ASSESSMENT AND MANAGEMENT OF GI ISSUES IN PATIENTS ON NUTRITION SUPPORT: THE HOSPITAL SETTING

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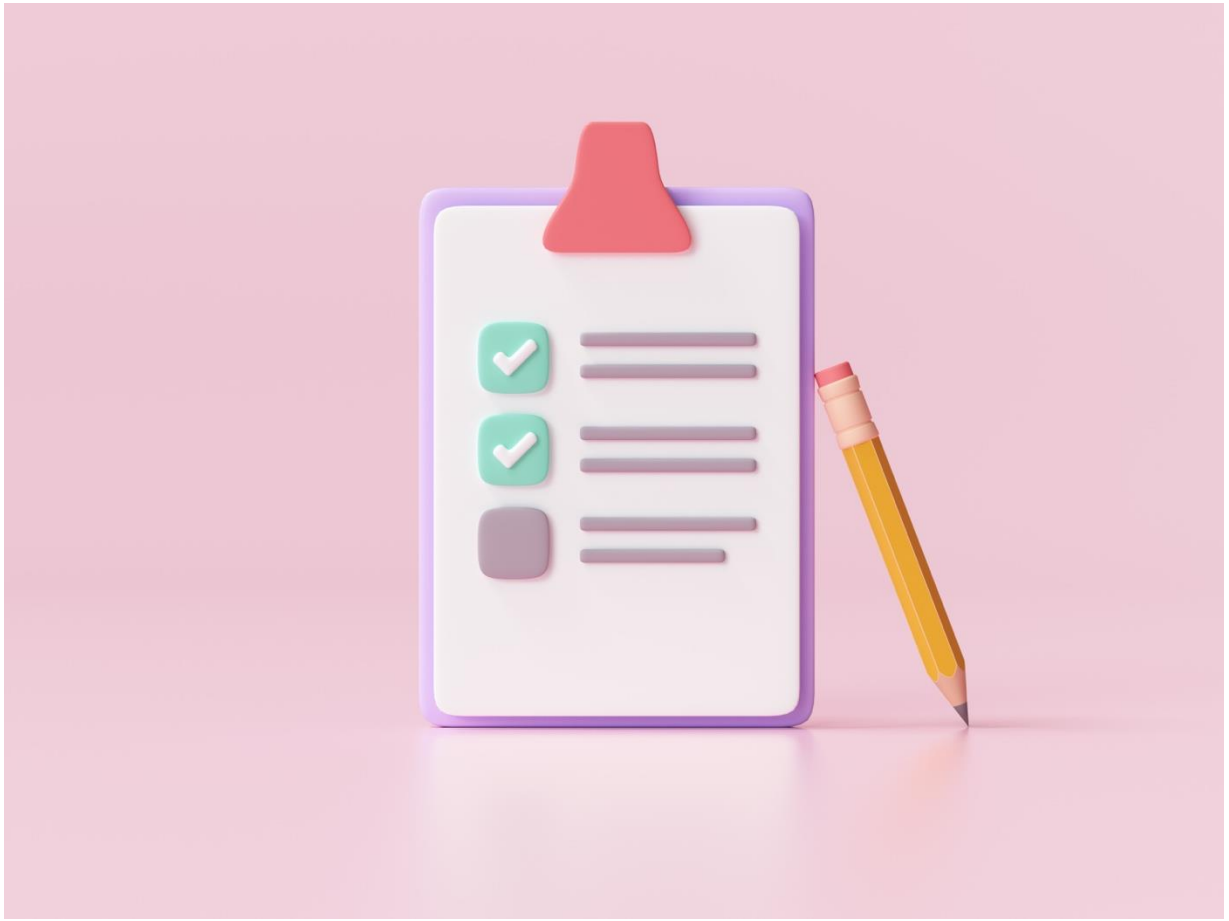
DISCLOSURES:

None

Objectives:



- Review screening for malnutrition and assessment of nutritional status
- Distinguish causes of GI intolerance in the tube fed patient
- Evaluate formula adjustments in various symptom management scenarios
- Recommend optimal monitoring of your patient and communicating with the medical team
- Case studies to illustrate the decision-making process for working with medically complex patients

Screening for Malnutrition:

Duerksen D, Laporte M, et al. NCP. 2021

- **Ambulatory cancer centers:**
  - MNA-SF, MST, MUST, NRS-2002, Nutriscore, PG-SGA SF (Trujillo 2024)
- **Hospitalized patients**
  - NRS-2002, MST, MNA-SF, MUST (Guenter 2018, Cederholm 2019)

Malnutrition Diagnosis:

Characteristic	Acute/ Injury related:	Chronic/Disease:	Social/ environmental:
Weight loss	1-2% loss in 1 wk; 5% in 1 month; 7.5% in 3 months	5% in 1 month; 7.5% in 3 months, 10% in 6 months, 20% in 1 year	5% in 1 month, 7.5% in 3 months; 10% in 6 months, 20% in 1 year
Energy Intake	<75% for >7 days	<75% for 1 month	<75% for 3 months
Body Fat	Mild depletion	Mild depletion	Mild depletion
Muscle Mass	Mild depletion	Mild depletion	Mild depletion
Fluid Accumulation	Mild	Mild	Mild
Grip Strength (diminished functional status)	n/a	n/a	n/a

