

Title:

Human Milk Feeding and Severity of Illness in Critically Ill Children With Respiratory Failure

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Session Title:

Rising Stars of Research and Scholarship Invited Student Posters

Keywords:

acute respiratory failure, critically ill children and human milk feeding

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Abstract Summary:

The relationship between human milk feeding and severity of illness in critically ill children with respiratory failure will be explored during this presentation. A novel conceptual map will be presented describing immunomodulatory programming that occurs with human milk feeding in the infant.

Learning Activity:

LEARNING OBJECTIVES	EXPANDED CONTENT OUTLINE
The learner will identify the current science associated with human milk feeding and the infant gut microbiome.	In poster format, the role of human milk feeding in development of the infant’s immune system will be presented along with a current review of the literature.
1. The learner will be able to state the impact of dose and exposure period of human milk feeding and severity of common respiratory illness in infancy.	In poster format, a current review of the literature of the relationship between human milk feeding and acute illness in infancy will be presented.

Abstract Text:

Introduction: Infectious illness is a major cause of acute respiratory failure in critically ill children admitted to the pediatric intensive care unit (PICU) (Farias et al., 2012; Monteverde et al., 2011). Mechanical ventilation in this population is driven by severity of illness and may be a major factor in risk of mortality (Pollack, Patel, Ruttimann 1996; Volakli et al., 2012; Payen et al., 2012). It is unclear why some children with similar respiratory illness develop severe illness and others do not, raising the question of whether or not severity of illness is modifiable. Recent work identifies that post birth exposure to human milk (HM) programs the recipient infant’s gut microbiome, gut metabolome, several enzymatic and hormonal pathways and specific immunomodulatory responses (Kramer et al., 2008; Sjögren et al., 2009; Poroyko et al., 2011; Schwartz et al., 2012; De Palma et al., 2012). Inflammatory and oxidative stress processes are down-regulated and persist through the lifespan. This is supported in a meta-analysis demonstrating up to a 3-fold reduction in risk of severe respiratory tract illness in infants receiving HM feeding for less than 4 months (Bachrach, Schwarz, Bachrach, 2003). Additionally, research has demonstrated a relationship between long term outcomes and dose and exposure period of HM feeding in very low birthweight infants (<1500g birthweight) (Patel et al., 2013; Vohr et al., 2007; Winberg & Wessner, 1971; Lucas & Cole, 1996; Ashraf et al., 1991; Sisk et al., 2007; Stout et al., 2008; Meinzen et al., 2009; Corpeleijn et al., 2012) and term infants (Ip et al., 20017; Lambert et al., 20017; Dixon, Griggs, Forsyth & Bersten 2010). However, there is no research exploring the impact of HM feeding on the severity of respiratory illness in critically ill children with acute respiratory failure requiring mechanical ventilation.

Objective: To examine the relationship between dose and exposure period of HM feeding and severity of illness in critically ill children with acute respiratory failure. The study seeks to determine if there are associations of dose and exposure period of HM feeding in critically ill children with respiratory failure and severity of illness on PICU admission; and among survivors, the duration of mechanical ventilation; and length of stay in the pediatric intensive care unit and hospital.

Methods: Subjects age 2 weeks to <37 months at enrollment in **Randomized Evaluation of Sedation Titration for Respiratory Failure (RESTORE)** (PI Curley, NCT00814099) trial who consented and enrolled in the follow up study **Sedation Strategy and Cognitive Outcome After Critical Illness in Early Childhood (RESTORE-cog)** (PI Curley & Watson, NCT02225041) were eligible for participation in this study. Each subject’s parent completed a feeding survey either by telephone or on mailed paper survey focused on dose and exposure period of HM feeding. All additional data was obtained from the *RESTORE* datasets, including demographic data, etiology of respiratory failure and past medical history, severity of illness scores including oxygenation index and multisystem organ dysfunction, risk of mortality, length of mechanical ventilation duration, pediatric intensive care unit and hospital stay.

Measurement and Data analysis: To date, 158 children ages 2 weeks to <37 months have been enrolled in the study. Data analysis is underway and will include correlational analyses, simple and multiple regression and logistic regression to explore the relationship between dose and exposure period of HM

feeding and severity of illness in critically ill children with respiratory failure. Propensity modeling will be used to statistically control for risk factors that may be associated with both human milk feeding and severity of illness in pediatric patients with acute respiratory failure.

Results: The results of the study will provide information on the impact of HM feeding on severe respiratory illness in critically ill children with acute respiratory failure that require mechanical ventilation – information that is currently not available. The results can help to inform clinical care practices as well as priority areas of research related to HM feeding and associations of dose and exposure for critically ill children with respiratory failure.