Pediatric Heart Institute Feeding Algorithm-High Risk

High Risk (RACHS Score 4-6):

1. Neonates with high kcal requirements and at high risk for feeding difficulties
   - Significant residual hemodynamic impairment
   - Prolonged ICU course; prolonged intubation
   - No prior feeding history; history of feeding intolerance
   - Preterm/IUGR
   - Genetic syndrome, vocal cord abnormality, cleft lip/palate

Ex: HLHS s/p Norwood; s/p BT shunt; single ventricle physiology

Examples of high risk lesions (not all inclusive)

1. Norwood / Stage I physiology
2. BT shunt
3. Neonatal Aortic Valvuloplasty
4. ASO with intracardiac repair of VSD, Subpulmonary Stenosis
5. Truncus arteriosus repair
6. Interrupted Aortic Arch

• Once extubated, move to either high-risk or average- to low-risk pathway
• Once on <5 L VT, pull tube to NG
• First NG feed in the PCCU
• Initiate NG feedings at 1/2 the NJ rate
• Advance 1 mL/kg/hour q6 hours to goal
• **For HR group, observe 12-24 hours of NG feeds in the PCCU prior to transfer**

Ready to feed?
1. Good perfusion
2. Stable respiratory status
3. No evidence for NEC/ileus/obstruction
4. ≤5 mcg/kg/min dopamine /0.02 of epi

No

• TPN if NPO expected >72hrs
• Start/continue Pepcid
• If pt is on high dose inotropes (>5 of DA), but not requiring boluses or escalation of inotropes for >12 hours, consider trophic feeds at 2 ml/hr

Yes

1. Place NJ (while intubated) with plan to transition to NG when respiratory stable.
2. Start/continue Pepcid (for Intubated and High Risk groups)
3. Measure abdominal girth

Intubated

• Initiate trophic feeds with EBM/Formula/DBM** at 1ml/kg/hr for 6 hrs
• After 6 hrs check for signs of feeding intolerance†
-vomiting, retching ,abdominal distension, falling Renal NIRS

• Advance feeds by 1ml/kg/hr every 6 hrs to goal of 6ml/kg/hr (144 ml/kg/day)
• Check for signs of intolerance every 6 hrs before advancement†

• Advance kcal q24hrs, as tolerated†
20->24->27 kcal/oz (for HR); may leave LR on 20 or 24 kcal/oz
- Continue adjusting volume based on growth and metabolic needs**

Extubated

• Once stable from respiratory status (tolerating </=5L VT):
• Place speech consult (See speech pathway)
• Pull tube NG
• Start NG feedings at 1/2 NJ rate and same caloric density
• Check for signs of intolerance†

• Advance feeds by 1ml/kg/hr every 6 hrs to goal of 5-6ml/kg/hr (120-144 ml/kg/d) based on needs**
• Check every 6 hrs for signs of feeding intolerance†
• On VT/NCPAP—>continuous feeds only
• Once off VT/CPAP consider transition to bolus/continuous feeds

• If not yet at goal caloric density, advance q24hrs, as tolerated
20->24->27 kcal/oz

• Once clinically able, transition to home PO/NG feeding regimen:
-Day (45%): q3h at 9a, 12p, 3p, 6p
OR
-Day (40%): q4h at 10a, 2p, 6p
-Night (55-60%): 10 hours (9p-7a)

• Taking >50% of bolus feeds PO?

No

• Continue PO/NG regimen

Yes

• Transition to PO/NG bolus feeds around the clock**
• Consider breastfeeding after discussion with medical team.

Single Ventricles/High Risk
● Start feeds with EBM/DBM; fortify with hydrolyzed formula (Nutramigen). If on DBM, transition from DBM to Nutramigen per DBM guidelines
All Cardiology Patients
● Use NICU protocol: <36 weeks or <2.5 kg
● If clinically indicated or severely volume restricted, concentrate to 30 kcal/oz
● Q3h boluses for <3kg, <4 months
● Q4h boluses for >3 kg, >4 months

**See nutrition recs
† Check for signs of feeding intolerance (abd distention, significant emesis, diarrhea, bloody stools) prior to each feeding advancement—abd assessment/ measure abd girth

PCARDS Dietitian:
Ryan Rafacz, RD, LDN: 831-4535
PCICU Dietitian *(Monday/Thursday)*:
Jane Douglas, MS, RD, LDN: 835-8950

Reflux/Aspiration Evaluation

For clinical signs of reflux and aspiration (desats, bradycardia, milk in the mouth, arching, coughing with feeds, frequent emesis, choking, gagging, increased work of breathing with feeds):
1. Optimize reflux/motility agents
2. Upper GI to evaluate anatomy
3. NG->NJ->NG trials (NJ 48-72hrs)

→ If symptoms resolve while NJ:

- Pull tube back to NG and re-evaluate for above signs/symptoms of reflux and aspiration.

→ If symptoms recur while NG fed, optimize reflux/motility agents.

If symptoms persist, recommend Nissen/g-tube.

