Miris Interviews

Advancing Neonatal Nutritional Care

- An Interview with Stephanie Merlino Barr and Sharon Groh-Wargo

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Stephanie Merlino Barr and Sharon Groh-Wargo have worked together for the past six years in the Neonatal Intensive Care Unit at MetroHealth Medical Center, in Cleveland, Ohio, USA. The hospital provides medical and surgical care for both adults and children which includes about 3000 deliveries per year and the care of both healthy and high-risk newborns. Stephanie and Sharon are passionate about lactation advocacy and translating human milk and fortification research into clinical practice. We interviewed Stephanie and Sharon to hear more about what challenges and changes they are experiencing in their facility.

The MetroHealth Medical Center NICU operates within a general "safety-net" hospital. How are the challenges different for you than other surrounding specialty children's hospitals?

Sharon:
Several things come to mind. First, regarding being a general hospital that has both adult and pediatric patients, our NICU tends to have a more homogenous patient population than a children's hospital. For example, our patients are primarily, but not exclusively, preterm and VLBW (Very Low Birth Weight) infants whereas children's hospitals usually have large surgical and cardiac units.

Secondly, regarding being a "safety-net" hospital, we are committed to serving everyone regardless of their ability to pay. This means our maternal population tends to be very high risk and often have multiple barriers to accessing healthcare. Subsequently, their newborns are often at increased risk at delivery and may have increased co-morbidities upon birth. The inequities of social determinants of health experienced by our patient population were exacerbated during the COVID-19 pandemic.

In addition, hospital resources can be limited due to reliance on public programs, such as Medicaid, for reimbursement, versus private insurance.

Stephanie:
Knowing these barriers, our patients and their families deserve access to innovative and collaborative care. We are extremely proud at MetroHealth to be national leaders in clinical anthropometric assessment – we are one of only a few units in the country to have standard utilization of air displacement plethysmography in our NICU care. We are also excited to join the growing number of units utilizing human milk analysis to better individualize the nutrition of our preterm infant population.

What role do neonatal dietitians play in the context of improving human milk feeding and fortification?

Sharon:
I think NICU dietitians are seen as experts regarding human milk composition. Their clinical experience and training positions them to translate knowledge into the creation of individualized nutrition plans in the NICU. Having a human milk analyzer available brings the discussion of human milk composition variability to the forefront. It also highlights that human milk is the best feeding for nearly all newborns but requires fortification to meet the nutritional needs of VLBW infants.

Most neonatal dietitians, and some neonatologists who have a special interest in nutrition, are following

the literature closely and trying to figure out how to operationalize improvements in human milk feeding and fortification. Stephanie and I are especially interested in the unique role of the registered dietitian on the multi-disciplinary team in the NICU. We recently collaborated with other colleagues on a survey of North American clinical dietetic practice in the NICU. Stephanie is the first author on a paper entitled "The role of the neonatal registered dietitian nutritionist: past, present, and future" that discusses some of the results of the survey. It was recently published in Clinics in Perinatology.

In addition, we have a group of neonatal dietitians in Ohio that are in close contact, including twice yearly in-person meetings. We share our practices, challenges and solutions freely.

Stephanie:

In terms of our specific goals – Sharon has been a leader in establishing the importance of both neonatal nutrition as well as the role of the neonatal dietitian. We are invested in better understanding how neonatal dietitians, both in terms of staffing and job responsibilities, improve NICU outcomes.

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We are also working on implementing concepts and technology long discussed in the literature into standard clinical care. Utilization of body composition assessment and individualized fortification to inform care plans and improve upon nutrition-related outcomes are two primary areas of focus.

Considering the recent feasibility of human milk analysis in the US, could you share the current state of the implementation process?

Stephanie:
In short, it's a new clinical practice in the US, whereas individualized fortification using human milk analysis is a much more common practice in the EU. The differing structure of the healthcare system between the US and the EU also create some differences in how resources are regulated, implemented, and billed for.

To give some perspective on the US timeline, human milk analysis in a clinical setting has only been feasible since December 2018, when the US Food and Drug Administration (FDA) granted marketing authorization of the Miris HMA™, allowing for its use in clinical laboratories. Within 15 months of this decision, the WHO declared COVID-19 a global pandemic and hospital resources shifted to respond. NICUs around the US, including ours, who were considering implementation of human milk analysis into their clinical practice were delayed in their efforts. We are in the early stages of lactoengineering and human milk analysis in the clinical space here in the US, and thus are working through challenges with implementing this change in clinical practice.

Could you provide insights into the process of performing human milk analysis in the NICU? What factors are involved in the analysis and what challenges do you see?

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Sharon:
Securing funding to acquire the analyzer can be challenging, but the positive aspect is that there are often available grants that can cover the equipment costs. Moreover, once purchased, the analyzer represents a one-time expense, alleviating further financial burden. However, the primary challenge lies in the ongoing expenses associated with the necessary personnel for targeted fortification implementation. Instructing lactating parents on milk collection, running the analysis, and creating individualized fortified milk recipes for each baby. This personalized care must be facilitated through adjustments to yearly NICU budgets.

Stephanie:
Outside of the necessary system required to implement and sustain Human Milk Analysis in a hospital setting, there are significant and intriguing questions that warrant exploration. These include:

- Should individualized fortification become a standard of care? And if so, which populations would benefit most from this personalized approach?

