


**Approach to chronic vomiting:
A case-based analysis**

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Conflicts of Interest:

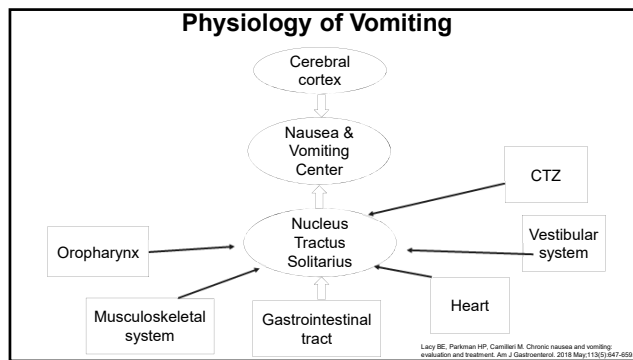
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Overview

- Definitions
- Physiology of vomiting
- Etiology of chronic vomiting
- Clinical history and examination
- Diagnostic testing
- Approach to Chronic vomiting
- Treatment options
- Case studies

Definition

Nausea	Feeling sick or unpleasant sensation which may or may not lead onto vomiting.
Vomiting	Forceful expulsion of gastric contents associated with abdominal muscle contraction.
Retching	Spasmodic muscular contraction of abdomen without any expulsion of gastric contents.
Regurgitation	Food brought back in the mouth without abdominal and diaphragmatic muscle contraction.
Rumination	Chewing and swallowing of regurgitated food with high abdominal pressure.



Most Common Cases for Chronic Vomiting

Mechanical gastrointestinal obstruction (small bowel, colon, pylorus, bile duct)
Mucosal inflammation (esophagus, stomach, duodenum)
Peritoneal inflammation (Colitis, cancer)
Carcinomas (gastric, ovarian, renal, etc)
Medications (anticholinergics, narcotics, L-dopa, progesterone, Gabp, NSAIDs, GLP analogues)
Metabolic (Diabetes, adrenal insufficiency, thyroid disorders, uremia)
Gastroparesis (Diabetes, hypothyroidism, postsurgical, idiopathic)
Neurogenic (autonomic, tumor, migraine, seizure, stroke, lactulose intolerance)
Psychogenic (eating disorders)
Cannabis/cyclical hyperemesis syndrome

Clinical Features:

- Vomiting (forceful expulsion and associated with nausea) vs regurgitation (passive and not associated with nausea).
- Insidious onset of nausea in middle aged female- r/o pregnancy.
- Medication use: OPIOIDS, NSAIDs, levodopa, anticholinergics.
- **Bowel pattern and reflux symptoms.**
- Type of vomitus:
 - Regurgitation of undigested food-Achalasia or Zenker's diverticulum or Rumination.
 - Partially digested food-Gastroparesis or gastric outlet obstruction.
 - Bilious-Small bowel obstruction.
 - Feculent-Distal bowel obstruction.
- Timing of vomiting:
 - Early morning: Pregnancy or uremia.
 - Projectile: Increased intracranial pressure.
 - Periodic: Cyclical vomiting or cannabis induced hyperemesis.
 - Postprandial: Gastric outlet obstruction or gastroparesis.
 - During meals: Rumination or eating disorder.
- Associated symptoms: colicky abdominal pain, early satiety, associated neurological symptoms.

Diagnostic testing:

- **Abdominal X-ray:** Stool burden, gas pattern in obstructive and non-obstructive cause.
- **CT scan:** Bowel obstruction.
- **UGI series and SBFT:** Gastric and small bowel obstruction.
- **Upper endoscopy:** Mucosal condition of the stomach and gastric outlet obstruction.
- **Gastric emptying study:**
 - Gastric scintigraphy.
 - Wireless transit study.
 - C¹³ breath testing.
- **CNS imaging:** in cases of projective vomiting or associated CNS symptoms.
- **Specialized gastric motility testing:** electrogastrography, antroduodenal manometry or endoflip.