→ If symptoms do not resolve while NJ (trial is inconclusive):

- Consider impedance probe for evidence of reflux and/or milk scan for evidence of aspiration.

→ If the impedance probe is abnormal, if the milk scan demonstrates aspiration, and/or if there are clinical concerns for reflux/aspiration/feeding intolerance, recommend Nissen/g-tube.

Oromotor/Speech Evaluation

Once extubated and stable from respiratory status, Bedside SLP eval for HR pts or those demonstrating concern

→ No overt concerns, approved for PO trials

Overt concerns, look for modifiable factors (ie, chest tubes, high doses of narcotics); obtain VFSS and/or FEES at the discretion of SLP.

→ Oropharyngeal dysphagia without aspiration → - NG-tube for primary nutrition
- Oral trials with SLP, with PO advancement as oral skills improve

→ Oropharyngeal dysphagia with aspiration but tolerating ng feeds → NPO with ng-tube for primary nutrition

→ Oropharyngeal dysphagia with aspiration and clinical signs of feeding intolerance (reflux/emesis) and/or vocal cord injury → Recommend Nissen/g-tube

Initiation of Feeds, s/p Nissen/G-tube

- Once stable, measure abdominal girth and initiate Pedialyte at 1 ml/kg/hr x6 hrs
  - If tolerated, advance Pedialyte by 1 ml/kg/hr to 2 ml/kg/hr x 6hrs†
- If tolerated, initiate prior formula/EBM at 20 kcal/oz at 2ml/kg/hr (same rate as Pedialyte); run x 12 hrs†
  - If 2 ml/kg/hr of 20kcal/oz tolerated x12 hrs, continue advancing by 1 ml/kg/hr q6hrs to goal volume †
- Once at goal volume, advance calories to goal q12-24 hours (20->24->27 kcal/oz; 30 kcal/oz if needed)†

If advancing q12hrs, order both caloric densities
- Condense feedings to 20 hours
- If well tolerated x 24 hours, trial bolus + continuous feedings
  - Condense bolus time, as tolerated, to goal of 30-60 minute boluses
  - If pt unable to tolerate bolus feeds run over 90 minutes or less (increased retching/gagging), revert back to 20 hours continuous

**ENT consult if concerns for vocal cord paralysis (hoarse cry, poor phonation, difficulty handling secretions, surgery with high-risk for vocal cord paralysis—aortic arch augmentation/Norwood/repair of aortic coarctation)
**Obtain upper GI before Nissen/g-tube
**Timing of VFSS: when at goal continuous ng tube feeds and moving to bolus feeds

Bloody Stools / NEC Pathway

Visible Blood in Stool
OR First Heme + Stool in PCICU
OR Clinical concerns

- Make NPO x 24 hrs
- Obtain the following:
  - KUB q8hr (x3)
  - CRP
  - CBC
  - ABG/VBG with lactate
  - Abdominal Exam
  - Rectal Exam for Fissures

All Normal?

No → Abnormal with evidence of pneumatosis/ NEC → Consult Peds Surgery
NPO x 7-10 days
Start Antibiotics
Start/Continue TPN

No → Abnormal but NO definite evidence of pneumatosis/ NEC → NPO x 48hrs
Start TPN
KUB/lab evaluations at provider's discretion
*Consider cultures/ antibiotics x 48 hrs

YES → After 24 hrs of NPO:
- Review the 3 KUBs
- Repeat and compare CRP
- Repeat and compare CBC
- Repeat/compare abdominal exam
- Repeat/compare ABG/VBG w/ lactate

All Normal? YES → -Restart @ 1/2 goal volume x24hrs (use previous caloric density if heme +; use 20 kcal/oz if grossly bloody or concerned over increased caloric density)
-If well tolerated, increase by 1ml/kg/hr q6hrs to goal.
-If goal volume tolerated x24hrs, increase caloric density per algorithm, as tolerated.

≥ 2 episodes of visibly bloody stools with normal exam/labs → Switch formula to Elecare

Level of Concern

High → 7 –10 days TPN
- When restarting feeds:
  —use 20kcal/oz EBM/DBM, 20 kcal/oz prior formula OR if believe intolerance related to formula, transition to elemental, hypoallergenic formula, Elecare.

Day 1&2: 1 ml/kg/hr x **24-48 hrs**†+ TPN
Day 3&4: adv 1 ml/kg/hr q6-12hrs†, ↓TPN
Day 5: hold goal volume
Day 6: advance kcals (20->22->24->27), q24hrs, as tolerated†

Low → -Restart @ 1ml/kg//hr with 20 kcal/oz EBM/DBM or formula for 12-24 hours†
-If well tolerated, increase by 1ml/kg/hr q6-12hrs† to goal (5-6 ml/kg/hr; should reach goal volume by end of day 3)**
-If goal volume tolerated x24hrs, increase caloric density ,per algorithm, as tolerated†

If preemie (<36 wks):
NICU protocol: start with 10-20 mL/kg/day and advance by 10 mL/kg/day† as TPN volume is decreased