MODERATE

Characteristic	Acute/ Injury related:	Chronic/Disease:	Social/ environmental:
Weight loss	>2% loss 1 wk; >5% in 1 month; >7.5% in 3 months	>5% in 1 month; >7.5% in 3 months, >10% in 6 months, >20% in 1 year	>5% in 1 month, >7.5% in 3 months; >10% in 6 months, >20% in 1 year
Energy Intake	50% for 5 days	75% for 1 month	50% for 1 months
Body Fat	Moderate depletion	Severe depletion	Severe depletion
Muscle Mass	Moderate depletion	Severe depletion	Severe depletion
Fluid Accumulation	Moderate to severe	Severe	Severe
Grip Strength (diminished functional status)	Not recommended in the ICU	Reduced for age/ gender	Reduced for age/ gender

SEVERE

Criteria for diagnosis for malnutrition/ undernutrition
White et al, 2012

Malone and Mogensen, 2022

Global Initiative on Malnutrition

- *"GLIM consensus approach was mainly intended to provide a feasible alternative for clinicians in clinical sites with more limited nutrition knowledge and resources rather than to displace other valid methods used by nutrition experts."* Jensen et al 2025

Phenotypic Criteria (meet one):

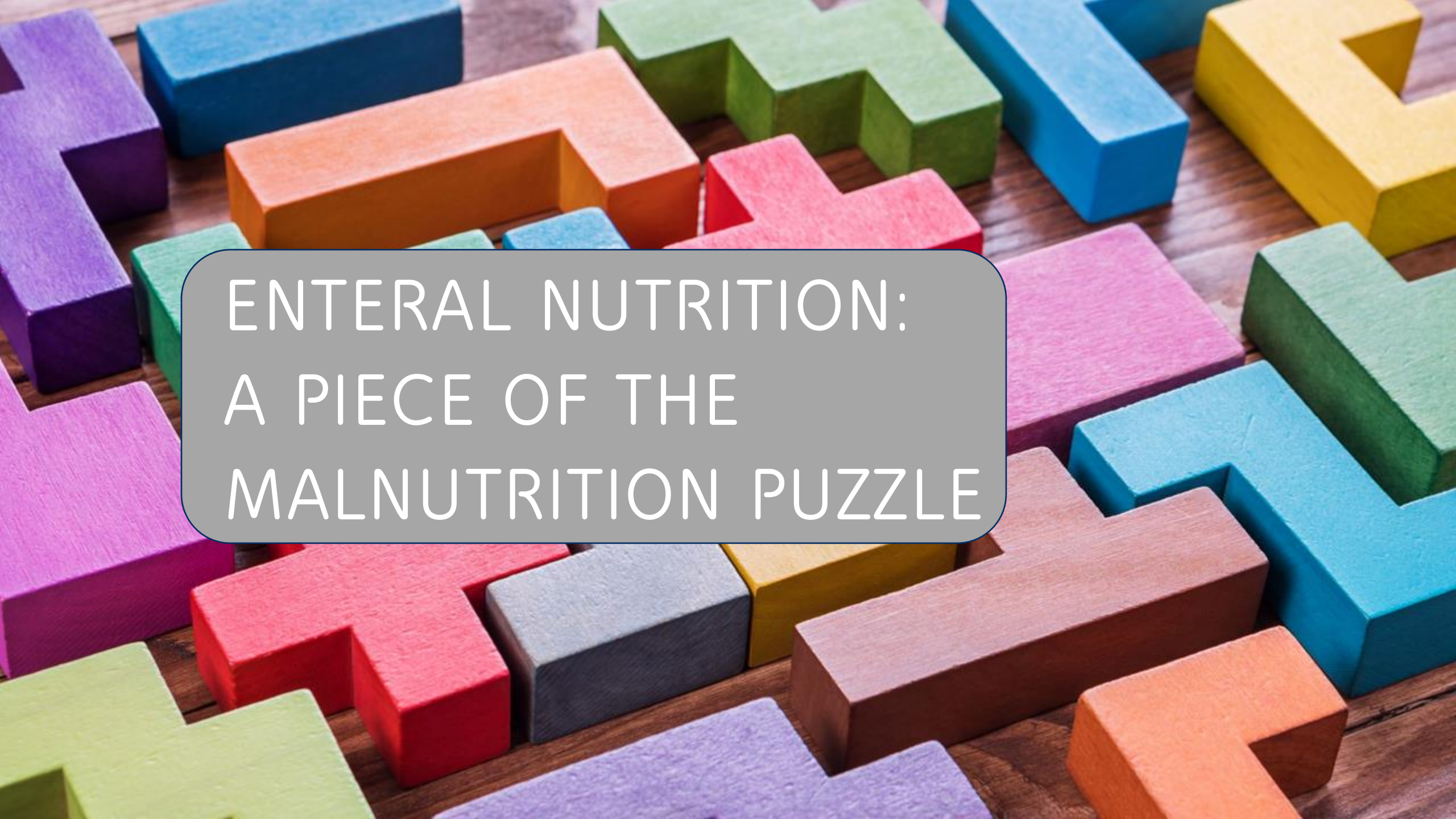
- Weight loss
  - >5% in 6 months or >10% beyond 6 mo
- BMI
  - <20 if <70 yo; <22 if > 70 yo (Asia: <18.5 if <70 yo; <20 if >70 yo)
- Muscle Mass
  - Reduced by measurement using validated techniques

Etiologic Criteria (meet one):

- Reduced food intake compared to requirements
  - 50% intake > 1 wk, or any reduction for >2 weeks
  - Chronic GI condition that impairs absorption or assimilation
- Disease state
  - Chronic disease with inflammation
  - Chronic disease with no inflammation
  - Acute disease or injury with severe inflammation
  - Starvation d/t socioeconomic factors

If BOTH categories are not met, then they are not considered malnourished

Cederholm et al, 2019


ENTERAL NUTRITION:
A PIECE OF THE
MALNUTRITION PUZZLE

Enteral Feeding:

