Evidence-Based Practice: Focus on Enteral Feeding

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Enteral vs. Parenteral

- Reduced infection risk
  - Lower dextrose concentration
  - Central line not required
- Cost effective
- Acute pancreatitis
  - Modulates stress response
  - Promotes resolution of disease process

Barrier: Underfeeding

- Unaware of nutritional goals
- Slow progression to increase formula rate
- 2003 Canadian nutrition survey (Heyland et al.)
  - 59 ICUs
  - Average enteral nutrition adequacy 43.0%
    - Range 1.8%–76.6%
  - PN adequacy lower than EN p <0.0001

Barrier: Interruptions

- Lack of feeding tube
- High gastric residual volume
- Feeding tube occlusion
- Test/ procedure/ surgery
- Bathing
- Lack of bowel sounds
- Diarrhea

Timing to Initiate Feeding

- Assess within 24-48 hours of admission
- Initiation within 24 hours of mechanical ventilation
  - Decreased mortality p=0.001 (Artinian et al.)
- Hemodynamically stable
  - Hold if hemodynamically unstable
  - Reduce risk of aspiration or gut ischemia

Nutritional Goals

- Nutritional needs assessed by dietician
  - Care team to review recommendations within 24hrs
  - Increase formula rate as tolerated until goal is met
  - Administer full strength formulas
    - Do not dilute
- Nutritional goals not met by second 24 hr period
  - Consult physician or dietician

Hazard analysis and critical control point (HACCP) [http://www.chmr.ubc.ca/~haccp.html]
**Small Bowel Tube Placement**
- Reduced gastroesophageal regurgitation
- Decreased microaspiration
- Recommended
  - Duodenum or proximal jejunum
  - Impaired gastric motility
  - High risk for aspiration
- Not recommended for all patients
  - Lack of available equipment (endoscopy, fluoroscopy)
  - Unreliable blind insertion methods

Heyland Crit Care Med 2001; 29(8):1495
Heyland JPEN 2002; 26(6):S51

**Complications of EN**
- Malposition of feeding tube
- Lung perforation
- Pneumothorax
- Empyema
- Bronchopleural fistula
- Death

Sorokin JPEN 2006; 30(5):440

**Complications of EN (cont’d)**
- Aspiration of gastric contents
  - HOB < 30 degrees
  - Glasgow Coma Scale (GCS) < 9
  - Vomiting
  - GERD
- Failure to meet nutritional goals

Metheny Crit Care Med 2006; 35(3):20
Metheny Crit Opin Gastroenterol 2007; 3(4):11-18

**Verification of Tube Placement**
- Recommended
  - Radiographic: primary confirmation
  - Mark tube at exit site-secondary confirmation
  - Not recommended
    - Auscultatory methods
    - Blue food dye
    - Inconclusive
      - pH measures
      - Capnography/ capnometry
      - Bilirubin measure promising: not readily available

Metheny Heart Lung 1999; 27(9):603
Metheny Crit Care Med 2007; 36(5):744
Metheny Crit Opin Gastroenterol 2007; 3(4):11-18
Metheny Nurs Res 2000; 39(3):166
Metheny Ann Nurs 2002; 105(12):40
Metheny Ann Crit Care Nursing 2007; 16(6):544
AACN Practice Alert 2005; www.aacn.org

**Tube Malposition**
- Blindly inserted small & large bore tubes
  - Different standards for verification
  - Not prevented by endotracheal & tracheostomy tube cuffs
  - Most common in tracheobronchial tree
  - May occur silently
  - Reported intracranial insertion

Metheny Heart Lung 1999; 27(9):603
Metheny Ann Crit Care Nursing 2007; 16(6):544
Metheny Am J Nurs 2005; 105(12):40
Spain JPEN 2002; 26(6):S62

**Are Bowel Sounds Necessary?**
- No evidence to correlate bowel sounds & peristalsis
- Most reliable indicator of GI motility
  - Flatus or bowel movement
  - Initiate enteral feeding in absence of bowel sounds
  - Expert opinion

Heyland AJN 2005; 105(12):40
Spain JPEN 2002; 26(6):S62
Patient Positioning
- Continuous feeding
  - Elevate HOB 30-45°
    - Greater than 30° may increase risk for shearing injury
- Intermittent feeding
  - Elevate HOB 30-45° for 1 hour following
- Reverse trendelenburg positioning

Gastric Residual Volumes (GRV)
- No direct correlation with gastric motility
- Saliva & gastric fluids ≤188 mL/hr
- Assess tubes of gastric placement
  - GRV unnecessary for small bowel tubes
  - No reservoir to collect formula
  - May assess tube movement into stomach
- Critically ill with artificial airways
  - GRV ≤200 mL – no additional risk of aspiration

