

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

Gramlich Nutrition 2004;20(10):843
McClave JPEN 2006; 30(2):143

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 $p < 0.0001$

McClave Crit Care Med 1999;27(7):1252
Heyland Crit Care Med 2004; 32(11):260

Barrier: Interruptions

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

Elpern Am J Crit Care 2004;13(3):221
McClave Crit Care Med 1999;27(7):1252
O'Meara Am J Crit Care 2008;17(1):53

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

DiSario JPEN 2002; 26(6): 575
Heyland Crit Care Med 2004; 32(11):260
McClave JPEN 2002; 26(6):S80
Artinian Chest 2006;129(4):960

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.cfsan.fda.gov/~lrd/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; 26(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;31(4):1007
Metheny Curr Opin Gastroenterol 2007;23(2):178

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 1990;29:631
Metheny Am J Nurs 2002;102(8):25

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

Elpern Am J Crit Care 2007;16(6):544
Metheny Curr Opin Gastroenterol 2007;23(2):178
Metheny Nurs Res 1990;39(5):262
Metheny Am J Nurs 1998;98(5):37
AACN Practice Alert 2005 www.aacn.org

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

Madsen AJN 2005; 105(12):40
Heyland Clin Intensive Care 1996;7(2):68
Spain JPEN 2002;26(6):S62

Patient Positioning

- Continuous feeding
 - Elevate HOB 30-45°
 - Greater than 30° may increased risk for shearing injury
- Intermittent feeding
 - Elevate HOB 30-45° for 1 hour following
- Reverse trendelenburg positioning

American Gastroenterological Association *Gastroenterology* 1995;108(4):1282
McClave JPEN 2002; 26(6):S80

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

American Society of Anesthesiologists (ASA) *Anesthesiology* 1999;90(3):896
Greenwood 2003 www.criticalcarenutrition.com/
McClave 2005 Unpublished Conference Proceeding

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

Lin JPEN 1997;21(5):286
McClave JPEN 2002;26(6):S43
Heyland JPEN 2003;27(5):335

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

Booker Am J Crit Care 2000;9(5):318

Causes of High GRV

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

Heyland JPEN 2002; 26(6):S51

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

American Gastroenterological Association *Gastroenterology* 1995;108(4):1282
Heyland Crit Care Med 2001;29(8):1495
McClave JPEN 2002; 26(6):S80
Metheny Heart Lung 1990;19:631

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

Marcuard JPEN 1988;12(4):403
Scanlon J Neurosci Nurs 1992;24(5):256
Reising Am J Nurs 2005;105(3):58

Feeding Tube Occlusions

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

Marcuard JPEN 1988;12(4):403
Bourgault Nutr Clin Pract 2003;18(5):398
Metheny Nurs Res 1988;37(3):165

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

Bourgault Nutr Clin Pract 2003;18(5):398

Intolerance to Enteral Feeding

- Consider alternate formula
 - Changes in patient condition
 - Signs of intolerance
- Signs of intolerance
 - Diarrhea
 - Nausea/ vomiting
 - Gastric residuals >200ml x 2
- Signs of dehydration
 - Dry mouth or skin turgor
 - High serum sodium

American Gastroenterological Association Gastroenterology 1995;108(4):1282
Martin CMAJ 2004;170(2):197

Evidence-Based Guidelines

- Enhanced nutritional delivery
- Improved clinical outcomes (Martin et al.)
 - Reduced LOS p=0.003
 - Trend towards reduced mortality p=0.058
- Meet feeding goals more quickly
 - Protocols that included
 - Prokinetic agents
 - Higher GRV ~250 mL

Heyland Crit Care Med 2004;32(11):2260
Martin CMAJ 2004;170(2):197
Pimilla JPEN 2001;25(2):81

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

Bourgault Crit Care Nurse 2007; 27(4):17

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

www.criticalcarenutrition.com/

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/
- Heyland DK et al. (2003). Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. JPEN J Parenter Enteral Nutr, 27(5), 355-373.
- www.aacn.org (Practice Alerts)
- www.sccm.org
- www.medscape.com
- www.saferhealthcarenow.ca/
- www.rnao.org
- www.ihl.org
- www.joannabriggs.edu.au
- www.ahrq.gov/clinic/epcix.htm
- www.guideline.gov/

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