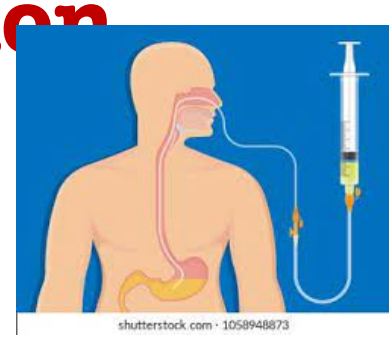
Nutrition Support

Enteral Nutrition

Chapter 20



Oral nutrition support

- If GI function is normal BUT patient has poor appetite (primary nutrition problem)
- Patients who are weak find it easier to consume oral supplements than to consume meals
- patient who can improve nutrition status with supplements may be able to avoid the stress, complications, and expense associated with tube feedings
- Examples: Hospitals have specific formulas-
  - nutrient- dense formulas, milkshakes, fruit drinks, and snack bars

Popular liquid supplements found in pharmacies

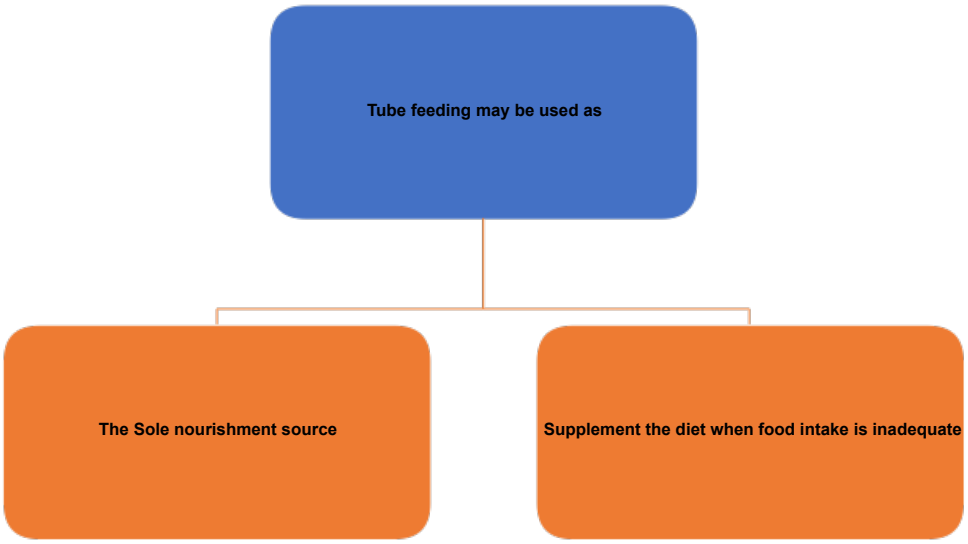
can add energy and protein to the diets
patients and be a reliable source of nut
powder or liquid

Help Patients Improve Intakes with Oral Supplements

- Let the patient sample different products that are appropriate for his or her needs
- Serve supplements attractively. For example, a liquid formula offered in a glass on an attractive plate may be more appealing than a formula served from a can with an unfamiliar name
- Keep the formula cold and fresh
- If a patient finds the smell of a formula unappealing, it may help to cover the top of the glass with plastic wrap or a lid, leaving just enough room for a straw.
- offer the drink or snack food in small amounts that are easy to tolerate If the pt. has no appetite. Serve multiple times a day/ small frequent

Tube Feedings

- person with a functional GI tract who cannot meet nutritional needs with regular foods alone may need tube feedings



Tube-Feeding Routes

- Used when
  - **Impaired ingestion**

    (Neurologic disorders, oral or esophogeal abnormalities, ICU pt with brain injury
  - **Inability to consume adequate nutrition orally**

    (example :Anorexia of cancer, hypermetabolic states)
  - **Impaired digestion, absorption, metabolism**

    Severe wasting or depressed growth, with increased needs unable to be met by oral feedings

  - Functional GI
  - Candidacy requirement :Unable to meet nutritional needs orally for at least 2 weeks

Tube-Feeding Routes

The feeding route chosen depends on

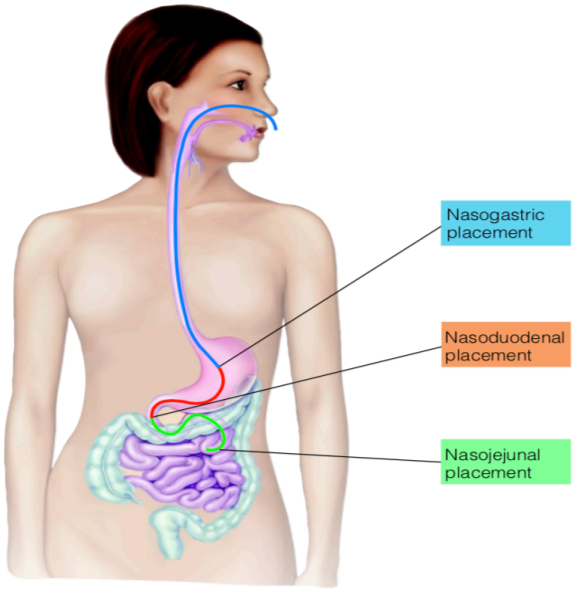
1. The patient's medical condition
2. Expected duration of tube feeding
3. Potential complications of a particular route

