**RD's in Practice: Advancing Practice in Pediatric Nutrition**
*Supporting the Pediatric Intensive Care Patient*

## Round Table:
Nursing Care of the Tube Fed Patient

Presented by: Jennifer Hayakawa DNP, PCNS-BC, CNRN, CCRN
Leigh Hammerstein, BSN, RN, CCRN

Outline:
1) PICU Enteral Feeding Protocol
2) Transpyloric Tube Placement
3) NG Tube Verification
    a) Initial placement verification
    b) Gastric residual volumes
4) NG Tube Maintenance
    a) Patency
    b) Long-term catheters and skin issues

**Program Objectives:**
Upon completion of this round table, participants should be able to:
1. Review best practice techniques used to ensure successful transpyloric tube placement.
2. Identify evidence-based methods to confirm NG tube placement.
3. Describe nursing interventions to promote feeding tube patency.

Nursing Care of the Tube Fed Patient

Jennifer Hayakawa DNP, PCNS-BC, CNRN, CCRN jhayakawa@choc.org
Leigh Hammerstein, BSN, RN, CCRN lhammerstein@choc.org

1) PICU Enteral Feeding Protocol
2) Transpyloric Tube Placement
3) NG Tube Verification
   a) Initial placement verification
   b) Gastric residual volumes
4) NG Tube Maintenance
   a) Patency
   b) Long-term catheters and skin issues

**References**

Abad-Jorge, A. (2013). Nutrition management of the critically ill pediatric patient: Minimizing barriers to optimal nutrition support. Infant, Child, Adolescent Nutrition, 5, 221-231. Retrieved from http://can.sagepub.com/content/5/4/221.short

Brown, A., Forbes, M., et al. (2012). Effects of a gastric feeding protocol on efficiency of enteral nutrition in critically ill infants and children. Infant, Child, Adolescent Nutrition, 4, 175-180. Retrieved from http://can.sagepub.com/content/4/3/175.full.pdf+html

Heyland, D. K., Chaill, N. E., et al. (2010). Impact of enteral feeding protocols on enteral nutrition delivery: Results of a multicenter observational study. Journal of Parenteral and Enteral Nutrition, 34, 675-86. Retrieved from http://pen.sagepub.com/content/34/6/675.abstract

Maklailov, T. A., Kuhn E. M., et al. (2014). Early enteral nutrition is associated with lower mortality in critically ill children. Journal of Parenteral and Enteral Nutrition, 3, 459-66. Retrieved from http://pen.sagepub.com/content/38/4/459

Mehta, N. M. (2009). Approach to enteral feeding in the PICU. Nutrition in Clinical Practice, 24, 377-87. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19483067

Mehta, N. M., Bechard, L. J., et al. (2012). Nutritional practices and their relationship to clinical outcomes in critically ill children – An international multicenter cohort study. Critical Care Medicine, 40, 2204-2212. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/22564954

Mehta, N. M., Compher, C. (2009). ASPEN clinical guidelines: Nutrition support of the critically ill child. Journal of Parenteral and Enteral Nutrition, 3, 260-278. Retrieved from http://pen.sagepub.com/content/33/3/260

Petrillo-Albarano, T., Pettignano, R., et al. (2006). Use of a feeding protocol to improve nutritional support through early, aggressive, enteral nutrition in the pediatric intensive care unit. Pediatric Critical Care Medicine, 7, 340-345. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/16738503 9-17-14

# PICU ENTERAL FEEDING GUIDELINES

CHOC Children's

**AIM:** *To continue, resume or initiate enteral feeds within 24hours of PICU admission and reach target nutritional goals earlier for all patients unable to take adequate oral nutrition.* *Early enteral nutrition reduces morbidity and mortality, preserves protective gut barrier function and improves overall nutritional status.*

**INDICATIONS:**

- All PICU patients (including those requiring ventilator support) who are unable to feed orally, or sustain adequate oral nutrition
- Functioning GI tract
- Absence of contraindications
- Absence of ileus confirmed

