

Sucking dynamics of preterm infants in the NICU

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The importance of human milk (HM) cannot be understated given the benefits afforded to both the mother and infant. Given the vulnerability of the preterm infant and the inherent long-term health risks associated with preterm birth, the benefits of HM are likely amplified in this population. HM not only affords protection from infection but also provides essential nutrients for growth and development, with the caveat that the very preterm infant's requirements for extra energy and minerals are usually met through HM fortification. The benefits of HM are highlighted by recent research showing preterm infants fed donor HM display better cardiac form and structure in adulthood compared to those fed high protein preterm formula which translates potentially to better cardiopulmonary outcomes later in life¹. Further findings of improved neurodevelopment² in HM fed preterm infants have been recently reinforced by a study showing predominantly HM fed preterm infants display better brain growth, higher IQ, memory, academic achievement and motor function at 7 years of age³. These beneficial effects of HM have been attributed to components in HM that are not present in formula⁴.

Whilst components of HM are critical to the growth, development and health of the infant, recent evidence also points to the oral mechanics of breastfeeding impacting facial and oral development, for example malocclusion is reduced by 68% in breastfed infants⁵. Further, anthropological observations point to broader flatter palates in breastfed infants. This new evolutionary field termed 'Darwinian Dentistry' asserts broad reaching effects of feeding mode on sleep disturbances and attention deficit issues⁶. Thus there appears to be structural developmental features of breastfeeding that are beneficial to the infant. Given the malleability of the facial structure and immaturity of muscular control and strength it would be potentially beneficial for the preterm infant to breastfeed regularly. However, full breastfeeding is hampered by the infant's immaturity as well as comorbidities, under developed feeding competencies and restricted maternal availability. Thus NICUs face the dilemma of how to achieve full oral feeds prior to discharge home. Early discharge of the infant is a NICU priority as it is associated with improved infant health and economic savings for the already overburdened health care system.

Within the NICU we have embarked on studies to improve the understanding of breastfeeding preterm infants with respect to sucking dynamics, intra-oral vacuum, cardiorespiratory stability, suck-swallow-breathe characteristics and milk transfer. This data is critical to form the basis of targeted interventions aiming to reduce the time to full breastfeeding as well as effectiveness of infant milk removal, which would potentially impact breastfeeding duration. Our initial study was of a cross sectional nature and measured the sucking dynamics of 38 breastfeeding infants at 32.7 to 39.9 weeks postmenstrual age (birth gestation age: 23.6-33.3 weeks). Synchronised ultrasound and intra-oral vacuum measurements showed that the preterm infants move their tongue in a similar fashion to that of the term breastfeeding infant to generate an intra-oral vacuum, albeit weaker than that of a term infant. Vacuum strength was not associated with infant milk intakes but rather higher proportions of feeding time spent sucking resulted in greater volumes of milk removed from the breast. Further studies are underway to investigate the longitudinal development of suck-swallow-breathe patterns of breastfed preterm infants, and factors influencing the amount of milk transferred by the infant.

References

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