Intervention for the malnourished hospitalized patient with a functional gut

Prevention of further malnutrition

- Post operative patients
- Altered GI function- feeding post gastric or post leak/fistula

Prolonged NPO

- Dysphasia
- Intubated patients

Benefits

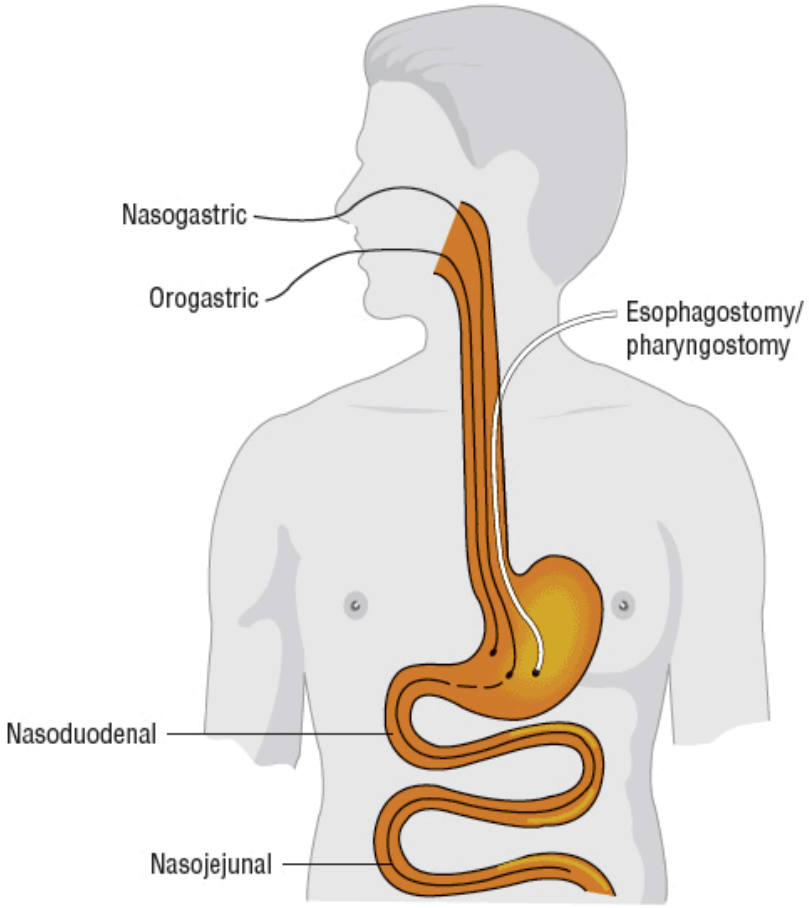
- Maintains digestive and absorptive capacity
- Maintains structure of the gut, possible reduction in infections

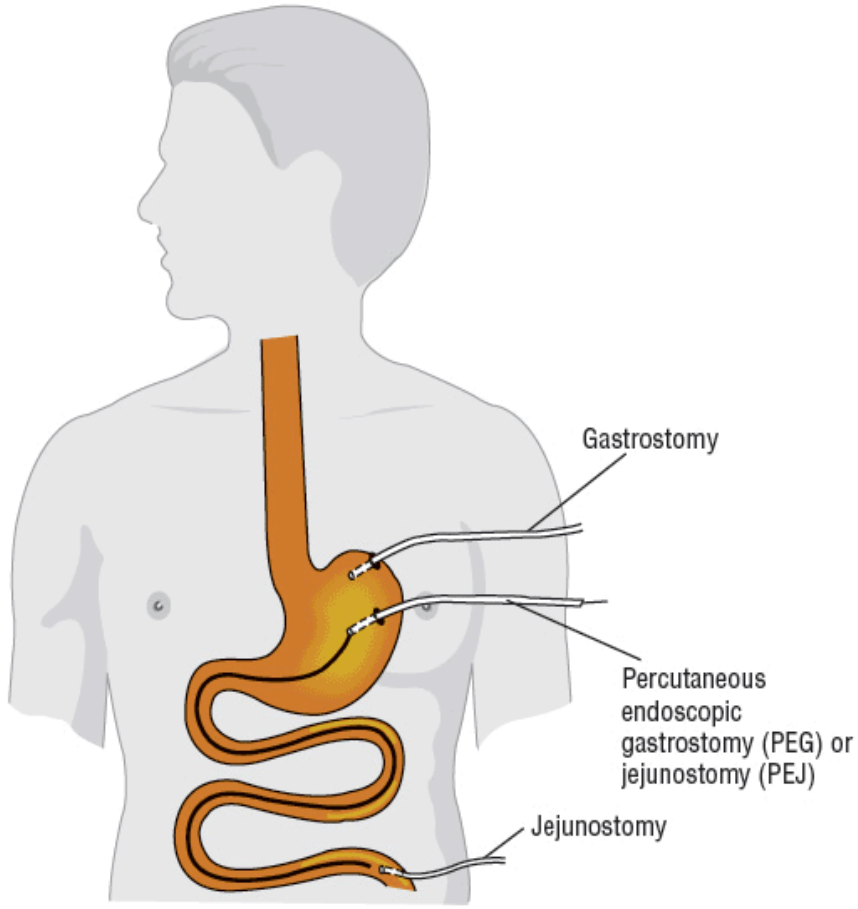
Hospitalized patients may benefit from EN (especially the malnourished) if unable to meet majority of nutritional needs to avoid sequela of progressive malnutrition (Bechtold 2022)

ASPEN Nutrition Support Core Curriculum, 4th ed. 2025

Enteral Feeding Access:

- PEG, PEGJ, Jtube
- Temporary- nasoenteric tube
  - Bedside blind placement (RN)
  - Device assisted- Cortrak
  - Complicated placements by IR or GI
  - Salem sump NGT or OGT





Enteral Feeding: Formulas

- Decide on formula to start with:
  - Polymeric (most populations…even the ICU)
  - Disease associated
    - Renal?
    - Diabetic?
    - Immune enhancing?
  - Semi-elemental/peptide based (malabsorption prior to initiation of enteral feeding)
- Decide which best meets your patient's nutritional needs
  - Propofol? Highest protein formula
  - About to discharge on gastric feedings? Volume concentrated formula
- Decide on rate to start and advancement regimen
  - Pepup?
  - Refeeding risk?