Differential diagnosis:			
DDx:	Distinguishing feature	Testing	Treatment options
Gastroparesis	Postprandial symptoms or non-periodic vomiting in the absence of obstruction	Delayed solid emptying	Dietary modifications Medications Nutritional support Surgical options
Cyclical vomiting syndrome	Periodic vomiting episodes in the absence of cannabis use	Diagnosis of exclusion	Avoidance of triggers Antiemetics, neuromodulators- Amitriptyline
Cannabis hyperemesis syndrome	Episodic vomiting with cannabis use.	Diagnosis of exclusion	Cessation of cannabis
Rumination syndrome	Effortless regurgitation	Postprandial ESM or antroduodenal manometry	Behavioral therapy(DBT)
Eating disorder	Distorted body image Purging episodes	Clinical history	Psychiatric care

Principles of Treatment
<ul style="list-style-type: none"> • Treatment is directed towards the cause. • It would be important to identify triggering factors: <ul style="list-style-type: none"> - Medications. - drug use anxiety/stress. - Menses. - bowel pattern. • Dietary modification and avoidance of triggers are the cornerstone in the management of chronic vomiting. • Medications such as prokinetics, anti-emetics and neuromodulators are often used. • In case of profound vomiting with weight loss, consider alternative nutrition route. • Watch for micronutrient deficiency.

Pro-kinetics:			
Medications	Mechanism	Pros	Con
Metoclopramide	D2 Antagonist	Improves gastric emptying. Lowest possible dose (5 mg TID before meals). No long-term study available. Efficacy:29-53%. Comparable to Domperidone	Black box warning:>12 weeks use of tardive dyskinesia Acute dystonias Parkinsonism type movements Associated with QTc interval
Domperidone	D2 Antagonist	Improvement in symptoms (54% to 79%). Drug interaction.	Less CNS effects Associated with QTc interval. Increases Prolactin levels. Requires IND for approval.
Erythromycin	Motilin agonist	Useful during acute exacerbation. IV better than PO.	tachyphylaxis. Associated with QTc prolongation.
Cisapride	5-HT4 agonist	Significant improvement in symptoms.	cardiac arrhythmias and death Requires IND
Prucalopride	5-HT4 agonist	Improves gastric emptying and colon transit times. FDA approved for chronic constipation.	Diarrhea and suicidal ideations. Avoidance in ESRD. No cardiac toxicity document.

Anti-emetics:			
Medications	MOA	Pros	Cons
Diphenhydramine	Antihistamines	Useful in mild nausea/vomiting.	• Sedative effect. • Anticholinergic S/E.
Hyoscine	Anti-cholinergics	Cheap and widely available. Useful in mild cases.	• Anti-cholinergic side effects(dry mouth, glaucoma,etc).
Phenothiazines/ prochlorperazine	D1/D2 Antagonist	Useful in severe nausea and vomiting.	• EKG changes • Psychomotor issues in elderly • Dystonia/Parkinsonism
Ondansetron	5HT3 antagonists	Widely available. Useful in mild vomiting.	• QT prolongation. • Serotonin syndrome. • Constipation.
Transdermal granisetron	5HT3 antagonists	Not widely available/cost. Useful in those who cannot tolerate oral meds.	• QT prolongation. • Serotonin syndrome. • Constipation.
Aprepitant	NK1 receptor antagonists	Not widely available/cost. Useful in reducing N/V.	• Fatigue. • Neutropenia.
Dronabinol	Agonist of CB ₁ and CB ₂	Helpful for N/V when other therapies have failed.	• Delays gastric emptying.

Neuromodulators:

Medications	MOA	Pros	Con
Nortriptyline/ Amitriptyline	TCA	Modest improvement in N/V and abdominal pain	Worsens gastric emptying. Anti-cholinergic side effects. Constipation.
Mirtazapine/B uspirone	SNRI/ SSRI	Improves appetite. Improves fundic accommodation.	Suicidal thoughts. EKG changes. Serotonin syndrome.