***Trophic feeding may start in absence of bowel sounds***

CONTRAINDICATIONS:

- Severe acidosis; hypoxia
- Hypotension; shock
- Escalating pressor support
- Ongoing volume resuscitation
- Severe cardiac dysfunction
- Mechanical bowel obstruction, bowel ischemia, significant GI bleed, severe ileus with vomiting, intractable diarrhea.
- Imminent surgery or procedure

- **Evaluate for risk of aspiration** (depressed cough/gag, altered mental status, delayed gastric emptying, significant reflux or vomiting, severe bronchospasm, prone positioning, unable to elevate HOB >30 degrees):
  *+aspiration risk*→ transpyloric ( nasoduodenal or nasojejunal) feeding tube
  *-aspiration risk*→ nasogastric feeding tube or via G.T.T. (in place prior to admission)
- **Place nasogastric tube**, preferably at time of intubation, or transpyloric tube, then confirm placement
- **Elevate HOB >30 degrees** unless contraindicated
- **Obtain Nutrition Consult** for all patients starting enteral feeds; coordinate with dietitian to identify goal feeding volume, nutritional status/ risk of malnutrition, caloric needs

**Trophic Feeding Candidates:**

- Resolving hypotension
- Weaning pressor support
- Post GI surgical patients

**Start:**
<10kg : 0.5ml/kg/hr
10-40kg: 5ml/hr
>40kg: 10ml/hr

- Establish tolerance of trophic volume without increasing
- Assess appropriateness for advancement on daily rounds
- If unable to advance after 3-5 days, consider PN : earlier for malnourished patients, 3 days for <2years well-nourished, 5 days for well-nourished >2 years

**Continuous Feeding Candidates:**

- All patients with transpyloric or jejunal feeding tubes
- Intolerance to bolus feeds
- Ready to advance trophic feeds to goal volumes

**Start:**
1 mL/kg/hr
**OR**
25% hourly goal rate
Max 25mL/hr

**Advance:**
<10kg: 1-5mL/hr q 4hrs
>10kg: 5-20mL/hr q 4hrs

- Advance until goal volume reached
- Titrate IVF to enteral volumes

**Bolus Feeding Candidates**:

- Stable
- Gastric tube placement
- Ready to consolidate or resume home schedule

**Transition from Continuous:**
***<6 months:*** Provide 3 hr equivalent volume over 1 hr
***>6 months:*** Provide 4 hr equivalent volume over 1 hr

**Resuming Home Regimen:**

- Initiate feeds at ½ of usual home bolus volume
- If tolerating , advance to ¾ of usual home bolus volume at next feeding
- Advance to full volume of usual home bolus
- Titrate IVF to enteral volumes

Approved Evidence Based Medicine Committee 9-17-14

## Formula Selection

- **Infants <12months CGA or 10kg:** breast milk or standard term formula (Enfamil or Similac) or home formula, if known
- **Toddler/Children >12 months or >10kg:** use Peptamen Jr as default pediatric formula if no history of prior enteral formula feeding and no documented milk protein allergy
- **Older children/Teenagers over 10 years or 40kg:** use adult Peptamen as default formula if no prior formula feeding and no documented milk protein allergy
- **Consult unit dietitian or on-call dietitian,** if needed, for clarification of home formula and/or appropriate formula choice

## Signs and Symptoms of Feeding Intolerance **notify MD if the following occur:**

- **Emesis**: >2 or more episodes/24hrs→ hold x 4hrs and reassess, consider scheduled antiemetic if appropriate or transpyloric tube placement; if volume intolerant, reduce volume of bolus feeds or consider continuous drip
- **Diarrhea**: >3 episodes of loose stool/24hrs→ discontinue laxatives and stool softeners, consult pharmacy to discontinue any sorbitol containing medication; consider opiate withdrawal; evaluate for stool pathogen (C.difficile if hematest positive) or malabsorption; consult dietitian to consider addition of soluble fiber and/or probiotic, need for alternate formula
- **Abdominal discomfort** (patient verbalizes discomfort, exhibits increased heart rate or blood pressure) **or abdominal distention:** >2 consecutive increases in abdominal girth measurement/24hrs→hold x 4hrs and reassess; ensure patient is stooling adequately; consider venting G.T.T. after/between feeds if applicable; consider promotility agent (erythromycin); consider return to previously tolerated feeding rate or volume