Enteral Feeding Provision - **Troubleshooting**

Protocols to help avoid holding feedings-

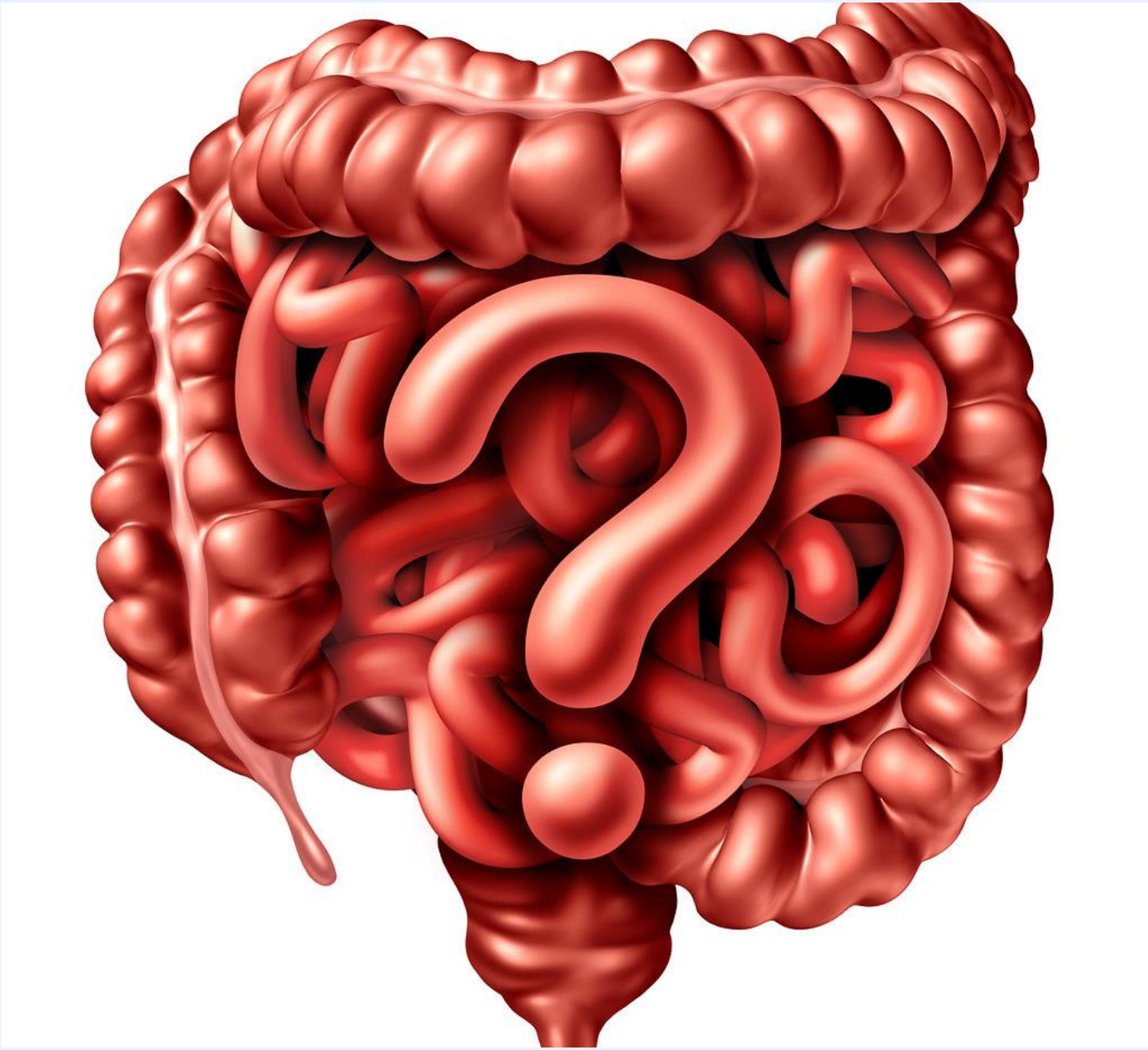
Key to successful feeding is ensuring it is being **delivered**

- Volume based feeding
  - Pepup (ICU protocol)
  - Volume goal instead of rate based goal
    - Padding the feeding rate (i.e. assume 20 hours of delivery instead of 24 hours of delivery)
- No longer waiting on bowel sounds or relying on gastric residuals or lack of bowel movement as an indication of lack of gut function
- Holding for meds
- Avoid constant holding for procedures (NPO after MN or for extubation)

- Finally…. addressing perceived GI issues due to TFs

"GI INTOLERANCE"

Reported anywhere between 33-66% of all patients receiving tube feeding (Steele 2024)



Nausea/Vomiting/Fullness

- Common in hospitalized patients for a multitude of reasons
  - Likely nothing to do with enteral nutrition
- What is the **cause**?
  - Always start with the anatomy
    - Delayed gastric emptying?
    - Ileus?
    - Gastroparesis?
    - Lack of bowel movements?
    - Medications on an empty stomach?
  - Where in the GI tract are they being fed?
  - Is the tube in the correct location?
  - PO intake?

