

**TRANSLATING THE SCIENCE OF HUMAN MILK INTO BEST NICU PRACTICES**  
**Notes from ILCA seminars, attended by Cindy Rux**  
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**Rush University Medical Center**

**Evidence for the Use of Human Milk in Very Low Birth weight Infants**

Human milk is not the perfect food. Preterm babies need increased calcium, phosphorus, and protein. Babies that were fed fortified human milk (HM) gained weight slower than those fed preterm formula, but went home sooner, because they escaped necrotizing enterocolitis (NEC). HM has components that we cannot duplicate in formula. These components are essential for brain growth.

Very Low Birth Weight (VLBW) < 1500gms consist of 1.4% of all live births and account for 30% of all newborn care costs.

Late on-set sepsis costs 4-7 more days in hospital (\$5875-\$12,480). If we could decrease sepsis by 25% we'd save 24 million dollars per year in health care costs. A single NEC case adds 22 days to the hospital stay and costs \$73,700- \$186,000. The more preterm the baby, the more protective mom's milk is to the baby. Moms of preterm babies have interstitial spaces between breast cells that remain open longer than moms of full term babies. This provides for longer protective factors in moms milk and customizes to protect the baby.

It takes very little formula to change babies gut flora. HM critical in the first 14-28 days. For every 2 tsp of HM provided to a baby, it decreases developmental problems. This makes a difference in the baby's long term outcome. Very important for moms that can't go home with the "freezer full" award. For every 100mls of HM given over the first 14 days, we decrease the risk of sepsis.

New HM evidence or view on HM use is that it down regulates inflammation and protects from systemic inflammatory response syndrome (SIRS) (i.e. Crohn's, ulcerative colitis, celiac disease, allergies, type 1 diabetes, organ injury, chronic lung, neuro-developmental delays). Human milk creates commensal bacteria that serve to protect the gut epithelial boarder and are anti-inflammatory (rust proofing the gut). Pre and pro-biotics prevent SIRS which HM naturally does. The infant gut colonizes with mom's GI bacteria and with the addition of human milk. The commensal bacteria protect spaces between the gut cells. Formula use loosens the bond between cells.

We need to balance the risk of feeding vs not feeding human milk in the NICU practice. An example of this is maternal medications that may be contraindicated due to effects of infant sedation. We are quite often sedating babies in the NICU and they are already on monitors. If we need to decrease medication exposure, a better option may be to use ½ HM and ½ formula.

## **Rush Mothers' Milk Club: A model to Translate Evidence about Human Milk in the NICU**

Their objective is to empower parents through sharing the science of lactation and mother's milk. 100% of mothers that were spoken to changed their decision from formula to breastfeeding upon hearing HM was needed and would impact their baby's health. The mothers meet weekly along with various staff members and have lunch provided. Moms are provided with information which includes research articles as evidence. A Milk Club Taxi is available and funded by grants.

Parents are encouraged "to go take care of their baby" (i.e. skin to skin) and not "go to visit your baby". Mothers are encouraged to pump at the bedside, keep milk volume records, taught to measure creatinocrits, and initiate tasting of milk by the baby at the emptied breast during skin to skin.

MD's tell moms that "HM is a medication for your baby. Without it, I won't be able to manage your baby's health as well"

All of the NICU nurses "Do" breasts and have an annual competency. This includes any male nurses.

Rush has salaried breastfeeding peer counselors(BPC) that have done a 5 day La Leche League peer counselor program. These BPC have been mothers of former NICU infants. They complete a 6 week intensive NICU orientation. Peer counselors provide 75% of Lactation Care in the NICU. They also visit antepartum patients twice a week. Coverage is 0730-2030, 7 days/week. These counselors are funded through 2 grants. Rush has 6 counselors. The counselors are considered research assistants. They prepare milk and prolacta for babies. Handheld computers are used for data collection.

New moms are seen within 24 hours by peer counselors. Pumping is initiated. Moms are fitted with a shield, taught milk labeling, test weights, creatinocrits as needed and questions are answered. Rush found that mothers doing creatinocrits were accurate and saved the nurses time. Most NICU babies go home with a scale. They breastfeed, weight the baby, supplement the difference with HM, and pump. Rush has a sliding scale pump rental program subsidized by the sale of other products.

Watch for new research late this year on providing HM 0.1ml in cheek pockets of babies while entubated. This protects the baby via the tonsils and lymph glands. Authors are Rodriguez N, and Meier P with review by Dr. Nancy Wight.

## **Protecting Milk Volume in Pump-Dependent Women with NICU infants: Evidence and Best Practices**

The first 2 weeks are critical for mom to push her milk supply to the maximum. At the end of 2 weeks after delivery, mom needs to produce 100-200ml per kg/day of what baby will need at time of discharge. Moms have no frame of reference on how much she needs to make. She needs early, frequent and complete milk removal to stimulate adequate milk production. They are

taught the importance of milk volume records by keeping a pumping log to help identify/treat problems. It is stressed “If we don’t have records, we can’t help you much”. The following information is share with moms in the NICU.

Standards for milk volume at 2 weeks:

Ideal: 750-1000ml/day

Adequate: 500ml/day (This is Rush’s goal)

Borderline: <350ml/day

51% of moms needed >24mm breast shield in first 48 hours.

