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Oral Feeding Outcomes for Infants with Congenital Heart Disease

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Background Congenital heart defects are anatomic abnormalities present at birth that result in abnormal cardiac function. The incidence of congenital heart defects in children is approximately 5 to 8 in 1,000 births. Infants identified during the newborn period are severely ill and require early surgical treatment. The early timing of the surgical repair for infants with CHD impacts opportunity for development of oral feeding skills and leads to feeding challenges in the hospital and once the infant is discharged to the home environment. These oral feeding challenges are heightened during the post-operative surgical period while the infant is recovering. Feeding performance has been shown to be an indicator of later neurodevelopmental outcome as well as a marker for possible parent-child relationship challenges.

The Canadian Occupational Performance Model and Barnard's Child Health Assessment Model were chosen as the conceptual frameworks for this research. These models contend that a newborn's ability to engage in oral feeding depends to a large extent on the development of a variety of underlying internal capacities (e.g., breathing, oxygenation, heart rate, body temperature) as well as on contextual elements (e.g., medical condition, medications, environment, sensory input, consistent caregivers).

Purpose The purpose of this study was to examine oral feeding outcomes with consideration of factors that may have influenced oral feeding progress for infants with CHD who required surgical repair in the neonatal period.

Two specific research questions were asked: (1) What factors influence or predict the volume intake of oral feedings? and (2) What are the indicators that tell us if a particular infant will be able to orally feed and go home with family?



Methodology A retrospective chart review of infants (>35 weeks gestation and < 1 one month of age) with CHD admitted to The Children's Hospital Heart Institute from January 2006 - December 2007 and who underwent surgical intervention (N=55) was conducted. An interdisciplinary team consisting of two physicians, a PhD nurse scientist and an occupational therapist was organized to review the medical record data. A multifactorial approach was used to examine internal and external factors that support, limit or prevent oral feeding.

Outcome Variables:

Indicators of oral feeding performance:

- Did the infant and family have time together to develop a positive feeding relationship?

- Was the mother supported and able to breast feed?
- Was the infant able to consume enough calories for growth and development and discharge in a timely fashion?
- How were consultative services used to support oral motor performance?

Predictors of oral feeding volumes and need for discharge with a feeding tube:

- Weight on admission and at time of surgery
- Volume taken orally with each feeding attempt
- Duration of ventilation
- Duration of circulatory arrest, cross clamp time, and by-pass time
- Aristotle score
- Time from surgery to first oral feeding
- Trans-esophageal echocardiogram
- Use of consultative feeding experts

Findings Statistically significant *predictors of inability to nipple full volumes*, therefore, requiring a cor pak feeding tube to go home ($p < .05$):

- ❖ Higher weight at time of admission
- ❖ Longer duration of intubation, BiPAP and/or NCPAP
- ❖ Longer duration of circulatory arrest (DHCA)
- ❖ Longer time from surgery to first oral feeding
- ❖ Longer length of stay
- ❖ OT consult

Indicators of oral feeding performance

- ❖ Surgical repair was performed within the first week of life (75% of infants) indicating that the infant did not have the opportunity for any positive oral experiences prior to repair.
- ❖ Infants required mechanical ventilation before surgery (45% on ventilator > 1 day prior to surgery) indicating less opportunity for positive oral feeding experiences prior to surgical repair.
- ❖ A proportion of these infants (31%) had associated syndromes, often DiGeorge, indicating more challenges to participation in positive oral experiences.
- ❖ Use of OT consult indicated less volume intake and need for cor pak at time of discharge (presumably consult was written after oral feeding challenges were observed).

- ❖ All mothers received an initial lactation consultation indicating desire to breast feed. However, no mother went home exclusively breastfeeding and only 3 mothers had any breastfeeding documented during the week prior to discharge.
- ❖ The majority of feedings were given by staff, including the first oral feeding, indicating the infant-parent dyad had limited time to establish a feeding relationship.
- ❖ 43% of the infants went home using a cor pak, unable to meet nutritional requirements by mouth.

Implications for Nursing Although surgical and technological advances have successfully fostered the survival and medical well being of newborns diagnosed with a congenital heart defects, the need to focus on long term quality of life rather than just survival is of utmost importance. Theoretical approaches used by nurses to deliver care that is based on assessment and support of the infant's internal capacities (regulatory systems) and contextual elements (environment, including parental) and development of strategies to support these can have a far reaching positive impact on oral feeding outcomes for the infant and the family.

Supporting the infant's emerging self-regulatory strategies with positioning so that the infant can self calm, or supporting the parents to hold the infant skin to skin, for example, supports the infant's internal capacities and provides the contextual elements necessary for positive feeding outcomes. Assisting parents in their efforts to feed their infant positively influences parental confidence and provides the infant with a consistent feeder, which has been shown to promote oral feeding outcomes.

Future Research A major contributor to poor nutritional state in infants with congenital heart disease requiring surgical repair in the neonatal period is inadequate oral intake and feeding problems. This is a significant cause of morbidity that affects growth, cognitive development, socio-emotional development and parental confidence. Further research is essential to support the development of oral feeding in these fragile infants and the utilization of specific feeding management strategies based on empirical evidence and prospective trials.

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