Solutions!

- Bowel meds.... antiemetics and prokinetics
  - Timing
  - Frequency
- Medication timing and administration
- Decrease feeding rate
  - Bolus --> pump feeding
- Concentrating the formula for less total volume
  - Water flush volume?
- Medical and surgical history
  - Recent surgical reports, Abdominal CT scans, abdominal xrays
  - Moving from gastric to post pyloric feeding
  - Venting the G port of a PEG J

Always take time for some detective work!

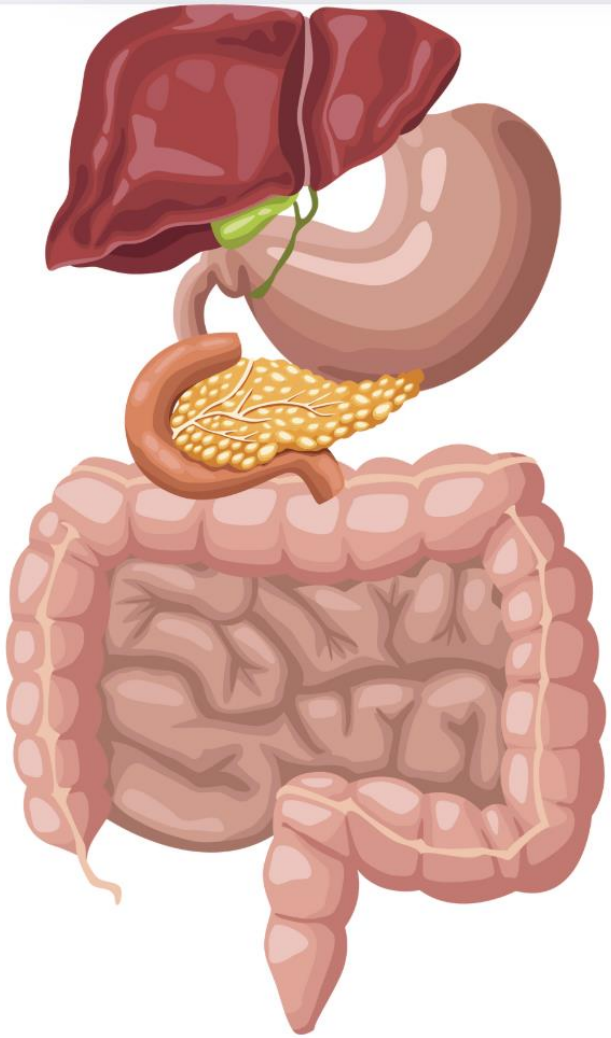
Consult!

"This patient is having diarrhea due to his tube feedings. Please add fiber to his formula."

Or

"Ms Y is having diarrhea after starting tube feedings. Please change to an elemental formula"

Understanding the GI tract



- Endogenous secretions
  - Saliva ~1.5L
  - Stomach: ~2-3L
  - Pancreas: ~1- 1.5L
  - Bile: 800mL – 1L
  - Intestine: ~1L
- PO intake additional volume
- Small bowel absorbs majority, remaining absorbed by the colon with a small amount left for elimination.

Diarrhea:

- What is the cause?
  - #1 Medications!
    - Sorbitol, sugar alcohols
    - Oral electrolytes
      - Magnesium or Phosphorus
    - Scheduled bowel meds… that are still being given
    - Antibiotics

Kumpf V, Parrish C. 2022

Meds	Sugar Alcohol Content
Acetaminophen (Tylenol)	Sorbitol
Amoxicillin / clavulanate (Augmentin)	Mannitol
Diphenoxylate and Atropine (Lomotil)	Sorbitol
Fer-In-Sol® (Ferrous sulfate) Liquid Iron Supplement	Sorbitol
Lacosamide (Vimpat)	Sorbitol
Oxycodone Hydrochloride Oral Solution	Sorbitol
Metoclopramide (Reglan)	Sorbitol
Simethicone (Gas relief)	Maltitol
Lansoprazole (Prevacid)	Mannitol
Levetiracetam (Keppra)	Maltitol

Hypertonicity or High Osmolality

- Gastric Feeding
  - One study showing 500mL of a test meal given gastrically was diluted to a volume of 1500-2000mL before passing to the duodenum
  - Another study showing hypertonic formula in the stomach was isotonic by the time it reached 25 cm past the pylorus.
- Jejunal feeding:
  - Again, medications being delivered here are much more hyperosmolar than any tube feeding formula
  - GI secretions quickly dilute the osmolality of enteral feeding delivered
  - Formulas fed at a very slow rate
- No reason to ever dilute formulas (in the hospital setting)
  - Look at the osmolality of what they are eating, drinking, and the medications they are receiving

Borgstrom, et al. 1957
Miller er al, 1978
Parrish, McCray. 2019

Secretory Diarrhea:

- Constipation (stooling around impaction)
- Infectious etiologies
  - C diff
- Short bowel syndrome
- High output ileostomy
- Gut damage
  - Crohn's Disease, Ulcerative Colitis, Celiac Disease, Radiation enteritis, Intestinal Ischemia

Easiest way to determine if it is a secretory diarrhea is by holding feeds and evaluating for a change in volume- requires strict NPO

