Improving Enteral and Oral Nutrition Outcomes in Neonates With Critical Congenital Heart Disease

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Aim

In infants with critical congenital heart disease requiring intervention (surgical or cath procedure) in the neonatal period

Overarching AIM:

Decrease time to achieve full enteral nutrition post cardiac surgery by 25%

Secondary AIMs:

Increase frequency of pre-operative feeding in eligible neonates to 100%

Decrease time to first oral feeding attempt

Maintain low rates of necrotizing enterocolitis

Importance

Infants with critical congenital heart lesions are at increased risk of developing necrotizing enterocolitis/bowel ischemia relative to neonates of similar gestation without heart disease. Risk of complications is variable as this is a heterogenous population of infants with varying gestational age, underlying diagnosis and hemodynamic stability modifying risk.

Literature evidence is scant and variable regarding the optimal way to feed these babies. As such, feeding practices for the Stollery Cardiac Program had been highly variable between units and amongst individual physicians. It can be difficult to balance reaching enteral autonomy in a timely manner while limiting risk of gastrointestinal complications.

Feeding Algorithm Development And Implementation

Step 1: Recruit Working Group

Multidisciplinary group across Stollery Cardiac Pediatric and Neonatal Intensive Care and Ward:

- Dietitians
- Physicians
- Speech Language Pathologists
- Nurse Practitioners

Step 2: Literature and Current Practice Review

- Literature review of feeding practices for cardiac neonates including risk factors, criteria for NPO, enteral nutrition composition, volume and advancement
- Audit of current neonatal feeding practices for the Stollery Cardiac Program

Step 3: Guideline Development

Pre-op and post-op feeding guidelines including:

- Stage specific risk stratification
- Enteral initiation and advancement rates
- Oral feeding recommendations
- Approach to feeding intolerance
- Indications for NPO

Detailed review document circulated with additional resources including a 2-page summary for quick reference.

Step 4: Education and Implementation

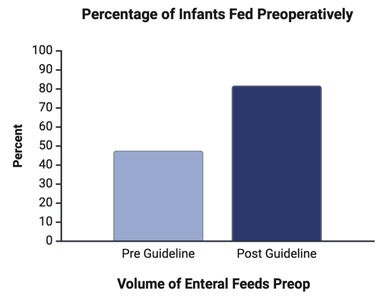
- Presentations:
  - Physician meetings
  - Stollery QAR
  - WCCHN (Western Canada Children's Heart Network) Rounds
- Distribution to WCCHN partners
- Dietitian "champions" for each unit to support guideline implementation

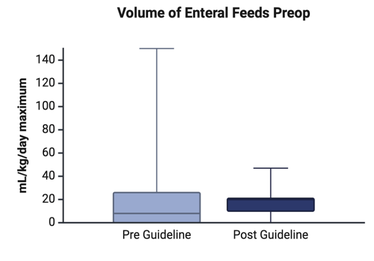
Results

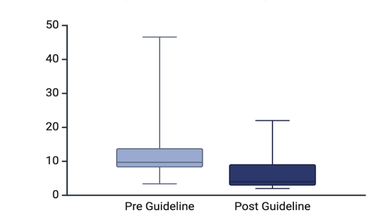
	Pre Guideline	Post Guideline
TGA	n=4	n=6
Neonates Fed Preop	1(25%)	3(50%)
Volume of Preop Feeds (mL/kg/d)	0(0-29)	25(12-25)
Days to Initiate Oral Feeds	7.7(3.7-21.4)	1.5(0-34)
Days to Enteral Autonomy	11.7(4.7-15.3)	2.5(2-5)
Complications	Chylothorax(2) Diaphragm paralysis(1)	None
Left Sided Obstruction (Coarctation and IAA)	n=6	n=9
Neonates Fed Preop	3(50%)	8(89%)
Volume of Preop Feeds (mL/kg/d)	4(0-50)	20(9-30)
Days to Initiate Oral Feeds	7.5(2.6-11.7)	21(1-64)
Days to Enteral Autonomy	13.7(8.4-46.6)	5(3-10)
Complications	Chylothorax(2) VCP(3) Sepsis(3)	Chylothorax(1) VCP(3) Diaphragm paralysis(3)
Right Sided Obstruction	n=4	n=1
Neonates Fed Preop	4(100%)	1(100%)
Volume of Preop Feeds (mL/kg/d)	22(10-150)	21(NA)
Days to Initiate Oral Feeds	4.4(0.6-10.7)	3*
Days to Enteral Autonomy	9.7(4.4-11.5)	4*
Complications	None	None
HLHS	n=2	n=4
Neonates Fed Preop	0(0%)	3(75%)
Volume of Preop Feeds (mL/kg/d)	0(NA)	10(10-20)
Days to Initiate Oral Feeds	Unknown*	23(21-42)
Days to Enteral Autonomy	9.7*	15(13-22)
Complications	VCP(1)	VCP(1)

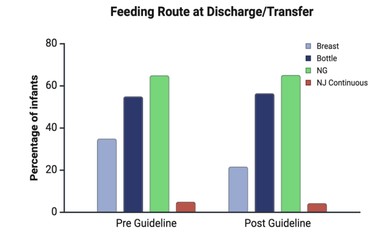
Data is reported as n(%) or median(range).

*Data for days to initiate oral feeding and reach enteral autonomy incomplete due to repatriation to home site.









Summary and Future Directions

In summary, guidelines were generally well adhered to and showed a trend for infants to reach enteral autonomy faster without an increased incidence of complications such as NEC, more infants also received feeds pre-intervention, however there does not appear to have been a big difference in the time to attempt oral feeds – often related to complications of VCP and need for ongoing respiratory support.

Future directions include:

Identifying strategies for oral development while on respiratory support and streamlining feeding assessments in babies diagnosed with vocal cord paresis

Improving breast feeding and breast milk feeding rates

Determine if pre-op feeding targets can be further increased and if this can improve post-op feeding tolerance/outcomes

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