Prioritizing High-Dose Long Exposure to Mothers' Own Milk During the Neonatal Intensive Care Unit Hospitalization

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FEEDINGS WITH MOTHERS' own milk improve short- and long-term outcomes in very low birth weight infants, including dose-dependent reductions in the risk, incidence, and severity of necrotizing enterocolitis (NEC), late-onset sepsis, bronchopulmonary dysplasia (BPD), retinopathy of prematurity, neurodevelopmental problems at 20 months corrected age, and rehospitalization after neonatal intensive care unit (NICU) discharge.¹ Despite these outcomes, the continued provision of mothers' own milk for premature infants remains a problem throughout the world. One of the primary barriers to high-dose long-exposure provision of mothers' own milk is the cost of providing evidence-based lactation care for breast pump-dependent mothers of very low birth weight infants.² The LOVE MOM (Longitudinal Outcomes of Very Low Birthweight Infants Exposed to Mothers' Own Milk) prospective cohort study was designed to examine health outcomes and costs of mothers' own milk feedings received during NICU hospitalization. Of the 430 very low birth weight infants enrolled, 98% received mothers' own milk; no donor human milk was used. Data from the study suggest that exposure to any amount of formula during the first 14 days of life increased the risk of NEC 3.5 times. NEC was associated with a marginal increase in costs of \$43,818, and each additional mL/(kg·d) of human milk received during the first 14 days was valued at an additional \$565 in non-NEC-related hospital costs.³ Analyses for the incidence of sepsis and BPD showed similar protective effects and cost savings with mothers' own milk.^{4,5} Furthermore, there was a significant dose-dependent association between human milk intake in the NICU and cognitive scores at 20 months corrected age; each 10 mL/(kg·d) increase in human milk was associated with a 0.35 increase in Bayley-III cognitive index score.⁶

From a scientific perspective, there is no substitute for mothers' own milk in very low birth weight infants. When this message is communicated to mothers, the majority mothers change their predelivery goals for formula feeding and instead initiate lactation.⁷ In the United States, lactation initiation rates are higher for mothers of premature infants than for the general population. However, preliminary find-

ings from the LOVE MOM cohort showed mothers' own milk feedings decreased over the NICU hospitalization. In a recent study of 430 LOVE MOM cohort mothers, achievement of coming to volume (i.e., ≥ 500 mL/day) by 2 weeks postpartum was the strongest predictor of continued provision of mothers' own milk through NICU discharge.⁸ Coming to volume ushers in the autocrine control of lactation, in which milk volume is regulated by the effectiveness of sucking and milk removal.^{9,10} During this stage, two mechanisms control lactation: the suckling-induced release of prolactin from the pituitary and the feedback inhibitor of lactation, a protein in breast milk that, when not removed by the infant or the pump, makes the alveolar membrane in the mammary gland less sensitive to prolactin. Problems that interfere with milk removal from the breasts (e.g., inefficient or infrequent pumping) can have a long-lasting impact on lactation performance.

To achieve high-dose long exposure to mothers' own milk in very low birth weight infants, mothers' own milk volume must be prioritized over all other NICU human milk practices.¹⁰ In mothers of preterm infants, the volume of milk needed to feed the infant is much less than the volume needed to maintain lactation. Mothers should be taught that they need to produce enough milk for the infant to receive exclusive feeds, as well as to program the mammary gland and protect milk synthesis and secretion for the duration of lactation. There are several strategies that can be implemented to prioritize the establishment and maintenance of milk volume in breast pump-dependent mothers, such as effective and efficient breast pumps, daily monitoring during the coming to volume transition, use of a creatatocrit for quick easy measurement of lipid and calories in pumped milk, and infant scales designed to measure milk intake as NICU discharge approaches (Table 1). In addition, mothers of former NICU infants can serve as employed breastfeeding peer counselors to provide additional NICU-specific lactation care and support.^{2,11}

Mothers' own milk feedings remain the best practice nutritional option for very low birth weight infants. Although rates of lactation initiation are high for this population, rates of mothers' own milk provision at NICU discharge are low.

TABLE 1. BEST PRACTICES TO PRIORITIZE HUMAN MILK FEEDINGS IN THE NEONATAL INTENSIVE CARE UNIT

Breast pumps should be effective, efficient, comfortable, and convenient.
<ul style="list-style-type: none"> • Should mimic suction rates, rhythms, and pressures of term healthy infants • Hospital-grade electric pumps should be made available in the NICU and after discharge
Pumping should be observed daily during coming to volume to monitor effectiveness, efficiency, and comfort
Nipple shields should be available in a variety of sizes to help increase mothers' own milk transfer during and after the NICU hospitalization
Supplies for milk collection and storage should be provided
<ul style="list-style-type: none"> • Personal collection kit for use with the electric pump • Breast shields in a variety of sizes • Food-grade milk storage containers • Safe storage for expressed human milk within the NICU • Waterless human milk warmers and disposable liners
A creatinocrit can be used to quickly and easily measure the lipid and caloric content of pumped milk
Test weights can be used to accurately measure milk intake during breastfeeding
Breastfeeding peer counselors can provide NICU-specific educational and emotional support

NICU, neonatal intensive care unit.

Interventions to optimize maternal lactation outcomes should be informed and prioritized by available data from published studies, but instead are often determined by ideological and economic barriers. In the absence of allocation of resources to prioritize mothers' own milk feedings, infants receive subsidized lesser quality nutrition in the form of either donor milk or formula, which may have a significant impact on health outcomes and health care costs.

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