NasoGastric or Naso

- Patient is expected to be tube-fed for less than 4 weeks
- Patient is frequently awake during **transnasal** (through-the-nose) placement of a feeding tube
- Tube is inserted into a nostril and passed into either the
  - **Stomach (nasogastric route)**
  - **Duodenum (nasoduodenal route)**
  - **Jejunum (nasojejunal route)**

https://www.youtube.com/watch?v=en5ctZInOyA

> FIGURE 20-2 Tube-Feeding Routes



Transnasal feeding tube placements

IF patient is tube-fed for longer than 4 weeks or if the nasointestinal route is inaccessible because of an obstruction or another medical reason, a direct route to the stomach or intestine may be created by passing the tube through an enterostomy, an opening in the abdominal wall that leads to the stomach (gastrostomy) or jejunum (jejunostomy)

Enteral Feeding Routes

Nasojejunal (NJ) tube

- Tube passes through the nose into the jejunum
- Use if aspiration risk is high, reflux is high, gastric emptying is slow or nausea/vomiting is common

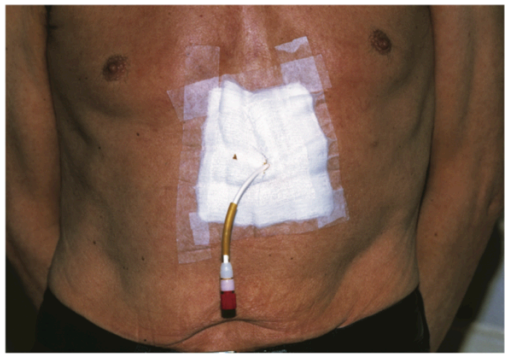
Enteral Feeding Routes

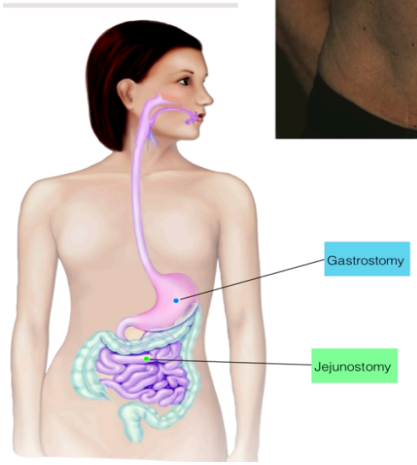
- Orogastric (OG) tube: the tube is inserted into the mouth, down the throat into the esophagus and rests in the stomach- also for short term use
  - In infants feeding tube is passed into the stomach via the mouth- preferred to help with normal breathing
  - Overall, Gastric feedings (nasogastric and gastrostomy routes) are preferred whenever possible
- A gastrostomy tube (also called a **G-tube**) is a tube inserted through the belly that brings nutrition directly to the stomach
  - Also known as Percutaneous Endoscopic Gastrostomy (PEG tube)
  - Tube passes through abdominal wall directly into the stomach

Enteral Feeding Routes

- Percutaneous Endoscopic Jejunostomy (PEJ tube)
  - Tube passes through abdominal wall directly into the jejunum
  - Route for long-term tube feeding when bypass of stomach is needed

Figure 5.5 A Gastrostomy Tube after Placement
This photo shows the external portion of a gastrostomy tube after successful placement.





Enteral Feeding Routes

- Gastric feedings (nasogastric and gastrostomy routes) are preferred These feedings are more easily tolerated and less complicated to deliver than intestinal feedings because the stomach controls the rate at which nutrients enter the intestine.
- When do we choose intestinal feedings?
- **If patients have gastric obstructions, motility disorders that impair stomach emptying, or inadequate stomach volume due to prior gastric surgery**
- High risk of **aspiration (**substances from the GI tract (such as GI secre- tions, food, or refluxed stomach contents) are drawn into the lungs)

Enteral Formulas

Standard formulas : contain intact proteins and polysaccharides (requires enzymes to split the nutrient into peptides before absorption across the gastrointestinal tract)

- Provided to individuals who can digest and absorb nutrients without difficulty.
  - **Blenderized formulas**, are produced from whole foods such as chicken, vegetables, fruit, and oil, along with some added vitamins and minerals
  - https://www.youtube.com/watch?v=nXwZra5mpXo

Formula Characteristics

Formulas are produced with different nutrient and energy densities so that they can supply the required nutrients in different volumes of fluid.