***Gastric residual volumes** do **NOT** correlate with gastric volumes, gastric emptying, reflux, or aspiration therefore are **NOT** an indication for feeding intolerance in absence of other signs and symptoms of intolerance*

## Bowel Management

- **Upon initiation of enteral nutrition, choose one of the following:**
  - Docusate sodium (Colace®) PO BID, or
  - Polyethylene glycol (Miralax™) PO at bedtime

  ***IF ON OPIATES**, add senna (Senokot®) PO at bedtime or may substitute Peri-Colace® (fixed dose combination of docusate sodium and senna) PO BID*
- **If NO stool after 48hrs on enteral nutrition, choose one of the following:**
  - Increase Miralax™ to BID, or
  - Consider glycerin suppository or bisacodyl suppository once daily
- **If NO stool after 24 hrs of increasing Miralax™ or adding suppository, choose one of the following:**
  - Start Senokot (stimulant) PO daily or BID (if not started already)
  - Consider phosphate enema

## Enteral Nutrition Maintenance

- **Review if goal volumes have been met** after day 3 of starting feeds. If no, consider promotility agent or transpyloric tube placement; ensure implementation of bowel management strategies; avoid unnecessary and prolonged interruptions in enteral feeding; monitor daily weights (ideally)
- **If enteral feeds are interrupted** for procedures or reasons other than intolerance, feedings should be resumed at previously tolerated rates

**References**
**PICU Enteral Feeding Guidelines**


Abad-Jorge A. Nutrition Management of the Critically Ill Pediatric Patient. Minimizing Barriers to Optimal Nutrition Support. Infant, Child, Adolescent Nutrition, 2013 5: 221-231. http://can.sagepub.com/content/5/4/221.short

Brown A, Forbes M, et al. Effects of a Gastric Feeding Protocol on Efficiency of Enteral Nutrition in Critically Ill Infants and Children. Infant, Child, Adolescent Nutrition, 2012 4: 175-180. http://can.sagepub.com/content/4/3/175.full.pdf+html

Heyland DK, Chaill, NE, et al. Impact of Enteral Feeding Protocols on Enteral Nutriton Delivery: Results of a Mutliticenter Observational study. Journal of Parenteral and Enteral Nutrition, 2010, 34: 675-86. http://pen.sagepub.com/content/34/6/675.abstract

Maklailov TA, Kuhn EM, et al. Early Enteral Nutrition is Associated with Lower Mortality in Critically Ill Children. Journal of Parenteral and Enteral Nutrition, 2014 38:459-66. http://pen.sagepub.com/content/38/4/459

Mehta NM. Approach to Enteral Feeding in the PICU. Nutrition in Clinical Practice, 2009, 24:377-87. http://www.ncbi.nlm.nih.gov/pubmed/19483067

Mehta NM, Bechard LJ, et al. Nutritional practices and their relationship to clinical outcomes in critically ill children – an international multicenter cohort study. Critical Care Medicine, 2012, 40: 2204-2212. http://www.ncbi.nlm.nih.gov/pubmed/22564954

Mehta NM, Compher C. ASPEN Clinical Guidelines: Nutrition Support of the Critically Ill Child. Journal of Parenteral and Enteral Nutrition, 2009, 3: 260-278. http://pen.sagepub.com/content/33/3/260