Case studies

Case study 1

• 42-year-old gentleman with type 2 diabetes(HgbA1c:9.5) on exenatide presenting with recurrent vomiting and nausea for the last 6 months?

What would be the next step?

Normal upper endoscopy with moderate food retention in the stomach.
Bx: negative for H. pylori.

4-hour GES: 43%. What do we do next?

**Switch exenatide to insulin+CGM.
Nutrition consult for gastroparesis.**

Definition:

Gastroparesis is defined as a delay in the emptying of ingested food in the absence of mechanical obstruction of the stomach or duodenum.

Camilleri M, Parkman H, Shafi M, et al. Clinical guideline: management of gastroparesis. Am J Gastroenterol 2013;108:18-37.

Treatment Algorithm for Suspected Gastroparesis

Suspected gastroparesis	
Step 1: Diagnosis: 4 h Gastric emptying by scintigraphy	
Step 2: Exclude iatrogenic disease Dietary: low fat, low fiber diet Glycemic control among diabetic	
Step 3: Pharmacological Rx: • Prokinetics: metoclopramide, erythromycin, domperidone • Antimetics: anti-histamine ₁ receptors; 5-HT ₃ antagonists	
Step 4: Nutritional support: Enteral formula	
Step 5: Non-pharmacological Rx Pyloric injection of botulinum toxin Venting gastrostomy, feeding jejunostomy Parenteral nutrition Gastric electrical stimulation Pyloroplasty Partial gastrectomy	

Camilleri, et al. Clinical Guideline: Management of Gastroparesis. Am J Gastroenterol 2013; 108:18-37

Therapeutic options guided by symptom severity

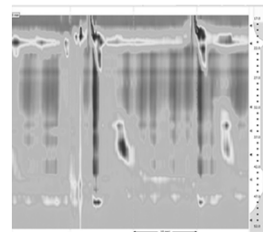
		Therapeutic options guided by symptom severity	
Lifestyle Modifications		Increased meal frequency, decreased meal volume. Aim for low particle size, fat, and fiber diet.	1 DM, optimize glycemic control. Balance diet with GP symptoms. Target plasma glucose \leq 200 mg/dl Trial withdrawal of medications known to impair gastric emptying (e.g., GLP-1 analogs, opioids).
		Nutritional assessment with correction of dietary deficiencies.	Consider enteral nutrition if the patient cannot tolerate oral diet
Pharmacotherapy	Mild		
	Prokinetic Agents	Metoclopramide (recommended duration \leq 12 wk due to risk of TD).	Domperidone (baseline QTc < 470 ms in men / <450 ms in women). Erythromycin (ambulatory use limited by tachyphylaxis).
Interventional Therapy	Symptom Control	Anti-emetic agents	Anti-nociceptive agents
	Severe		Gastric Electrical Stimulator May benefit patients with diabetic GP and intractable nausea/vomiting Surgical Options Pyloroplasty and subtotal/total gastrectomy may benefit patients with post-surgical GP. Consider gastric bypass in obese patients

Gastroparesis: A Review of Current Diagnosis and Treatment Options. Stern, Benjamin, Ewehah, Kelly, Levy, Brian. Journal of Clinical Gastroenterology. 49(7):530-538, August 2015.

Case Study 2:

- 26-year-old female with prior hx of chronic insomnia and anxiety presented with chronic vomiting.
- She complains of
 - Postprandial regurgitation of food associated with upset stomach and associated swallowing the food back again.
 - Feeling of Charlie-horse in her chest followed by regurgitation of food.
 - Upper endoscopy and 4-hour GES were unremarkable.
 - She was tried on Nortriptyline, pantoprazole and reglan without much benefit.