Protein content

- Most standard formulas ranges from 12 to 20 percent of total calories
- When are protein needs higher? severe metabolic stress
- Protein restriction? patients with chronic kidney disease.
- Peptides & hydrolyzed proteins = can provide improved absorption amino acids

Formula Characteristics

Energy

1-2 kcal/m(varies with formula)

- Lower energy densities are appropriate for patients with average fluid requirements
- High energy density formulas meet energy and nutrient needs in a smaller volume of fluid good for patients with high nutrient needs or fluid restrictions
- Low energy density formulas: Individuals with high fluid needs (OR additional water can be supplied via the feeding tube or intravenously)

Formula Characteristics

Carbohydrate

- Mono- & oligo-saccharides, maltodextrins, Lactose free
- standard formulas generally provide 30 to 60 percent of calories from carbohydrate

Fat

long or medium chain triglycerides (LCTs) or (MCTs), some n-3 FA essential fatty acids (EFAs)

Formula Characteristics

Fiber

- Originally, formulas were fiber free and low in residue, but today many products are also available with fiber added. Fiber added to formulas is generally thought to improve stool consistency and reduce diarrhea
- Insoluble fibers such as soy polysaccharides inulin , pectin, pectin, and oat fibers are most often found in enteral feedings because they are less hydrophilic
- **Hydrophilic fiber (soluble)** (attracts water), which causes enteral formulas to thicken and form a gel when fiber is added

Formula Characteristics

Glutamine

- Restores muscle mass
- Accelerates intestinal healing
- Protects mucosa

Vitamins & Minerals

Water

Enteral formulas are often the primary source of water for patients receiving them

Standard formulas are 85% water
Nutrient dense formulas are 70-75% water

Water Needs

- 30 to 40 milliliters of water per kilogram body weight daily
- or 1ml/kcal
- Additional water is required in patients with severe vomiting, diarrhea, fever, excessive sweating, high urine output, high-output ostomies, blood loss, or open wounds.
- Fluids may be restricted in persons with kidney, liver, or heart disease.
- Water is also provided through feeding tube water flushes (≈ 30 ml)

Enteral Formulas

- **Elemental formulas** contain macronutrients that have been broken down to some extent and require less digestion
  - Prescribed for patients who have compromised digestive or absorptive functions
  - Fat from **medium-chain triglycerides (MCT)** to ease digestion and absorption.

- **Specialized formulas**
  - *Disease-specific formulas*
  - Intended to meet the nutrient needs of patients with particular illnesses
  - Some formulas were developed for individuals with liver, kidney, and lung diseases; glucose intolerance; severe wounds; and metabolic stress

Enteral Formulas

Modular Formula:

contains specific nutrients, usually a single macronutrient (carbohydrate, protein or fat)

- prepared for patients who require specific
- nutrient combinations. Vitamin and mineral preparations are also included in the formulas
- Different modules can be combined to result in a nutritionally complete diet
- (can be used with Infants who cannot tolerate existing proprietary formulas/ **infants with specific or complex food intolerances)**

Osmolality

- Osmolality refers to the number of water-attracting particles per kilogram of water (concentration of solutes/solvent)
- formulas that are partially hydrolyzed have a higher osmolality
- The osmolality of body fluids/blood serum is 300 mOsm/kg
- Isoosmolar (or isotonic—the same osmolality as body fluids)
- If formula is hyperosmolar?
  - rapid movement of fluids into the gastrointestinal tract to dilute hyperosmolar or concentrated fluids diarrhea
- Most enteral formulas have osmolalities between 300 and 700 milliosmoles per kilogram; generally, elemental formulas and nutrient-dense formulas have higher osmolalities than standard formulas
- When medications are in- fused along with enteral feedings, however, the osmotic load increases

- The nutrient density of an enteral formula is measured in kilocalories per milliliter
- Density = calories / volume

- If a patient needs 2000 calories, how much volume will he needs from: 1- A standard formula which provides **1.2 kcal/ml (Density)**
  2- A high density formula which provides **1.8 kcal/ml (Density)**

- If the patient is to receive intermittent feedings six times a day, how much volume of formula at each feeding?

$1 - \frac{1.2}{1} = \frac{2000}{V}$ $\quad \frac{1.2V}{1.2} = \frac{2000}{1.2} \Rightarrow V = 1.7\,L$

$\frac{1.7}{6} = .283\,L/feeding.$

$?. \frac{2000}{1.6} = 1.1\,L$

$\frac{1.1L}{6} = .183\,L/Feeding$