milk oligosaccharides
• Antibodies
• Anti-oxidants
• Lactoferrin
• Osteopontin
• White blood cells
• Stem cells
The Power of Pumping!

- http://www.chop.edu/service/breastfeeding-and-lactation/home.html
STEP 2: ESTABLISHMENT & MAINTENANCE OF MILK SUPPLY
Lactogenesis I

• Begins at 16 weeks of pregnancy
• Breasts are prepared to make milk!
Breastfeeding in OR!

- When infant is physiological stable & able to feed at breast

Prioritize early and frequent skin to skin contact
Milk Volume Colostrum

• During days 0-4, only small amounts of colostrum are expected to be produced
  • Infants on average only consume $15 \pm 11$ grams during first 24 hours
  • Per feed intake is only $1.5 \pm 1.1$ grams

• Critical role of colostrum
  • Save it ALL!

Santoro and colleagues (2010) *Pediatrics*; 156:29-21
Vacuum is Necessary for Milk Removal!

- Geddes, D. T. and colleagues (2008) in *Early Human Development*
  - Peak vacuum (-145 ± 58 mmHg) occurred with the tongue was at the lowest position
  - Milk flow through the milk ductules was observed at this time

  - Vacuum is likely *KEY* for milk removal

- *Hands only techniques will not result in adequate suction vacuum to establish full milk volume*
Pumping must be First Priority!

  - Mothers who pumped within 1 hour had (compared to mothers who pumped within 6 hours):
    - Significantly more milk during the first 7 days (P=0.05)
    - Significantly more milk at week 3 (P=0.01)

Milk Production is Vital!


- Milk volume & frequency of expression on day 4 are significant predictors of milk supply at 6 weeks

- Production of less than 500 mls/day by end of week 2 = less than adequate milk production long term
Setting Up Pumping Stations - India

⁻ Hospital Grade Pumps

⁻ Pumping Supplies →

⁻ Water purifier

⁻ Machine to sterilize pump equipment →
Setting Up Pumping Stations - Thailand
Lactation Clinic-Thailand
STEP 4: ORAL CARE & FEEDING HUMAN MILK
Colostrum as Oral Immune Therapy to Promote Neonatal Health
Sheila M. Gephart, PhD, RN; Michelle Weller, BSN, RN, IBCLC

ABSTRACT
It is well known that the immune response is blunted and underdeveloped in the premature infant, but human milk supports the infant’s growth, function, and effectiveness. Thus, own mother’s colostrum (OMC) administered oropharyngeally has potential to deliver oral immune therapy (C-OIT) even before enteral feedings have begun. Colostrum interacts with lymphoid tissue in the oropharynx and gut. Colostrum as oral immune therapy is delivered by swabbing the cheeks in the first days of life. Little formal study has evaluated its effectiveness. However, small studies demonstrate that it is a practice that is safe, feasible, and well tolerated even by the smallest premature infants. Encouraging preliminary evidence supports the effect of C-OIT to reduce the time to full enteral feedings. Effects on other outcomes is unclear, in part because existing studies are underpowered to detect significant differences on outcomes like necrotizing enterocolitis, sepsis, and death. Another limitation in the evidence base is that adherence to the intervention and the number of doses of colostrum infants received in the studies is not consistently made clear. More well-designed studies are needed to demonstrate the impact on neonatal complications and how C-OIT supports the infant’s immune development. Quality improvement and time series reports of differences pre- and postimplementation of OMC given orally should minimally include statistics for adherence to the intervention and/or the number of doses an infant received as a covariate. Even so, OMC is an immune therapy that poses little risk yet offers likely cost-effective benefit for vulnerable infants.

Key Words: breast milk, colostrum, extremely low birth weight, health promotion, human milk, infection prevention, neonate, neonatal intensive care, nutrition, oral immune therapy, very low birth weight
Oropharyngeal Colostrum Administration in Extremely Premature Infants: An RCT

Juyoung Lee, MD, Han-Suk Kim, MD, PhD, Young Hwa Jung, MD, Ka Young Choi, MD, Seung Han Shin, MD, Ee-Kyung Kim, MD, PhD, Jung-Hwan Choi, MD, PhD

**Objective:** To determine the immunologic effects of oropharyngeal colostrum administration in extremely premature infants.

**Methods:** We conducted a double-blind, randomized, placebo-controlled trial involving 48 preterm infants born before 28 weeks' gestation. Subjects received 0.2 mL of their mother's colostrum or sterile water via oropharyngeal route every 3 hours for 3 days beginning at 48 to 96 hours of life. To measure concentrations of secretory immunoglobulin A, lactoferrin, and several immune substances, urine and saliva were obtained during the first 24 hours of life and at 8 and 15 days. Clinical data during hospitalization were collected.

**Results:** Urinary levels of secretory immunoglobulin A at 1 week (71.4 vs 26.5 ng/g creatinine, \( P = .04 \)) and 2 weeks (233.8 vs 48.3 ng/g creatinine, \( P = .006 \)), and lactoferrin at 1 week (3.5 vs 0.9 μg/g creatinine, \( P = .01 \)) were significantly higher in colostrum group. Urine interleukin-1β level was significantly lower in colostrum group at 2 weeks (55.3 vs 91.8 μg/g creatinine, \( P = .01 \)). Salivary transforming growth factor-β1 (39.2 vs 69.7 μg/mL, \( P = .03 \)) and interleukin-8 (1.2 vs 4.9 ng/mL, \( P = .04 \)) were significantly lower at 2 weeks in colostrum group. A significant reduction in the incidence of clinical sepsis was noted in colostrum group (50% vs 92%, \( P = .003 \)).

**Conclusions:** This study suggests that oropharyngeal administration of colostrum may decrease clinical sepsis, inhibit secretion of pro-inflammatory cytokines, and increase levels of circulating immune-protective factors in extremely premature infants. Larger studies to confirm these findings are warranted.
Oral Care Benefits Family Too!

Novel findings
• Human milk oral care translates to feelings of inclusion in the CDH infant’s daily care

• Empowers mothers and families
  • Motivation
  • Inclusion
  • Bonding
  • Feelings of positive progress

Keep pumping and build supply

Donor Milk


• Donor milk is not a replacement mom’s own milk —but a bridge
STEP 5 - SKIN TO SKIN CARE

- NICUs can NOT be closed to mothers & families!
- CHOP developed DVD for transfer of intubated infants
Skin to Skin is Essential

• Kangaroo Mother Care (if infant stable)
• Intermittent skin to skin even if infant is intubated!
• Need to teach staff & families both
Step 6: Non-Nutritive Sucking
Step 7: Direct Breastfeeding

• The BFHI states no pacifiers, but in the NICU pacifiers are associated with positive outcomes (mom’s breast should be used!)
• If mom’s goal is to breastfeed-infant needs to be but to breast as soon as exubated!
Thank You!

• To contact me: spatz@nursing.upenn.edu

For more information: http://www.aannet.org/edge-runners--10-steps-to-promote-and-protect-human-milk