Postprandial esophageal manometry



1. Rise in gastric pressure
2. Reflux of gastric contents
3. Rise in esophageal pressure during reflux
4. Relaxation of upper esophageal sphincter

ROME IV Criteria for Rumination Syndrome

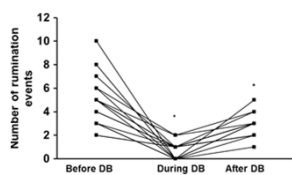
Table 1 Clinical diagnosis of rumination in adults
Rome IV criterion
Must include all of the following:
<ol style="list-style-type: none"> 1. Persistent or recurrent regurgitation of recently ingested food into the mouth with subsequent spitting or remastication and swallowing 2. Regurgitation is not preceded by retching
Criteria fulfilled for the last 3 months with symptom onset at least 6 months before diagnosis.
Supportive remarks:
<ul style="list-style-type: none"> • Effortless regurgitation events are usually not preceded by nausea • Regurgitant contains recognizable food that might have a pleasant taste • The process tends to cease when the regurgitated material becomes acidic

Stanghellini V, Chan FK, Hasler WL, et al. Gastrointestinal disorders. Gastroenterology 2016;150:1380-1392.

Further Care..

- On Physical therapy.
- Started on buspirone.
- Daily pantoprazole was stopped and only can take if she has symptoms.
- 4 weeks following therapy: She has noticed an improvement in symptoms - decreased frequency to a 1-2 times every other day.

Effect of DBT on Rumination syndrome



16 patients with rumination were studied with manometry before and after a meal. The postprandial assessment comprised three periods: before, during, and after DB augmented with biofeedback therapy.

Diaphragmatic breathing increased EGJ pressure and restored a negative gastroesophageal pressure gradient).

Halland, M., Parthasarathy, G., Bharucha, A.E. and Katzka, D.A. (2016). Diaphragmatic breathing for rumination syndrome: efficacy and mechanisms of action. Neurogastroenterol. Motil., 28: 384-391. <https://doi.org/10.1111/nmo.12737>

Case Study 3:

- 21-year-old female with prior hx of migraines presenting with
- Episodic vomiting with normalcy in between these episodes.
- Often periodic, happens in the early morning, several episodes of vomiting requiring hospitalization.
- Underwent EGD and 4-hour GES which were unremarkable.
- She was tried on PPI, reglan without much benefit.

Rome Criteria for Cyclical Vomiting Syndrome

Stereotypical episodes of vomiting regarding onset (acute) and duration (<1 week)

1. At least three discrete episodes in the prior year and two episodes in the past 6 months, occurring at least 1 week apart
2. Absence of vomiting between episodes, but other milder symptoms can be present between cycles

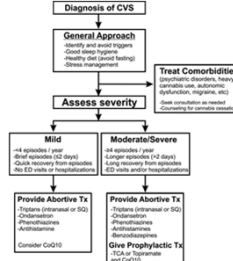
Supportive remarks:

Personal or family history of migraine headaches

Criteria must be fulfilled for the last 6 months with symptom onset at least 3 months before diagnosis

Venkatesan, T, Levinthal, DJ, Tarbell, SE, et al. Guidelines on management of cyclic vomiting syndrome in adults by the American Neurogastroenterology and Motility Society and the Cyclic Vomiting Syndrome Association. *Neurogastroenterol Motil.* 2019; 31(Suppl. 2):e13604. <https://doi.org/10.1111/nmo.13604>

Management of cyclic vomiting syndrome



Venkatesan, T, Levinthal, DJ, Tarbell, SE, et al. Guidelines on management of cyclic vomiting syndrome in adults by the American Neurogastroenterology and Motility Society and the Cyclic Vomiting Syndrome Association. *Neurogastroenterol Motil.* 2019; 31(Suppl. 2):e13604. <https://doi.org/10.1111/nmo.13604>



