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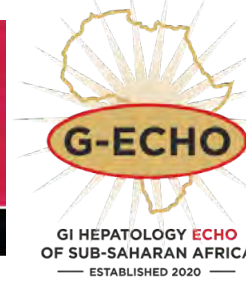
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# Approach to nausea/vomiting incl syndromes and gastroparesis



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Photo by Stefan Els



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- Gastroparesis

## Definition

- **Nausea**- Subjective unpleasant sensation of impending vomiting with associated salivation, anorexia, perspiration and anxiety.
- **Retching**- Spasmodic respiratory movements with a closed glottis.
- **Vomiting**- partially voluntary act of forcefully expelling of gastric or intestinal content through the mouth.

Feldman M, Sleisenger and Fordtran's, 2020

## Definition

- **Regurgitation**- effortless reflux of gastric content into the oesophagus that reaches the mouth without forceful ejection
- **Rumination**-effortless regurgitation of small amounts of recently ingested food into the mouth, followed by re-chewing and re-swallowing or expulsion

Feldman M, Sleisenger and Fordtran's, 2020

# Acute vs Chronic Nausea and vomiting

## Acute Nausea and vomiting

- Symptom duration that last 7 days or less
- Aetiology is a transient medical condition

## Chronic Nausea and vomiting

- Symptom duration of 4 weeks or longer
- Etiologic can be gastrointestinal and non gastrointestinal

## Pathophysiology of Nausea and vomiting

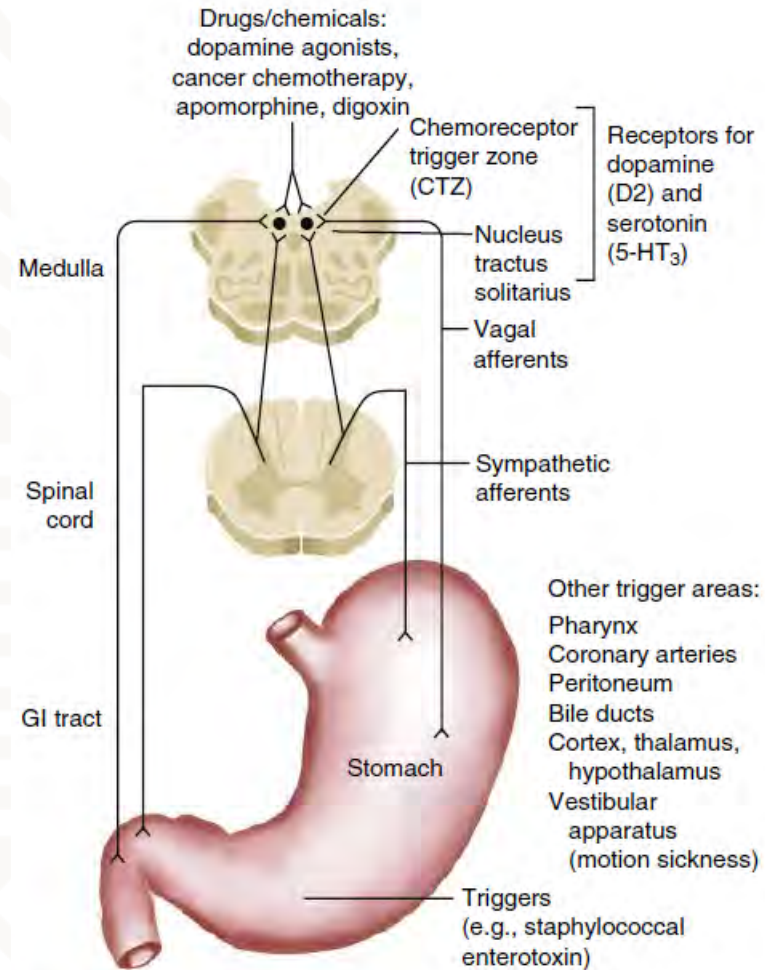
- Complex mechanism
- synchronization of muscles groups
  - diaphragm, abdominal wall muscle, pharyngeal muscles and postural muscle
- Vomiting centre in the medulla and Chemoreceptor Trigger Zone(CTZ) are responsible for initiating emesis
- Afferent signals from various organs including pharynx, stomach, small bowel and extraintestinal organs like heart and testes
- CTZ- detection of endogenous and exogenous molecules that initiate vomiting