Petrillo-Albarano T, Pettignano R, et al. Use of a feeding protocol to improve nutritional support through early, aggressive, enteral nutrition in the pediatric intensive care unit. Pediatric Critical Care Medicine 2006, 7: 340-345. http://www.ncbi.nlm.nih.gov/pubmed/16738503


9-17-14

# Trans-pyloric Feeding Tube Placement

**Kara Russell, Craig Eaton, Allison Greenwood, Paige O'Brien**
**Pediatric ICU, CHOC Children's Hospital, Orange, CA**

## BACKGROUND

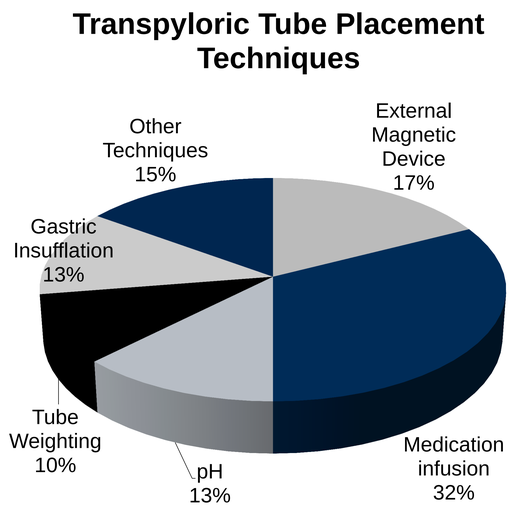
In the pediatric intensive care unit, enteral nutrition is preferred over parenteral nutrition to prevent the development of complications such as gastroparesis. Transpyloric placement of feeding tubes can be beneficial in certain patient populations where gastric placement is contraindicated, including patients with gastric atony, pancreatitis, and pulmonary aspiration risk. Additionally, placement beyond the pylorus reduces tracheoesophageal reflux, allows for earlier initiation of enteral nutrition, and improves tolerance of feedings. However, the placement of transpyloric tubes is often delayed due to challenges with accurate tube placement.

## PURPOSE

The purpose of this project is to conduct a literature review to determine best nursing practices for reliable placement of transpyloric feeding tubes, giving consideration to cost.

## METHODS / FINDINGS

We conducted a literature review and found 24 relevant articles. Five key nursing placement methods were identified:




We also interviewed a Nurse Educator from a Children's Hospital where PICU nurses successfully place transpyloric feeding tubes at bedside.

The literature review revealed that no single technique met our selection criteria due to cost limitations, mixed results or required specialized training. Therefore, we concluded that a combination of techniques delivers the most consistent result.

## SAMPLE TECHNIQUE

Following is a recommendation for successful postpyloric tube placement:

- ❑ Measure distance from nares to tragus to xiphoid process; mark tube.
- ❑ Starting at marking, measure chest diameter (mid-axillary across xiphoid process) & make 2nd mark.
- ❑ Flush feeding tube with 10ml sterile H20 to ensure easy removal of stylet.
- ❑ Administer meds (gastric motility agent or sedation) if ordered.
- ❑ Insert NG tube per protocol; confirm gastric placement.
- ❑ **Insufflate tube with 10ml air (5ml if <1yo) while advancing tube by 2 to 3cm at a time until second marking is reached, aspirating after each advancement.**
- ❑ **Tube is considered post-pyloric when 5-10ml of air can be insufflated & only 2ml air aspirated.**
- ❑ Confirm postpyloric placement with KUB x-ray.

## CONCLUSIONS

Based on our review, we conclude that a combination of nursing placement techniques aids in the successful placement of a transpyloric feeding tube.

## LIMITATIONS

- ❑ Majority of studies conducted in adult ICU patients.
- ❑ Many studies employed multiple techniques, difficult to determine which variable had greatest impact.
- ❑ Time to initiate feeding may increase & more x-rays may be required compared to gastric placement.
- ❑ Some studies showed no difference in aspiration risk or complication incidence compared to gastric feeding.
- ❑ Some articles may be out of date.