Medical Nutrition Therapy for Nausea and Vomiting: a case based approach

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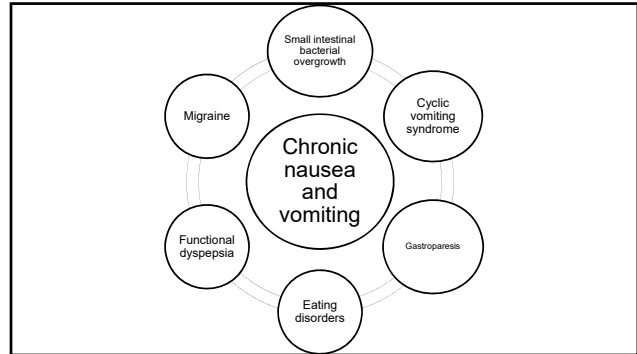
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Disclosures

- Nothing to disclose

Objectives

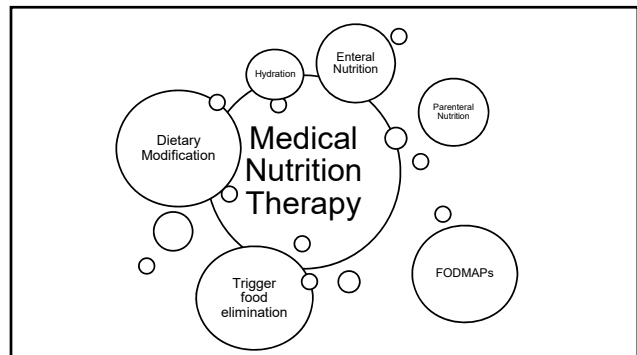
- Discuss evidence-based medical nutrition therapy for symptom management in those with nausea and vomiting
- Differentiate when oral diet is sufficient to meet nutritional needs



Nutritional Problems Associated with N/V

- Starvation¹
 - Chronic: significant deterioration in body mass (adiposity and lean body mass).
 - Intermediate: Metabolic derangements, decreased EER, episodic illness leads to obesity.
- Dehydration and electrolyte abnormalities
- Micronutrient deficiencies
- Poor nutritional quality of life

¹Olsen et al. J Cachexia, Sarcopenia and Muscle. 2020. DOI: 10.1002/jcsm.12630



General Nutrition Recommendations for N/V

- Keep patient away from strong food odors; remove lid to food served in hospital prior to entering room
- Provide assistance in food preparation so as to avoid cooking odors
- Eat foods at room temperature
- Keep patient's mouth clean and perform oral hygiene tasks after each episode of vomiting
- Offer fluids between meals
- Patient should sip liquids throughout the day
- Cold beverages may be more easily tolerated
- Keep low-fat crackers or dry cereal by the bed to eat before getting out of bed
- Relax after meals instead of moving around
- Sit up for 1 hour after eating
- Wear loose-fitting clothes

Nutrition Care Manual, AND, Accessed 11/16/2020

Case Study #1: Gastroparesis

54 F with T2DM on metformin. H_{1c} 6.7% down from 7.1% 6 months prior.
C/o worsening nausea, abdominal pain and intermittent vomiting. Worsening symptoms in the morning. GES confirms gastroparesis.
RDN consult for dietary management of T2DM and GP.



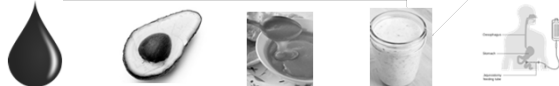
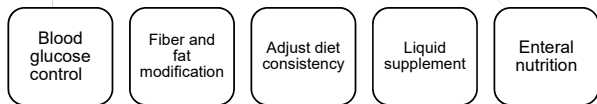
Breakfast Lunch Dinner

GES – 4hr, 11/3/2018

Findings:

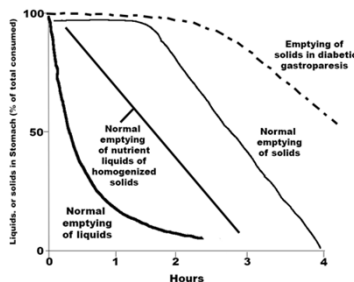
- At 60 minutes after meal consumption, 87% of initial gastric contents were retained within the stomach (normal range, 30-90%).
- At 120 minutes after meal consumption, 68% of initial gastric contents were retained within the stomach (normal range, <60%).
- At 240 minutes after meal consumption, 45% of initial gastric contents were retained within the stomach (normal range, <10 %)