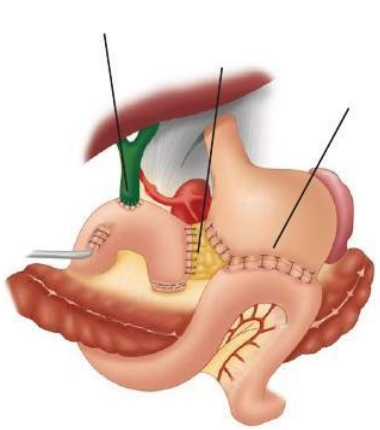
A word about “Fiber”:

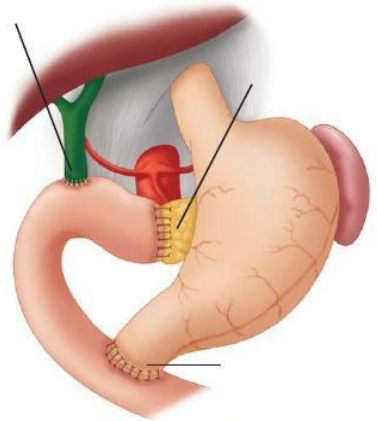
- All fiber (and formulas containing fiber) are not all the same.
- Data is variable re: enteral feeding and fiber resolving GI distress
- Different formulas have different amounts and types of fiber
  - Many include FODMAPs
  - Giving 1.5L of one fiber containing formula provides 33g of fiber!
- Careful in patients with dysmotility, on narcotics with a slowed gut, gastroparesis or at high risk of intestinal ischemia

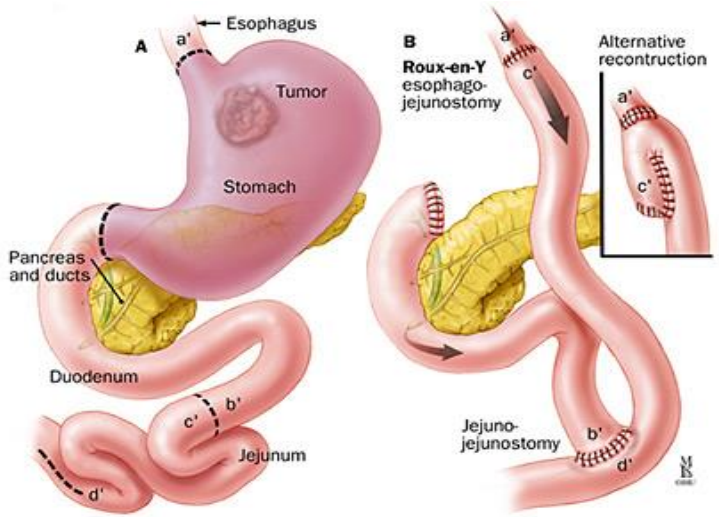
Tarleton S, Kraft C, DiBaise J. 2014

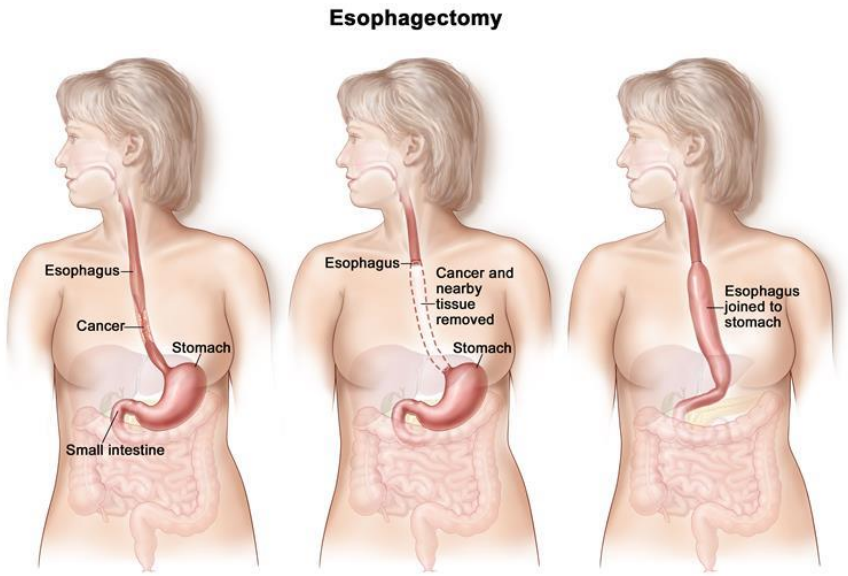
Does the patient's anatomy put them at risk for:

- Dumping syndrome?
- Delayed gastric emptying
- Strictures?
- Dysphasia?
- SIBO?
- Pancreatic Exocrine Insufficiency?









Suggested Pathway to Address Diarrhea in Enterally Fed Patients:

Adapted from UVAHS Traineeship 2019

Tips to troubleshoot diarrhea in enterally fed patients:

- Evaluate normal stooling patterns of a patient prior to admission
- Evaluate stool burden on xray
- Strict I/Os to determine volume in and out
- Review medication lists

  -Bowel Meds

  -Sorbitol or sugar alcohol containing meds

  -Oral electrolytes
- If unable to remove causative agent, can add gut slowing medications and increase as appropriate
  - *Squeo G, Parrish C. High output ileostomies: Preventing acute kidney injury. Pract Gastro, 2022.*
- Compare the timing of when diarrhea started in relation to initiation of TF (and if the TF were being infused)
- Consider other causes based on history-
  - SIBO, dumping syndrome, bile acid malabsorption
- Check infectious etiologies