77% of moms needed >24mm breast shield by 2 weeks.

Indicators of a snugly-fitted shell: nipple pain in periphery (not the tip) of the nipple, small residue of skin around the interior of the shell, and incomplete breast emptying during pumping.

If milk is not completely removed, the Feedback Inhibitor of Lactation (FIL) works to inhibit supply of milk. This happens with nipple piercings and breast surgeries. Moms sometimes think they have so much milk volume that they tend to slack off in pumping. If mom skips just one pumping, she can stimulate FIL.

Found in the majority of moms: The right breast generally over performs and the left under performs. The maximum difference = 94ml in study. No matter the volume, one breast will always produce more.

Moms should use the pump for 2 consecutive minutes after droplets cease. Moms that pump 10-15 minutes may not empty entirely and may have increased lipids/calories left in the breast and lower calories in the pumped milk. Not emptying thoroughly compromises the total volume and lipid content. She should pump 8 times/day. Don’t set the alarm clock at night, she needs to sleep. Use pump if they awaken though. Once supply is well established at 500ml/day, mom can pump 5-6 times/day. Moms using a community NICU pump are taught to clean the pump prior to using. This way she has an increased vested interest in having a clean pump. Rush uses “Quick Clean Wipes” kept in a wire basket with a cleaning card attached. They feel these are safer than bleach wipes. Mom then washes her hands prior to pumping.

Bacteria in Baby’s oropharynx colonizes in the distal milk ducts of mom’s breast and grows. If bacteria noted it is usually from the baby’s mouth or mother’s hands.

Rush gives “Full Freezer Awards” to mom when the equivalent of 1 freezer is full. They try of make fun for the mom.

Reglan is used first for low supply and then herbals to maintain supply. They do not see major side effects with its use. They do not wait to see what pumping will do first. Reglan will work only if mom has intact prolactin response.

They use 11ml – 240ml vials from Capital Vial. They want to have entire pumping in 1 container.

Factors that are linked with delayed onset of lactation may be high body mass index and duration of labor. The prolactin Inhibiting Factor (PIH) also influences milk production. It is secreted in response to stress, anxiety, fatigue, and pain. Anxiety and insomnia should be treated with short term pharmacologic agents because mom needs sleep.

### **Managing Complex Human Milk Feeding Problems**

Milk composition varies with the stage of lactation and gestational age of the baby. There is a huge variability in lipids. Calories can range from 18.1-33.9/oz. Average 26.2 cal/oz. Some moms have fewer lipids so baby takes more volume/day. Moms that have a higher milk volume in the am have lower calorie counts per ounce. It may be more appropriate to freeze this milk for the future and use afternoon pumping for feedings of preterm infants.

Hind milk feedings: As breast is emptied the fat content increases.

80% of volume is removed in the first 5 minutes.  
50% of fat is in the last volume of milk.

If mom's volume exceeds a container's volume, the lipid content will be different. She should pump into a container that is big enough to hold the entire pumping.

Moms that work all day and pumps when first home will have decreased lipids due to the milk storage in the breast. Lactose in milk draws in more water into the milk volume thus reducing lipid concentrations. This can also happen with moms sleeping through the night.

Trouble Shooting: Is she getting breast emptied?

Is she using the appropriate breast shield size?

Infant feeding intolerance symptoms can be due to inadequate amounts of fat received.

Use mini-bore tubing (0.6ml) vs standard tubing (5.0ml). The mini-bore has less fat adhering to the inside of the lumen.

Chan, 2007 is doing a study of donor based HM fortifier that shows less interference on immune properties in mother's milk. Similac Human Milk Fortifier (HMF) has fewer immunological effects in HM than Enfamil HMF. Prolacta which is a donor milk based HMF had no increased effect on immunological properties of HM.

They check all milk like blood products using 2 people at most institutions. Paula Meier does not feel that 2 people check would prevent milk mix ups. All wrong milk given has been due to other factors.

CMV protocol updates: Dr. Nancy Wight is rewriting this for 2008 and adding new studies.

## **ETHICAL CONSIDERATIONS FOR THE USE OF COMPLEMENTARY & ALTERNATIVE THERAPIES**

**Lisa Marasco, BA,MA, IBCLC**

Complementary Alternative Therapies (CAT's) include: Naturopathy, Reflexology, Aromatherapy, Homeopathy, Acupuncture, Acupressure, Cranial Sacral Therapy, Etc.

CAT's are defined by social norms and driven by popularity. There is a definite role of politics in power over ethics standards. Who is in determines what's in or what's out.

We should use evidence based practice, but sometimes good evidence doesn't always exist. An evidence based approach is important, but we need to take a mature approach to this or we will never make progress without trying new therapies.

Code of Ethics: We may not prescribe, but it is acceptable to discuss with the patient. We should encourage them to seek guidance of their Health Care Provider before taking medications or herbals. CAT's are not specifically addressed.

We need to weigh the risk of formula vs risk of CAT's.

Counseling skills: Do no harm

Identify risks/benefits

Balanced presentation to avoid personal bias

Avoid paternalism (Don't tell mom what to do by providing selective information)

Informed consent

Charting and Documentation

Refer and report as appropriate (Health Care Provider reports)

**nccam.nih.gov** is a web site for the National Center for Complementary & Alternative Medicine.