Holding Feeding
- Avoid holding during bath/ linen change
- No hold prior to diagnostic test/ procedure
  - Restart within 1 hour
- Hold 2-4 hrs prior to surgery
- Making up lost feeding time
  - Obtain order for rate adjustment
  - Formulas of 1-1.2 cal/mL
  - Not to exceed 150mL/hr

GRV Procedure
- Re-instill up to 200 mL of gastric contents
- Serum potassium lower when full GRV discarded
- Discard remainder of aspirate
- Document as output

Causes of High GRV
- Inadequate bowel movements
  - Consider bowel regime
- Inadequate GI motility
  - Consider gastric motility agent
    - Metoclopramide (Maxeran)
  - Delayed gastric emptying

Delayed Gastric Emptying
- Increased risk for aspiration
- Decreased motility
  - Propofol (Diprivan)
  - Dopamine
  - Opioids
- Small bowel placement preferred
  - High risk for intolerance
  - Decreases risk of microaspiration
Preventing Tube Occlusions
- Coagulation of protein based formulas
- Contact with acidic environment or medications
- Routine water flushes (30ml) necessary
  - Q4h
  - Before & after intermittent feeding
  - Before & after individual medications
  - Following aspiration of gastric fluid
  - PRN if tube sluggish or occluded
  - Document water intake

Feeding Tube Occlusions
- Attempt to flush tube with tap water
- Pancreatic enzyme solution for persistent occlusion
- Ineffective solutions
  - Cranberry juice
  - Soda pop

Pancreatic Enzyme Solution
- Mix medications with 5 mL warm water
  - Viokase-8 tablet (pancrelipase)
  - Sodium bicarbonate 325 mg tablet
- Aspirate formula from tube
  - Enzyme solution to directly contact obstruction
- Instill enzyme mixture into tube
- Clamp tube x 5 minutes
- Flush tube with water until obstruction clears

Intolerance to Enteral Feeding
- Consider alternate formula
- Changes in patient condition
- Signs of intolerance
- Signs of dehydration
  - Dry mouth or skin turgor
  - High serum sodium

Evidence-Based Guidelines
- Enhanced nutritional delivery
- Improved clinical outcomes (Martin et al.)
  - Reduced LOS p=0.003
  - Trend towards reduced mortality p=0.098
- Meet feeding goals more quickly
  - Protocols that included
    - Prokinetic agents
    - Higher GRV ~250 mL

Nursing Influence of EN Practice
- Timing to initiate feeding
- Aspiration prevention
  - Verification of tube location
  - HOB elevation
- Minimize underfeeding
  - Prevention of feeding tube occlusions
  - Avoid interruptions in feeding
  - Timely advancement of rate to feeding goal
  - Advocate for evidence-based gastric residual volumes
  - Communicate & trouble shoot intolerance issues
International Nutrition Survey

- 156 participating ICUs
- Yearly audit of nutritional practices
- 2007 winner: Regional Hospital- A. Cardarelli, Italy
- Secrets to their success
  1. Full time dedicated nutrition team
  2. Assessment of clinical status & nutritional needs
  3. Begin feeding immediately or ASAP
  4. Close monitoring of nutritional care & daily briefing
  5. Great passion

Support EBP

- Identify gaps in practice
- Change champion
- Disseminate information
  - Does your organization have a formal process?
  - Get involved- ask nurse leaders
    - Planning, implementation, evaluation, & revisions
  - Mentor
    - Don’t make assumptions about knowledge or awareness of others

Planning EBP Changes

- Key stakeholders
  - Staff nurses MUST be involved
    - What’s in it for me?
    - What’s in it for my patients?
  - Interdisciplinary when possible
- Make changes fit your environment
  - Culture of organization
  - Culture of unit
- Translation science theory

Measuring Outcomes

- Often overlooked
- Common misconception
  - Practice change ends at implementation
- Benefits of measuring outcomes
  - Objective, quantified data
  - Data specific to your unit & organization
  - Evidence to evaluate practice change
  - Data to support revisions
  - Compare data
  - Share & celebrate your hard work!

Practice Change: Doesn’t End on The “Go Live” Date

- Keep the conversation alive
- Recognize individual efforts
- Track outcomes
- Involve entire team
- Be patient
- Be persistent!

EBP Resources

- www.criticalcarenutrition.com/
- www.aacn.org (Practice Alerts)
- www.sccm.org
- www.medscape.com
- www.saferhealthcarenow.ca/
- www.rnao.org
- www.ihi.org
- www.joannabriggs.edu.au
- wwwahrq.gov/clinic/epcix.htm
- www.guideline.gov/
- abourgault@mcg.edu