Title:
Change in Caregiving Activities in Preterm Infants Over the First 14 Days of Life

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Session Title:
Infant Safety Interventions
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Abstract Summary:
High-risk term and preterm infants are most vulnerable to an altered microbiome due to the atypical Neonatal Intensive Care Unit (NICU) environment. This study described the frequency and changes in caregiving activities that have the potential to alter the development of the skin, gut, and pulmonary microbiome.

Learning Activity:

<table>
<thead>
<tr>
<th>LEARNING OBJECTIVES</th>
<th>EXPANDED CONTENT OUTLINE</th>
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</thead>
<tbody>
<tr>
<td>Learners will be able to describe caregiving activities with the potential to impact the preterm infant microbiome.</td>
<td>Caregiving activities associated with skin, gut and pulmonary microbiome.</td>
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<tr>
<td>Learners will be able to describe factors impacting the change of caregiving over the first 14 days of life.</td>
<td>Factors influencing caregiving frequency and change over the first 14 days of life.</td>
</tr>
</tbody>
</table>

Abstract Text:

Purpose: High-risk term and preterm infants are some of the most vulnerable to an altered microbiome due to the atypical Neonatal Intensive Care Unit (NICU) environment of care following birth. Infants typically develop their microbiome in close contact with the mother and the home environment. Research on the impact of microbial colonization on the health of preterm infants has grown significantly recently (DiBartolomeo & Claud, 2016). Yet, most of the research to date has focused on how the mode of delivery, use of antibiotics, and environmental surfaces of the NICU could impact the microbiome. How
specific health caregiving activities in the NICU impacts the development of the preterm infant’s microbiome is largely unknown (Hartz, Bradshaw, & Brandon, 2015). Understanding the nature of caregiving that could influence the microbiome is a critical first step. Therefore, the purpose of this study was to describe the frequency and change in caregiving activities of extremely low birthweight infants over the first 14 days of life that have the potential to alter the development of the skin, gut and pulmonary microbiome.

**Methods:** A longitudinal multiple case study design was used to examine caregiving interventions. Infants were videotaped over the first 14 days of life while receiving care in their incubator in a Level IV NICU. Observational coding of the frequency and length of caregiving activities was conducted using Observer XT ver. 11.5. Development of the coding schema over five iterations resulted in 26 caregiving codes. Four coders were trained to 80% Kappa reliability. The case history of each of the five extremely preterm infants were established to examine major events across the first 14 days of life including respiratory support, feeding status, medications, severity of illness and major diagnoses.

**Results:** The five infants contributed 817 hours of data over 54 days. Descriptive statistics were used to calculate frequency and percent of each of the 26 categories per day. All 26 categories were discussed and categories based upon the category’s relationship to infant skin, gut, or pulmonary systems. Consensus for placement of each caregiving activity categorization was obtained between the authors. Some of the caregiving activities were not present. Skin caregiving activities coded included *infant touch, diaper changing, cleansing, and infant removal from the incubator*. Gut caregiving activities included oral care, oral or nasal pharynx suctioning, nasal gastric or oral gastric tube, and pacifier placement. Pulmonary caregiving activities included endotracheal placement (ETT) and ETT suctioning.

Across the five infants, the average number of times an infant was touched each day ranged from 58.9 to 122.8 times. The co-occurrence of case history events and changes in the frequency of caregiving activities were also explored. The number of times touched per day was highly variable across the first 14 days of life and associated with the infant’s severity of illness. While hands in the incubator mirrored the *infant touch* frequency they were typically more *hands in the incubator* than touch time across the 14 days of life. Across the first 14 days of life routine caregiving activities were more consistent across time. For example, the mean number of *diaper changes* were 2-4 per day and the mean number of *oral care* events were 1-3. These caregiving activities were consistent over time. The frequency of other caregiving activities was associated with rarer procedural events. For example, *cleansing* activities were associated with placement of percutaneous inserted central catheters. Therefore, these caregiving activities did not have a pattern of change over time, rather they co-occurred with procedural events.

**Conclusion:** Caregiving activities for extremely low birthweight infants were easily grouped into skin, gut, and pulmonary categories with the potential to influence the developing microbiome. Over the first 14 days of life caregiving activities that were more routine such as diaper changes were consistent over time while other activities such as infant touch was associated with infant severity of illness or procedural events. These findings provide beginning description of events that should be mapped with microbiome development. Routine caregiving activities such as oral care may influence gut microbiome while the frequency of infant touch can influence the skin. Future research should map microbiome development of the skin, gut, and pulmonary systems in relationship to specific caregiving. Modifiable caregiving strategies should be considered based upon the microbiome.