GP



¹Neurogastroenterol Motil. 2006;20:8-18 ²Neurogastroenterol Motil. 2009;21:492

Particle Size and Food Consistency



- Emptying is faster for smaller particles and liquid consistencies.
- Liquid foods empty at 200 kcals/hr¹
- Translation for patient care:
 - Chew your food well
 - Trial a liquid meal at the 'worst point' in your day

¹ Camilleri M. Gastroenterology 2006.

Low-Fiber Diet

- Avoid foods with ≥ 3 grams of fiber per serving
- Avoid meals with >5 grams of fiber

FOOD GROUPS	FOOD TO AVOID	FOODS TO CHOOSE
Grains, cereal, pasta	Whole grains, brown rice, popcorn, potatoes with the skin, high fiber cereals, rye bread, whole wheat breads, corn bread.	White bread, white rice, crackers, refined grains, pretzels, refined cereals.
Fruits, vegetables and legumes	Skins, nuts and seeds of the plant. Avoid uncooked fruits and vegetables. Avoid corn, onion, lentils, peas and beans.	Cooked or canned fruits and vegetables with the skin removed. Casseroles. Sweet or white potatoes without the skin.
Milk and dairy products	Dairy products that are fortified with fiber.	Dairy should be consumed as tolerated as this is a naturally fiber-free food.
Meats, fish, eggs and poultry	Tough cuts of meat, processed meats (hot dogs, sausage, cold-cuts).	Baked, broiled, tender meats/fish/poultry, tofu, ground meats, smooth peanut butter and any style eggs.

Table is property of Therabty

Modified-Fat Diet

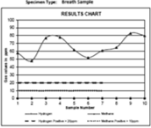
- Fats are essential for life—Moderation is key for tolerance.
- 10-15 grams of fat per meal is a good starting point.

FOOD GROUPS	FOOD TO AVOID	FOODS TO CHOOSE
Grains, cereal, pasta	Crackers, chips, fried breading.	White bread, white rice, crackers, refined grains, pretzels, refined cereals.
Fruits, vegetables and legumes	Fruits, vegetables or legumes that are fried or cooked with excessive oil/butter.	Cooked or canned fruits and vegetables with the skin removed. Casseroles. Sweet or white potatoes without the skin.
Milk and dairy products	2% or whole dairy products (milk, yogurt, cheese).	If tolerated, skim or 1% dairy products (milk, yogurt, cheese).
Meats, fish, eggs and poultry	High-fat beef/pork/lamb. Avoid meats with visible fat (white-marbling).	Egg whites, skinless chicken or turkey breast, lean pork/beef/lamb/veal, liver, fish, shrimp and crab.

Table is property of Therabty

Case Study #2: SIBO

67 M hx bladder cancer s/p RTx. Presents with excessive flatulence, intermittent nausea and abdominal pain. HBT supports SIBO and patient selecting dietary management. RDN consult placed



Sample	Sample Volume	Hydrogen (ppm)	Methane (ppm)	Carbon Dioxide (ppm)
1	100	10	0	0
2	100	10	0	0
3	100	10	0	0
4	100	10	0	0
5	100	10	0	0
6	100	10	0	0
7	100	10	0	0
8	100	10	0	0
9	100	10	0	0
10	100	10	0	0
11	100	10	0	0
12	100	10	0	0
13	100	10	0	0
14	100	10	0	0
15	100	10	0	0
16	100	10	0	0
17	100	10	0	0
18	100	10	0	0
19	100	10	0	0
20	100	10	0	0
21	100	10	0	0
22	100	10	0	0
23	100	10	0	0
24	100	10	0	0
25	100	10	0	0
26	100	10	0	0
27	100	10	0	0
28	100	10	0	0
29	100	10	0	0
30	100	10	0	0
31	100	10	0	0
32	100	10	0	0
33	100	10	0	0
34	100	10	0	0
35	100	10	0	0
36	100	10	0	0
37	100	10	0	0
38	100	10	0	0
39	100	10	0	0
40	100	10	0	0
41	100	10	0	0
42	100	10	0	0
43	100	10	0	0
44	100	10	0	0
45	100	10	0	0
46	100	10	0	0
47	100	10	0	0
48	100	10	0	0
49	100	10	0	0
50	100	10	0	0

