Implementing Nutrition Support Protocols in a Pediatric Intensive Care Unit

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Objectives

- Discuss current evidence for early enteral nutrition (EEN) in PICU
- Review barriers to achieving EEN
- Discuss how feeding protocols can advance current practices and improve EEN support
- Identify strategies to develop, implement, and maintain feeding protocols
Background

Malnutrition → poor clinical outcomes → future complications & quality of life

Children ↑ risk
- Fewer reserves
- Growth

PICU ↑ risk
- Inflammatory response
- Nutrient delivery barriers

Benefits of EEN

- Initiating enteral nutrition within 48 hours of ICU admission
  - Nutrients for protein synthesis
    - Reduces protein catabolism
  - Nutrients for immune response
  - Preserves intestinal integrity
    - GI atrophy
    - Bacterial translocation
    - Gut associated lymphoid tissue


Outcomes of EEN

- Initiating enteral nutrition within 48 hours of ICU admission
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↓ days on mechanical ventilation
↓ infection rates
↓ length of stay
↓ wounds
↓ TPN use
↓ hospital mortality
↓ healthcare resource use
Algorithm at Miller Children’s PICU

- Order set build in 2011
- Components
  - Formula selection by age
  - Initiation and advancement by age
  - Bowel regimen
  - Nursing care orders
    - Fluid management
    - MD notification (possible intolerance)
    - Tube placement verification X-ray order
  - RD referral
- Physician driven
Outcomes at Miller Children’s
Retrospective chart review: 1/01/11 to 8/01/13

Inclusion:
- 37 weeks gestation to 21 years
- LOS >48 hours
- MV
- EN

Exclusion
- Parenteral nutrition (PN)
- Oral nutrition (ON)
- Nutrition support at time of admission
- Chronically ventilated patients
Outcomes at Miller Children’s

Nutrient prescriptions
- Calories: WHO or indirect calorimetry
- Protein: ASPEN critical care guidelines (1.5-2 x RDA)

Risk of mortality
- PRISM 3

MV parameters
- Mean airway pressure (MAP)
- Positive end expiratory pressure (PEEP)
- Fi02
- Arterial blood gas
- Pulse oximetry

Figure 1-1. Prescribed calories within 72 hours

- PRISM
- LOV
- PICU LOS
- LOS

- Met Goal
- Did not meet goal

n = 33
n = 39
Figure 1-2. Prescribed protein within 72 hours

- Met Goal
  - n = 35
- Did not meet goal
  - n = 37
48%
Develop an Algorithm

- Create a team
  - Nutrition champions
  - Key stakeholders
  - Changemakers

- Physicians
  - Pharmacists
  - Nurses
  - Patients
  - Families
  - Occupational/Speech Therapy
  - Surgeons
  - Clinicians at the bedside
  - Managers/Directors
  - Executive management
Develop an Algorithm

- Create a team
- Examine current practice
  - Barriers
  - Strengths
  - Areas to improve

Perceived intolerance
- Team communication
- Daily rounding
  - visibility
- What are the strengths of your institution?
- Order delay
- ...and more!
Develop an Algorithm

- Create a team
- Examine current practice
- Define priorities
  - Determine components
  - Review literature

  - Nutrition Assessment
  - NPO times
  - Intolerance parameters
  - Escalation plans
  - Initiation/advancement
  - Calorie Goal
    - IC or estimate
  - Bowel regimen
  - Nursing care
    - Head of bed elevation
    - Placement verification

Initiation and Advancement


## NPO Times

<table>
<thead>
<tr>
<th>NPO Reason</th>
<th>Time (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gastric feeds</td>
</tr>
<tr>
<td>Surgical Procedure under GA (OR)</td>
<td></td>
</tr>
<tr>
<td>Clear liquids</td>
<td>2</td>
</tr>
<tr>
<td>Breastmilk</td>
<td>4</td>
</tr>
<tr>
<td>Formula</td>
<td>6*</td>
</tr>
<tr>
<td>Nonhuman Milk</td>
<td>6*</td>
</tr>
<tr>
<td>Solid food/meal</td>
<td>6*</td>
</tr>
<tr>
<td>GI Surgical Procedure under GA</td>
<td>6*</td>
</tr>
<tr>
<td>Endotracheal Extubation/elective intubation</td>
<td>6*</td>
</tr>
<tr>
<td>Radiologic/IR procedure under GA</td>
<td>6*</td>
</tr>
<tr>
<td>Radiologic/IR procedure NOT under GA</td>
<td>4</td>
</tr>
<tr>
<td>Bedside procedures under sedation intubated</td>
<td>4</td>
</tr>
<tr>
<td>Bedside procedures under sedation extubated</td>
<td>8</td>
</tr>
</tbody>
</table>

*AN320 Anesthesia P&P states 8 hrs
Intolerance and Escalation Plan

- **High Risk**
  - Bilious emesis
  - Hematemesis

- **Moderate Risk**
  - Nausea/Emesis
  - Abdominal distension
  - Abdominal pain
  - Diarrhea
  - Heme + stools
  - Reflux/aspiration

- **Low Risk**
  - Constipation

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1. RN hold feeds, notify MD
   - If high risk
     1. Consider starting IVF
     2. Determine reason for intolerance
     3. Consider recommendations below
     4. RN contact MD in 4 hrs if assessment has not been completed

2. RN restart feeds at previously tolerated volume; reassess for signs/symptoms of intolerance

3. If patient continues to have signs/symptoms of intolerance, then hold for 4 hrs, notify MD
   1. Do not hold feeds, notify MD
      a) Determine reason for intolerance
      b) Consider recommendations below
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Definition</th>
<th>Interventions to Consider</th>
</tr>
</thead>
</table>
| Nausea/Emesis    | • ≥ 2 episodes in 24hrs (associated with feeding versus medical Dx [i.e., chemotherapy])  
• Forceful ejection of stomach contents | • Assess enteral tube position  
• Correct any electrolyte imbalance  
• Check medication (volume/osmolality)  
• Administer formula at room temperature  
• Anti-emetic agent  
• Pro-kinetic agent  
• Reduce, discontinue, or change narcotic medications  
• Decrease enteral infusion rate by 25%  
• Change bolus feeding to continuous feeding  
• Change formula  
  • Peptide based  
  • Lower fat content  
  • 100% free amino acid  
• Post-pyloric tube for feeding  
• Diagnostic studies to evaluate for obstruction, ileus, or other surgical etiologies  
• Evaluate other etiologies (i.e.: pancreatitis, neurologic, medication side effects, etc.) |
Implementation

- Education
- Champion algorithm
  - Daily rounds
- Audit compliance
- Measure outcomes
Keep It Going!

1. Audits/outcomes
2. Examine current practice
3. Define priorities
4. Implement
Thank you

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