  -C. Diff, etc

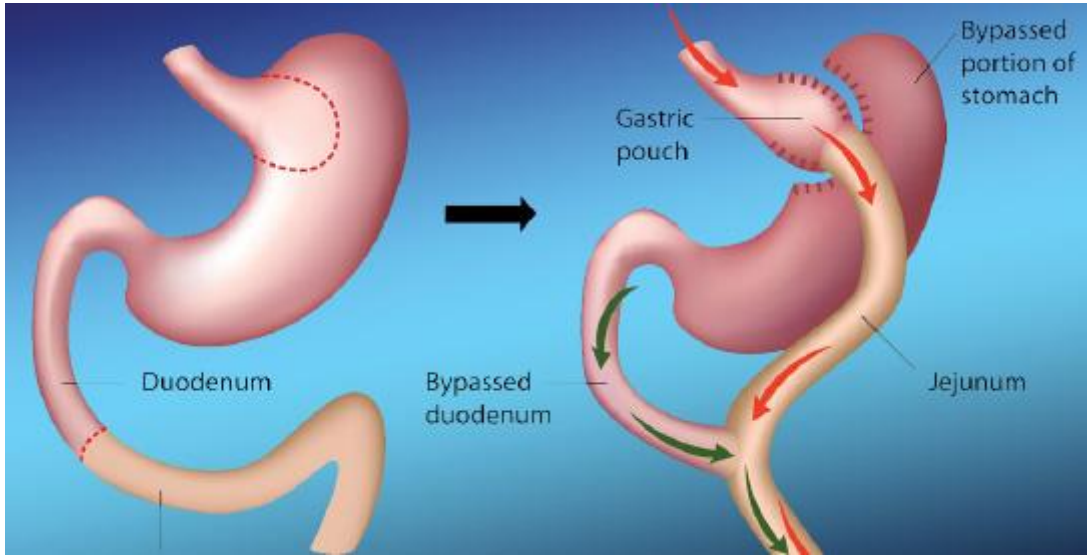
Malabsorption:

- History of chronic pancreatitis, acute pancreatitis, pancreatic resection
- History of alcoholism or prolonged diabetes
- Esophagectomy and Total Gastrectomy
  - Diagnosis of EPI (by FE-1) found in 16-26% of post op patients in 4-6 mo
  - Up to 44% at 18-24 mo
  - Cause of EPI post UGI surgery:
    - Vagal denervation- neuro-endocrine signaling system disrupting pancreatic enzyme timing of release
    - Bile acid insufficiency

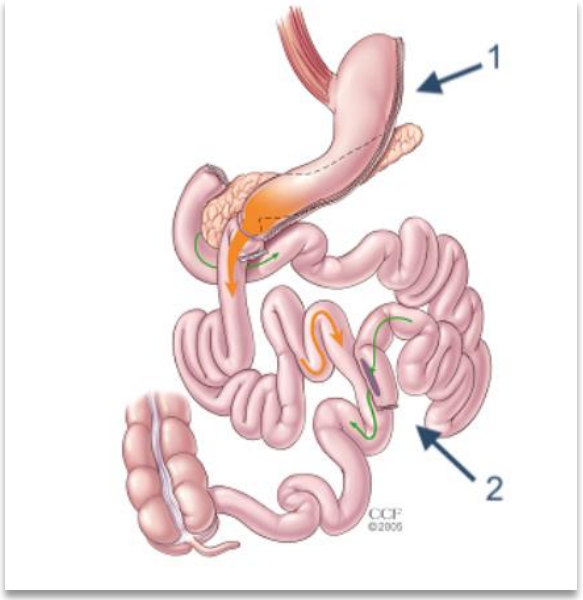
Khaw et al, 2022
Veeralakshmanan et al. 2020

Malabsorption:

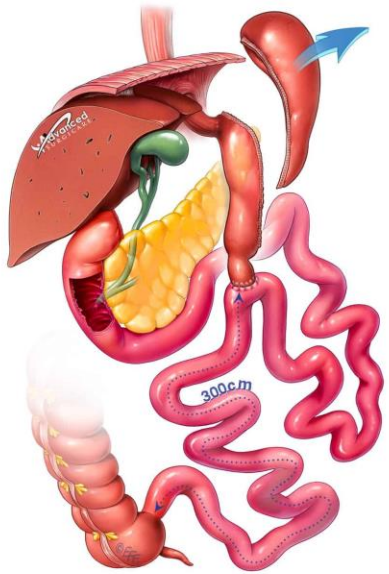
- Roux en Y gastric bypass, SADI, duodenal switch with biliopancreatic diversion
- Moore et al (2023) found **47.9% of RYGB & 70% of BPD-DS** were found with EPI



https://www.saintlukeshospitals.com/roux-en-y-gastric-bypass.php



https://asmbs.org/condition_procedures/biliopancreatic-diversion-with-duodenal-switch/



https://www.advancedobesitysurgery.com.au/laparoscopic-sadi-s-surgery/

Enteral Nutrition in an EPI patient:

TABLE 3 Enteral feeding considerations for patients with EPI.[35,56,69,84]

Steps	Suggestions
Step 1. Standard formula	• If EPI is unknown/suspected or is considered mild, can try polymeric standard enteral formula and assess tolerance. • If symptoms continue, proceed to step 2. • If the patient has severe EPI *and* severe malnutrition, start with Step 2.
Step 2. Semi-elemental formula	• Change to semi-elemental formula if standard not tolerated. • If still having EPI symptoms, proceed to options in step 3.
Step 3. In-line lipase cartridge[a]	• Initiate in-line lipase cartridge with standard fiber-free formula. • Initiate in-line lipase cartridge with semi-elemental formula.
Step 3a. If bolus feeding or in-line cartridge unavailable	• Mix directly with enteral formula or administer via feeding tube q 4 h[b] o Crushed non-enteric-coated pancreatic enzyme, OR o Gastric feeds: mix beads in thickened acidic solution (I.e. applesauce) for administration, OR o Powdered enzymes.[c] • Flush well with water after administration.