- What constitutes the ideal nutritional composition to support the unique needs of preterm infants, considering factors such as their disease state, birthweight, and gestational age? Additionally, what specific products should be employed to achieve these goals within a clinical setting?

- Does the implementation of individualized fortification lead to improved clinical outcomes for this vulnerable population?

These questions hold great promise and excitement for researchers, as they pave the way for a deeper understanding of the growth and nutrition requirements of preterm infants. Through ongoing research, we can continue to unlock valuable insights and ultimately provide enhanced care and better outcomes for these fragile newborns.

Human milk analysis and individualized fortification requires a collaboration between the family, milk room staff, neonatal dietitians, nurses, and the medical team. We are currently working towards a sustainable implementation of this technology into our daily clinical care.

What are some of the potential benefits of targeted fortification in a NICU setting? How does this personalized approach to fortification contribute to the health and well-being of premature infants, and what positive outcomes can be expected from its implementation in the care of these vulnerable newborns?

Sharon:
The greatest potential benefit of targeted fortification in the NICU may be the ability to more closely meet nutritional requirements. If the composition of a feeding is not known, if it is only a "best guess," there is no way to assure that we are reaching estimated macronutrient needs. One positive outcome that could be expected from implementation of targeted fortification is improved protein intake. Protein intake in the expected range is associated with better length gain which, in turn, is associated with high quality weight gain. For example, improved accretion of fat free mass as opposed to just gains in adiposity. Fat free mass accretion is associated with improved neurocognition, an extremely important indicator of long-term outcomes.

Stephanie:
In addition to what Sharon mentioned, I think there is potential to tie targeted fortification to malnutrition prevention and intervention in the neonatal population. Better understanding of the true daily provision of

energy and protein to preterm infants will continue to corroborate our understanding of clinical best practices and interventions to support growth. A necessary next step in targeted fortification research will be to determine how this feeding practice influences nutrition-related preterm infant outcomes in the short term (e.g., bronchopulmonary dysplasia) as well as the long term (e.g., neurodevelopment).

In your view, what are the potential areas for growth or necessary developments in human milk research as we look into the future?

Sharon:
I feel that an individualized approach to feeding high risk newborns, specifically milk analysis and targeted fortification, is the next logical innovation and improvement in how we feed preterm and VLBW infants. Assessment of micronutrient content of human milk is not currently feasible but may be a next step in creating individualized feeds for preterm infants.

Stephanie:
There is absolutely a need for human milk research beyond the NICU environment. Human milk is a wonderfully complex biological system and should be studied as such. The Breastmilk Ecology: Genesis of Infant Nutrition (or, BEGIN) project was formed to identify gaps in the literature and to create a framework to help guide our exploration into the unknowns of human milk science. Sharon and I were contributors on this incredibly multidisciplinary project, and our work was just published.

When discussing human milk analysis and human milk fortification with families, how do families generally perceive the benefits and value of these practices in optimizing the health and well-being of their infants? Additionally, could you elaborate on the positive outcomes and improvements in neonatal care that families commonly appreciate and embrace when human milk analysis and fortification are part of the care plan for their newborns?

Stephanie:
In the NICU, families have had a traumatic end to pregnancy, a traumatic start to parenthood, and are not having the newborn experience that they expected or planned for. Infant feeding and nutrition are often the only ways that families feel they can contribute to their child's care. As modifications to nutrition plans are made to meet the elevated nutrient requirements of preterm infants, families can often feel like they are doing something wrong to make their breast milk insufficient to nourish and grow their infant. Thus, discussing tools used to optimize nutrition in the NICU is an important conversation to have with families.

In these conversations, I like to emphasize the known benefits of human milk (reducing risk of NEC! Unique composition to optimize digestion! Its role in immune system development!). I also like to focus on both short- and long-term goals – for the short term our goal typically focuses on meeting the unique nutrition requirements and supporting growth, whereas discussing long-term goals include discussing how long a parent wants to pump and/or breastfeed, what nutrition will look like post-NICU discharge, and what breastfeeding goals the lactating parent has.

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How do you communicate the difference between Mothers' milk versus donor milk to parents

Sharon:

Donor milk is not equal to mother's own milk. The discussion about donor milk with mothers in the NICU needs to be carefully delivered so that the message focuses on how mom's own milk is special and specifically intended for her baby. Donor milk needs to be presented as a secondary option. All team members need to deliver a unified message around donor milk so that mothers and other family members are not confused.

What are your thoughts regarding human milk analysis for healthy full-term infants versus preterm patients?

Sharon:

We have received occasional requests from hospital colleagues to analyze their breast milk. In general, I think analysis of human milk that is being fed to healthy babies should be discouraged. Historically, babies have been fed human milk and have done well nearly all of the time without knowing if the milk is high fat or low, etc. It's the same with having a scale in the home to weigh a healthy term breast fed baby – too much emphasis on technology.

Stephanie:

I think all depends on the intent. Personally, I think it could be awesome to have ways of showing how unique and dynamic human milk is at the individual level. However, the potential for this information to be exploited is incredibly high. We don't need to go looking for problems and marketing solutions for any vulnerable family. However, in the preterm and critically ill infant population, human milk analysis can be a tool to help better understand and improve upon nutritional care.

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