Feldman M, Sleisenger and Fordtran's, 2020

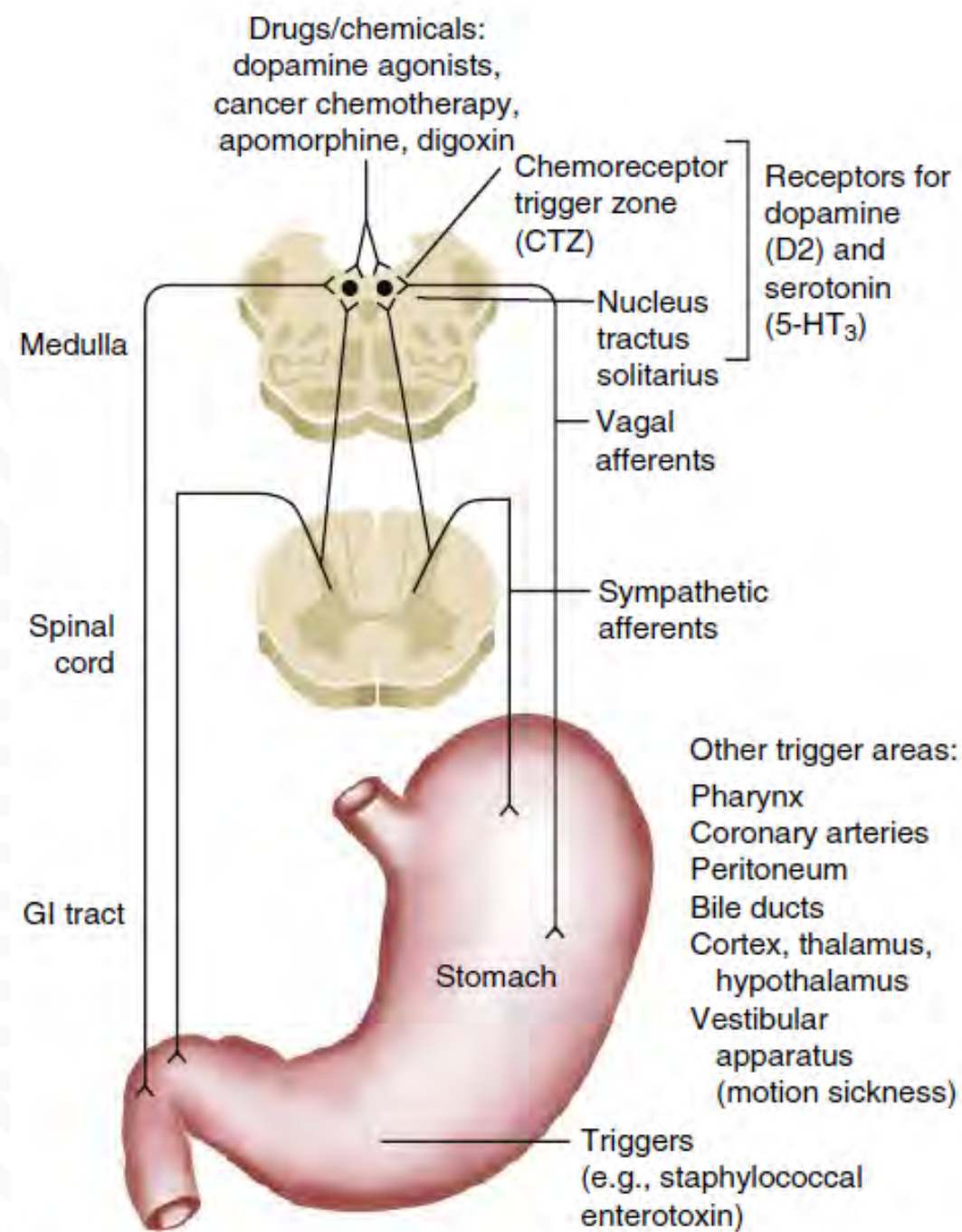
## Receptors associated with the vomiting reflex