Summary of 90 Minute Patient Results

Greater difference over baseline for each trace gas are presented below:

Hydrogen (H₂) Production: 65 ppm Normal < 20 ppm

Methane (CH₄) Production: 20 ppm Normal < 10 ppm

Combined Gas (H₂ + CH₄) Production: N/A ppm Normal < 10 ppm

SUPPORTED

Low FODMAP Diet

- Efficacy:** 50-75% experience symptom improvement*
- Nutritional Adequacy:** concern for inadequate intake due to restriction; inconsistent data
- Adherence:** High rates of adherence (75%) generally reported, but inconsistently assessed

F ERMENTABLE
O LIGOSACCHARIDES
D ISACCHARIDES
M ONOSACCHARIDES
A ND
P OLYOLS

Nutrient of Concern	Restricted Source	Supporting Literature
Calcium	Dairy	Staudacher et al. 2012
Overall CHO	Fruits, veg, grains, dairy	Bohn et al. 2015
Fiber	Fruits, veg, whole grains	Bohn et al. 2015

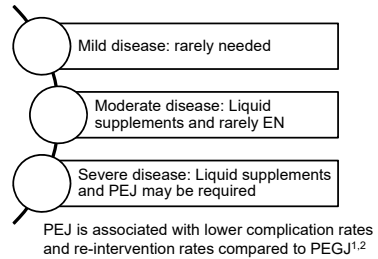
*In IBS
Holtree et al. 2014; Eswaran et al. 2016; Schumann et al. 2017; de Roest et al. 2013; O'Keefe et al. 2018

When are Supplements and EN Necessary?

- Unintentional weight loss of >10% within 3 months
 - Unable to achieve a healthy body weight
 - Repeat hospitalizations for symptoms interfering with oral intake
 - Nausea and vomiting impacting the quality of life
- ↓
- Consider severity of symptoms and start liquid supplementation or consider small bowel feeding tube trial¹

¹Koch et al. Gastroenterol Clin N Amer. 2015;39:57

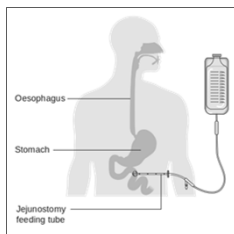
Nausea and Vomiting Severity and EN



¹Fan et al. Gastrointest Endosco. 2002; ²Toussaint et al. Endoscopy. 2012

Steps to Initiation of Enteral Nutrition

- Trial nasojejunal (NJ) feeding tube
 - Consider home EN start
 - Avoid if risk for refeeding syndrome
 - Encourage NPO status.
- Place PEJ to restore nutritional balance¹
 - Use reverse progression of nutritional management to regain full nutritional autonomy



¹Sarosiek et al. Gastroenterol Clin N Am; 2015

Referral to RDN → It's simple!

1. Have you lost weight recently without trying?	
No	0
Unsure	2
If Yes, how much weight (kg) have you lost?	
1 – 5	1
6 – 10	2
11 – 15	3
> 15	4
Unsure	2
Weight Loss Score: <input type="text"/>	
2. Have you been eating poorly because of a decreased appetite?	
No	0
Yes	1
Appetite Score: <input type="text"/>	
Total MST Score (weight loss + appetite scores) <input type="text"/>	