

The Benefits of Early Enteral Feeding

In this feature, Neonatal Intensive Care interviews clinicians and healthcare providers about the actual application of specific products and therapies. Participating in the interview is Olivia Mayer, RD, Clinical Dietitian, NICU Specialist from Lucile Packard Children's Hospital, Stanford.

Lynne Russo: Infants are being fed at 24 weeks gestational age, are their guts mature enough to accept enteral feeding?

Olivia Mayer: Yes, they are! The organ formation of the gastrointestinal tract is complete and intact at 12 weeks of gestation. Swallowing is detectable at 16-17 weeks of gestation. Amniotic fluid flows through the GI tract, in utero, which contains substances such as epidermal growth factors, carbohydrates, protein and fat, which stimulates the maturation of the organ. The absorptive process is only partially available at 26 weeks gestation; however, the composition of the enteral feeding (human milk vs. cow's milk based) also impact the absorption and tolerance of the feeds. At 36 weeks gestational age, the gastrointestinal tract should achieve mature motility - barring any surgical or ischemic injury.

LR: How do you define "early feeding"?

OM: Early feeding is more 'medicinal' than nutritional. I define it as using human milk within 24-72 hours of life, starting 10-30 mL/kg/day. It is to stimulate gut hormone maturation, gut hormone release, induce gut motility, continue to stimulate the microvilli of the GI tract.

LR: What are the measurable benefits of early enteral feeding?

OM: Decreased Necrotizing Enterocolitis, decreased days on parenteral nutrition, decreased cholestatic jaundice, decreased IV line days, decreased late-onset sepsis, likely achieve full feeds faster, regain birth weight faster, improved bone mass, and improved mental outcomes at 24 months corrected age. All good things.

LR: Are there any circumstances during which you shouldn't feed these infants early?

OM: If there is a major abdominal defect, such as an omphalocele or gastroschisis, or a gastrointestinal tract perforation, or a trachoesophageal fistula — or other anatomic limitation. If the baby is not hemodynamically stable and requiring aggressive resuscitation including dopamine.

LR: There has been debate about the speed of advancement of feeding, what is your view on this?

OM: I am of the 'slow and steady' mindset. I think in these extremely fragile infants, starting slow and advancing in a steady fashion is prudent. Watching the baby's tolerance very closely is

key as well. If their feeds are advancing, and they start to show increased abdominal distention, emesis, etc. I would prefer to hold the feeds at the current volume — or even back off a few mLs per feed — at least for a day or two, instead of pushing through those signs.

LR: Is there a particular juncture where the start of enteral feeding outweighs the risk of developing NEC?

OM: This is a great question. Assuming the baby is relatively stable, and no anatomic malformations or pharmacologic therapies that may impede blood flow to the GI tract — I believe trophic feeds should be started within the first 24 hours of life. Now, the second part of this is the availability of mom's own milk vs. feeding with banked breast milk. Many feel very strongly that the very first feed(s) should be that infant's mother's own milk; however, mothers who deliver prematurely experience a delay in Lactogenesis II — or a delay in her milk 'coming in' — so it may be 3-4 days before mom is able to produce and express her own milk. Banked breast milk can 'bridge that gap'; however, the concern for some is that the baby is not being colonized with adequate/specific immunoglobulins and probiotics. It's true that there is some degradation of immunoglobulins in the pasteurization process of banked breast milk; however, there are still properties that survive that are unable to be replicated in formula. The other reality is that there are still NICUs without access to or budget for banked breast milk. If banked breast milk is not available, I believe the waiting for mom's own milk outweighs the risk of starting enteral feeds with formula.

LR: There is a difference of opinion about needing to hold feeds while treating PDA, what is your opinion on this?