Abbreviations: EPI, exocrine pancreatic insufficiency; FDA, Food and Drug Administration; tsp, teaspoon.

[a]Refer to in-line lipase section of article for usage and limitations.

[b]These are anecdotal methods that have been reported in clinical practice but are NOT FDA-approved.

[c]Powdered enzymes are no longer available in the US but are available for use in the UK.

Berry A, Bilbo A. 2024

Formula adjustments:

- Review anatomy/ history for cause of malabsorption; consider semi-elemental feedings or in-line digestive filter
- Does the patient have a history with a risk of malabsorption?
  - Try a semi-elemental feeding
  - Still with loose stools? Add an in-line enzyme filter
- If all else has been assessed and loose stools remain… the beauty of inpatient is trial and error!
  - Only one change at a time!
  - Whole foods formula?
  - Semi-elemental formula?


Cases:

Quick Cases:

- An ENT patient is discharged home on bolus feedings via DHT. He readmits with profuse diarrhea every time he feeds, which is new. What do you suspect?

- A patient is admitted from the OSH with what appears to be a PEG tube, and the transferring notes mention patient has a PEG but can't use it due to diarrhea. He is on TPN. He has a history of esophageal cancer and esophagectomy 2 years ago, and the patient reports this was when his feeding tube was placed. He now presents with FTT, dehydration and weight loss. Can we get him off TPN? How would you feed him? What do you suspect?

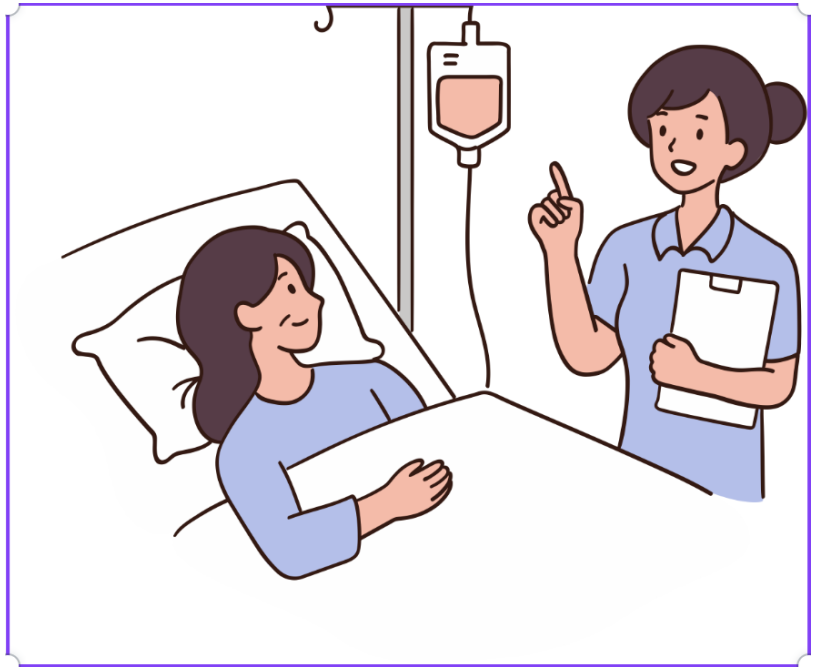
Is it the formula?

What formula?	Polymeric 1.5
What rate do you start?	○ Low rate for refeeding risk, kept her at ~60% x 2 days while lytes were repleted ○ Started on aggressive bowel meds regimen for BM
Day 3	○ Advancing to goal rate, again requiring electrolyte repletion.
Day 4 The team wants to cycle her for discharge. The patient is complaining of nausea now that she is at goal. Do you change her formula?	○ Just had her first small bowel movement with the help of medications ○ Not using prn antiemetics, changed to scheduled. ○ Hold on cycled
Day 5 Lytes are improved, she is stooling, notes nausea improved as long as she gets her nausea meds, tolerating her goal continuous rate.	How do we transition her to home?

Formula infusion:	Water Flush:
4 cans overnight 50ml/hr x 20 hours	60mL water flush before/after feeding. You will need an additional 4 cups of water per day flushed via tube or taken by mouth
4 cans overnight 60 ml/hr x 16 hours	60mL water flush before/after feeding. You will need an additional 4 cups of water per day flushed via tube or taken by mouth
4 cans overnight 70 ml/hr x 14 hours	60mL water flush before/after feeding. You will need an additional 4 cups of water per day flushed via tube or taken by mouth
4 cans overnight 80 ml/hr x 12.5 hours	60mL water flush before/after feeding. You will need an additional 4 cups of water per day flushed via tube or taken by mouth

Transition to home:

- Important part of the hospital RD's job is to set them up for success at home
- Referral to outpatient nutrition provider (if possible)
- The medication regimen in the hospital should mimic their home regimen
  - Change IV prokinetics, IV PPI, IV antiemetics to the form they will be on at home
- Education on their home enteral feeding regimen



In Conclusion:

Successful Enteral Feeding Requires:

- Understanding of GI anatomy
- Knowledge of current evidence in the practice of enteral nutrition
- Experience as a bedside clinician caring for nutrition support patients
  - Communication with the treating team to assist in troubleshooting.
- It's rarely the "tube feeding formula"!

Don't forget: Frequent monitoring and adjustments!

Parrish C, McCray S. Prac Gastro, 2019

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