- Stimulation of 5-HT<sub>3</sub> in the brain stimulates the release of dopamine
- Activation of D<sub>2</sub> Receptors in the brain stem which activates the emetic centre
- Neurokinin-1 (NK<sub>1</sub>) receptors in the Area postrema binds to substance P is the basis of chemotherapy induced vomiting.
- Histamine and muscarinic receptors are abundant in the vestibular centre and solitary nucleus – motion sickness, vestibular apparatus, pregnancy related sickness

Feldman M, Sleisenger and Fordtran's, 2020



**Fig. 15.1** Schematic representation of the proposed neural pathways that mediate vomiting. 5-HT, 5-hydroxytryptamine. **Feldman M, Sleisenger and Fordtran's, 2020**



**Fig. 15.1** Schematic representation of the proposed neural pathways

## Sequence of vomiting

- Nausea develops as a result of cerebral cortex activation
- The stomach relaxes
- Antral and intestinal peristalsis is inhibited
- Secondly- Retching occurs
- Thirdly brisk contractions of the diaphragm and abdominal muscles
  - Relaxation of the lower oesophageal sphincter
  - Forceful retrograde peristaltic contraction of the jejunum
  - Simultaneous protective reflexes are activated to protect the airway

## Approach Chronic Nausea and vomiting

- Identify secondary causes

### Syndromes

- Chronic Nausea and vomiting Syndrome
- Cyclic vomiting syndrome
- Rumination syndrome
- Cannabis Hyperemesis Syndrome

## Approach to Nausea and vomiting

- Comprehensive history
- Clarify onset of symptoms- abrupt vs gradual
- Timing- in relation to food/ frequency
- Nature of emesis-gastric/ food/ Bilous/ blood
- Associated symptoms- Abdominal Pain, LOW, Early satiety, Bloating
- Comorbid Conditions
- Medication
- Substances

J Tome Et al Mayo clin proc 2022

## Approach to nausea and vomiting

- Examination
  - Look for signs : dehydration or acute illness
  - Lymphadenopathy, jaundice, abdominal masses and Succussion splash
  - anxiety and depression
  - Any neurological signs
  - Laboratory- basic blood test and then subsequently guided by history and examination
  - Imaging- AXR, CT, EGD, manometry and gastric emptying study
  - If diagnostic test are unremarkable then psychogenic assessment for unexplained nausea and vomiting

# Causes of secondary nausea and Vomiting



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Endocrine/Metabolic	Pregnancy
	Metabolic acidosis
	Uraemia
	Hypercalcaemia
	Hyperthyroidism
	Adrenal disorders
	Parathyroid disorders
GI inflammation	Infectious
	Autoimmune
	Mucositis
Dysautonomia	syndrome (POTS)
	Autoimmune dysautonomia
	Neurological disorders (Parkinson's disease, multiple system atrophy)
Pharmacological	Opioids

# Causes of Vomiting

Pharmacological	Opioids
	GLP-1 agonists
	Dopaminergics
Low-grade GI obstruction	Radiation enteritis
	Adhesions
	Intestinal strictures
CNS disorders	Intracranial hypertension
	Migraine
	Hydrocephalus
Vestibular	Labyrinthine lesions
	Meniere's disease
Vagal nerve injury	Post-surgical
Psychiatric	Anxiety
	Depression
	Eating disorders
Malignancy related	Chemotherapy
	Radiotherapy
	Disease-related complications

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# Causes of secondary nausea and Vomiting



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## Gastrointestinal obstruction