OM: This is also a great question. There are several studies that looked at trophic feeding during indomethacin treatment for PDA and actually found their NEC rate decreased. As far as I know, this is still not widely practiced. In my opinion, I do think trophic feeds should be continued when treating PDAs. I completely understand the hesitation with feeding through treatment and the very real concern and risk of NEC/spontaneous intestinal perforation; however, I think a compromise might be to decrease the volume and/or frequency (i.e. if the baby was at 30 or 40 mL/kg/day and feeding Q 3 hours, maybe decreasing to 20 mL/kg/day &/or feeding every 4-6 hours).

LR: How important is it to have standard feeding protocols across any particular NICU?

OM: A standardized protocol can lead to improved nutritional outcomes, decreased rates of major morbidities and better

Input on questions was provided by Lynne Russo. If you would like to participate in this feature, as a company or healthcare provider, please contact Steve Goldstien at s.gold4@verizon.net.

growth for VLBW infants. In a unit, like a NICU, where the attending physicians and nurse practitioners rotate on and off service, the standardized feeding protocol promotes more consistent care with less variability. It facilitates improved communication and the continuity of care across all members of the medical team. The major aims of the LPCH protocol were to (1) advance enteral feeds in a safe, standardized manner; (2) advocate the use of human milk as the definitive first choice for feeds; and (3) use colostrum, by oral administration, to promote immunological protection and intestinal colonization and maturation in neonates.

LR: Your hospital (LCPH) did a study looking at feeding protocols, what did you find?

OM: Data were analyzed on 147 VLBW infants who received enteral feedings, 83 before ('Before') and 64 subsequent to ('After') feeding protocol initiation. We found improved nutritional outcomes, decreased rates of major morbidities and better growth for VLBW infants. The outcomes in the ELBW infants were even more pronounced.

LR: Did you see a difference on any of these things:

- OM:** *Nutrition* – Excluding those with weight <3rd percentile at birth, the proportion with weight <3rd percentile at discharge decreased significantly after protocol initiation (35% Before vs 17% After, P=0.03).
- *NEC rates* – Necrotizing enterocolitis decreased in the After group among VLBW (15/83, 18% Before vs 2/64, 3% After, P=0.005) and ELBW infants (11/31, 35% Before vs 2/26, 8% After, P =0.01).
 - *Late onset sepsis* – Late-onset sepsis decreased significantly in the After group (26/83, 31% Before vs 6/64, 9% After, P = 0.001).
 - *Reaching full feeds faster* – Extremely low birth weight (ELBW) infants in the After group attained enteral volumes of 120 ml/kg/day (43.9 days Before vs 32.8 days After, P=0.02) and 160 ml/kg/day (48.5 days Before vs 35.8 days After, P=0.02) significantly faster.
 - *Decreased TPN days* – received significantly fewer days of parenteral nutrition (46.2 days Before vs 31.3 days After, P=0.01).

LR: How have you incorporated an exclusive human milk diet (EHMD) into your feeding protocols at your hospital?

OM: We have used banked breast milk in our hospital for a very long time. In 2010, we started using the human milk based, human milk fortifiers added to human milk feeds — mom's milk, or banked breast milk. We incorporated them into our standardized feeding pathways, so that when a baby is ordered to receive enteral feedings at a total of 100 mL/kg/day, the human milk based, human milk fortifiers are automatically ordered to start.

LR: What outcomes have you seen as a result of implementing an EHMD?

OM: Greatly improved tolerance to feeds, less stopping and holding of feeds, shorter time to reach full feeds, less number of days on parenteral nutrition, continued lower NEC rates.

LR: Have you seen a difference in growth weight rates?

OM: We have actually seen a steady, consistent increase in our growth rates. We have made many improvements to our unit's nutrition strategies including early parenteral nutrition, standardized feeding pathways for our VLBW infants, and use of

an exclusive human milk diet in our less than, or equal to 1250 gm birthweight babies.

LR: Do you attribute to early feeding, EHMD or both?

OM: I attribute improved outcomes to both early, trophic feeding and utilizing an exclusive human milk diet. I think it is a synergistic relationship where by each strategy is enhanced by the other.