Basics of Enteral Feeding 2004
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Objectives
- define enteral nutrition
- to explore the different types of enteral formulas that are available
- describe tube feeding administration guidelines

Suggested Reading

I. Enteral Nutrition Defined
A. Enteral nutrition or tube feeding is a way of providing nutrition support via the gastrointestinal tract for patients unable to otherwise meet nutrient requirements by the oral route
B. Enteral nutrition is the preferred route of nutrition support when feasible
   - Safer, cheaper, more physiologic, and maintains gut function and integrity in comparison to parenteral (intravenous) support
   - Data particularly supportive for abdominal trauma

II. Types of enteral feeding catheters
A. Nasogastric tube
B. Nasojejunal tube
C. Surgical gastrostomy tube
D. PEG tube (percutaneous endoscopic gastrostomy)
E. G-J and PEJ tubes (percutaneous endoscopic gastrojejunostomy and jejunostomy tubes)
F. Surgical jejunostomy tube

III. Tube Feeding Formulations
A. Standard polymeric
B. Elemental or small peptide
C. Disease specific

IV. Tube Feeding composition of commercially prepared formulas
A. Protein Content: from 6 to 26%
   -can be made with casein, soy, hydrolyzed protein with added amino acids, or free amino acids alone.
B. Carbohydrate Content: from 28 to 90%
   -can be made with starch, glucose polymers, and/or disaccharides such as sucrose.
C. Fat Content: from <1% to 55%
- can be with long-chain triglycerides, medium chain triglycerides and fish or other specialty oils

V. Standard formula composition:
Protein Content: 10-15%
Carbohydrate Content: 50-60%
Fat content: 30-35%

Some patients may require different proportions because of specific disease states such as diabetes, renal or hepatic disease.

VI. Formula selection
- Standard/Polymeric tube feedings require some degree of digestive and absorptive capacity
- Elemental/Peptide tube feedings are recommended for patients with malabsorption, pancreatitis, short bowel syndrome and/or dysfunction.

VII. Disease Specific formulations
A. Glucose intolerance formula
   - made with less % total carbohydrate content
   - hydrolyzed cornstarch, usually higher fat content

B. Immune function formula
   - contain added amounts of glutamine, arginine, beta-carotene, nucleic acids and fish oil (arginine use is controversial in septic, critically ill patients)

C. Hepatic dysfunction formula
   - increased content of high branched chain amino acids and lower concentration of aromatic amino acids, reduced sodium content, high calorie to reduce volume needed to meet nutritional needs

D. Pulmonary dysfunction/ adult respiratory distress syndrome (ARDS)
   - altered fat contents to favor n3 fatty acids and gamma linolenic acid

E. Renal dysfunction
   - high calorie, high protein, modified levels of electrolytes and specific alterations in vitamin and mineral content

F. Trauma formulation
   - high protein, high calorie, some with increased branched-chain amino acid (BCAA) content, some with added glutamine, arginine, special fat blends, increased levels of copper and zinc

G. Wound healing formulation
   - high protein and higher contents of vitamin A, vitamin C and zinc

VIII. Monitoring Tube Feeding Tolerance
A. Gastric residuals- volume aspirated from a feeding tube placed in the stomach- should not exceed 250 ml volume
B. Abdominal distension
C. Diarrhea
D. Constipation

**IX. Complications**
A. Gastrointestinal
   a. medications are leading cause for diarrhea
B. Metabolic
   a. volume status, sugars, electrolytes
C. Aspiration
   a. risks – aged, demented, stuporous, early post-op, altered gastric motility
   b. elevate head of bed, check residuals, post-pyloric feeding, nasogastric decompression
D. Mechanical – malposition, erosion, reflux, clogging, and obstruction

**X. Tube feeding administration guidelines.**
A. Continuous pump infusion for critically ill or post-operative patients
   • Can feed by nasogastric route in many patients.
   • Confirm position by x-ray.
   • In general standard formulations are well tolerated.
   • Consider duodenal or jejunal feeding when aspiration risk is present.
   • Start full-strength at rate of 25 cc/hr.
   • Increase as tolerated every 6-12 hrs to goal.
B. Intermittent or bolus feeding
   • Usually 5 feedings per day every three hours
   • Not recommended for critically ill or post-op
   • Only use for gastric feeding
   • Easier and less expensive for home or institutional tube feeding
   • Infuse by gravity or pump over 20-30 minutes or longer if needed

**Conclusions**
A. Use the gut if feasible.
B. Nasogastric feedings are well-tolerated by most patients.
C. Use standard, full-strength formulations for most patients.
D. Consult dietitian for assistance.

**References**

**Review Questions**

1. Common complications of nasoenteric tube placement and feeding may include:
   a. Aspiration
   b. Diarrhea
   c. Peritonitis
   d. Pneumothorax

2. An appropriate enteral feeding formula choice for a debilitated patient with advanced dementia and no known gastrointestinal or other organ pathology would be:
   a. Elemental formula
   b. Polymeric formula
   c. High fat specialty formula
   d. Concentrated renal formula

3. The strongest support for enteral in favor of parenteral nutrition comes from studies of:
   a. Patients with severe pancreatitis
   b. Patients with bowel obstruction
   c. Patients with mesenteric ischemia
   d. Patients with abdominal trauma

4. It is imperative that feedings be diluted upon initiation of tube feedings to promote tolerance.
   a. True
   b. False

Answers: 1-a,b, 2-b, 3-d, 4-b