- Challenging in low grade obstruction without proximal dilation
- Chronic obstruction risk factors: IBD, Previous Abdominal or Pelvic surgery, Malignancy or radiation to the abdominal pelvic area
- Other symptoms- colicky abdominal pain and visible abdominal distention
- Vomiting stops with fasting in intestinal obstruction
- Imaging- AXR, CT Enterography, MRI, beak sign and faeces sign

Malagelada et al UEGJ 2025

# Causes of secondary nausea and Vomiting

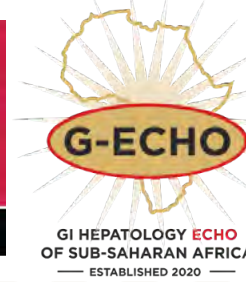


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## Gastric outlet obstruction

- PUD – with pyloric channel ulcer or stricture narrowing
  - Can be both acute or chronic mimicking gastroparesis
- Gastric volvulus, paraesophageal hernia/ post traumatic diaphragmatic hernia
  - Important but uncommon cause
  - Relapsing because of intermittent obstruction and spontaneous resolution
- Acute or chronic pancreatitis with associated inflammatory mass/ necrosis, pseudocyst
- Malignancies
- Gastroparesis



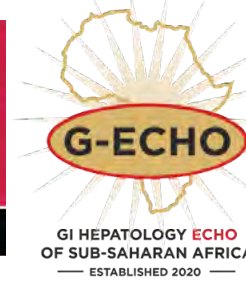
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## Nausea and vomiting Syndromes

- Chronic Nausea and vomiting Syndrome
- Cyclic vomiting syndrome
- Rumination syndrome
- Cannabis Hyperemesis Syndrome

# Vomiting syndromes



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## Chronic Nausea and vomiting syndrome - Rome IV

- Must include all of the following:
- Bothersome (i.e., severe enough to impact on usual activities) nausea, occurring at least 1 day per week and/or one or more vomiting episodes per week
- Self-induced vomiting, eating disorders, regurgitation, or rumination are excluded
- No evidence of organic, systemic, or metabolic diseases likely to explain the symptoms on routine investigations (including at upper endoscopy)
- \*Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

. [theromefoundation.org/rome-iv/rome-iv-criteria/](https://theromefoundation.org/rome-iv/rome-iv-criteria/)

# Vomiting syndromes



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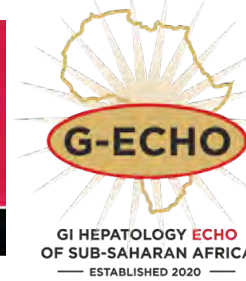
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## Chronic Nausea and vomiting syndrome - Rome IV

- 1% Prevalence
- In refractory cases of chronic nausea and vomiting syndrome, gastric electrical stimulation can be considered
- Anti emetics can be used but overall evidence is low, such as:
  - TCA
  - H1 antagonist – promethazine
  - M1 antagonist – scopolamine
  - D2 antagonist
  - Mirtazapine

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# Cyclic Vomiting syndrome



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## Definition

- Cyclic vomiting syndrome (CVS) refers to recurrent, regular, and stereotypical episodes of nausea and severe vomiting separated by symptom-free intervals. CVS can be diagnosed only in the absence of other causes (organic or metabolic) that can explain the symptoms.
- Episodes are often sudden, intense, multiple episodes of vomiting 6/hour

## Phases

1. Prodrome
2. Emetic phase
3. Recovery phase
4. Interepisodic phase

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# Vomiting syndromes



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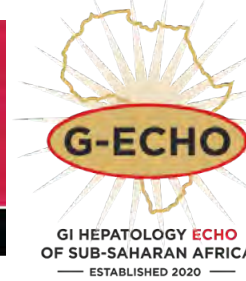
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## Criteria for CVS - Rome IV

