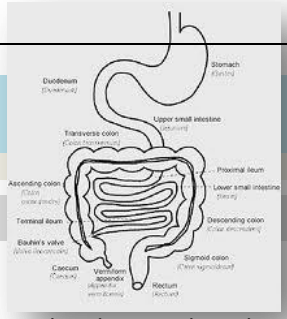
Enteral Nutrition



Indications for enteral nutrition products

- **Inability to eat or swallow:** e.g. jaw fracture, head & neck cancer
- **Inability to consume adequate nutrients:** e.g. anorexia, wasting syndrome
- Fully or partially functioning GI tract with positive gastric/intestinal motility: needed in order to absorb enteral products

Contraindications to enteral nutrition products

- **Absolute contraindications:** GI obstruction, ischemic bowel, perforated bowel
- **Relative contraindications:** hypoactive bowel, paralytic ileus, active inflammatory bowel (ulcerative colitis, Crohn's), massive diarrhea, active GI bleed, protracted vomiting & diarrhea, severe acute pancreatitis, fistulas
  → *Can work around these issues by strategically placing catheter in an appropriate area of GI tract*

Pros & cons: ***enteral*** nutrition products

Advantages	Disadvantages
↓Septic complications, supports immune system, maintains GI tract integrity, improves end organ functions, ↑nutrient availability (glutamine, MCFA), ↓bacterial & endotoxin translocation, can deliver meds through tube, ↓$	Pulmonary aspiration risk, sinusitis (nasoenteral tube), local tissue infections (J-tube, G-tube), nasal bleeding/erosion, tube obstruction (fiber), under/overhydration, diarrhea, cramping, distention, nausea, vomiting

Pros & cons: ***parenteral*** nutrition products

Advantages	Disadvantages
Easy to use, delivers exact amount/proportions of nutrients, not dependent on GI function, no aspiration risk	Vascular injury, pneumothorax, hemothorax, embolism, ↑sepsis risk, EFAD, fatty acid overload, immunosuppression, ↑$$

Sites of enteral feeding

Based on this scenario	Place catheter in…
Gastroparesis, partial gastrectomy	Small intestine
Full gastrectomy, jejunostomy	Enteral not recommended
Aspiration risk	Jejunum
Short term use <14 days	Nasoenteral
Head & neck cancer	Surgery needed

Nutrient content in enteral products

Carbohydrates	Protein	Lipids
Mostly **oligosaccharides** or **polysaccharides**	**Intact protein:** milk, lactalbumin, caseinates, soy protein isolates	**Long-chain triglycerides (LCT)**: slowly cleared, requires carnitine, contains essential fatty acids
Maltodextrin: most complex, easy to digest, low osmolality	**Oligomeric:** partially hydrolyzed, peptide-based formula, completely absorbed in small intestine	**Medium-chain triglycerides (MLT)**: does not require bile & pancreatic lipase
Modified corn starch: high osmolality, more effort to absorb	**Monomeric, free AA, elemental formula**: absorbed directly into bloodstream, pre-digested proteins	
Corn syrup: simpler, moderate osmolality	**Glutamine:** maintains intestinal mucosa integrity, produces IgA, positive trophic effect on mucosa	

Products

Standard formulas (1.0-1.5 kcal/mL)	Ensure, Jevity
High protein	Peptamen, VHP, NuBasic VHP
Fiber-rich	Ensure with fiber, Replete with fiber
Concentrated (2kcal/mL)	TwoCal HN, Nutren 2.0
Disease-specific	Nepro, Oxepa, Glucerna

Enteral feeding regimens

Continuous feeding	Intermittent infusion	Bolus feeding
--24hr continuous infusion --Start low go slow: initiate at 10 mL/hr --Start at full strength, don't dilute --↑Rate by 10-20 mL/hr q4hr to goal rate of 70-80 mL/hr	--12 to 18hr continuous infusion then off rest of day --Rate: <150 mL/hr --Admin meds during off hrs if they interact with enteral formulas --Titration similar to continuous infusion	--Feeding time during waking hours --Mimics physiological eating schedules --Start at 50 to 100mL bolus q2-4hrs --↑Each bolus feed by 100mL to goal of 500 to 1200 mL per 24hr --Need water flushes before/after boluses

Prokinetic agents

- **Enhances GI tract functioning:** ↑gastric emptying + stimulate GI tone
- **Metoclopramide**
  - Dopamine antagonist
  - MOA: ↑esophageal & gastric smooth muscle tone
  - Route of admin: IV or PO
  - SE: extrapyramidal effects, dystonia
  - Dose: 10mg IVP or PNGT q6°-q8°
- **Erythromycin**
  - Motilin receptor agonist
  - Route of admin: IV or PO
  - SE: thrombophlebitis, QT interval prolongation
  - Drug interactions: CYP1A2, CYP3A4, P-gp substrates
  - Dose: 250mg IVPB or PNGT q6°

Overview

	Indication	Advantages	Disadvantages
Nasogastric tube (NG tube)	--At least a partially functioning GI tract --Patients unable to consume adequate nutrition by mouth	--Performed bedside --Easy to insert	--Pulmonary aspiration risk --Sinusitis risk
Nasoduodenal (ND) or **nasojejunal** (NJ) **tube** e.g. dobbhoff tube	--Similar to NG tube	--Favorable for patients with gastroparesis or partial gastrectomy --Less risk for aspiration than NG	--Transpyloric tube placement: difficult w/o endoscopic or fiberoptic help --Post-pyloric position difficult --If rate not controlled → dumping syndrome --Sinusitis risk
Gastronomy	--When transnasal route unavailable --Long term feeding	--Can be performed in conjunction with other surgeries --No surgery required for percutaneous gastrostomies (PEG) --Can be placed laparoscopically	--Surgery required for gastrostomies --Stoma care required --Potential inadvertment tube dislodgment
Jejunostomy	--When upper GI access contraindicated --Poor gastric motility --High risk for GERD or pulmonary aspiration	--Can be performed in conjunction with other surgeries --No surgery required for percutaneous jejunostomies (PEJ) --Can be placed laparoscopically	--Surgery required for jejunostomies --Stoma care required --Potential for intraperitoneal leakage --Potential for volvulus