- Must include all of the following:
- Stereotypical episodes of vomiting regarding onset (*acute*) and duration (*less than 1 week*)
- At least three discrete episodes in the prior year and two episodes in the past 6 months, occurring at least 1 week apart
- Absence of vomiting between episodes, but other milder symptoms can be present between cycles
- \*Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

[theromefoundation.org/rome-iv/rome-iv-criteria/](http://theromefoundation.org/rome-iv/rome-iv-criteria/)

# Cyclic Vomiting syndrome



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## Epidemiology

- CVS affects about 0.1%–2% of the adult population.
- Incidence and prevalence of CVS decrease with age.
- Prevalence of CVS is higher in children than in adults.
- Prevalence in children reaches 0.2%–6.2%
- Associated with migraines

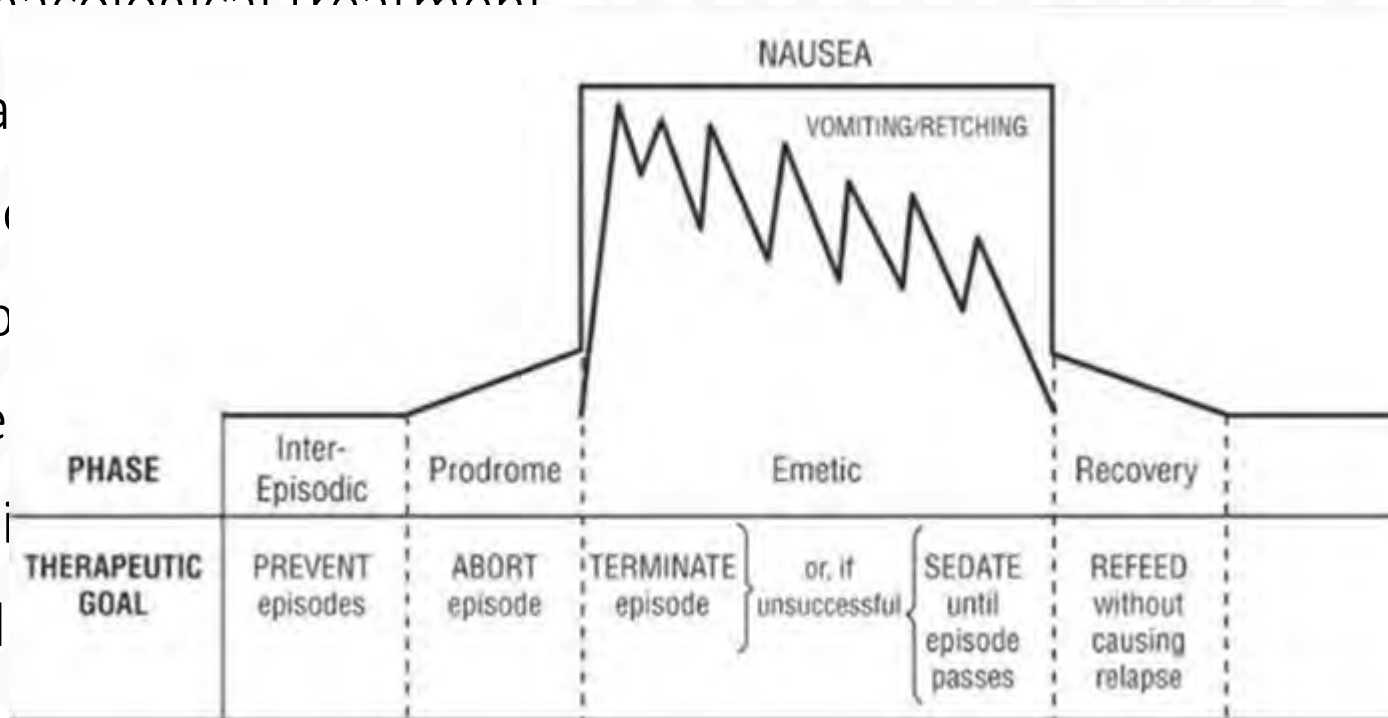
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## Cyclic vomiting syndrome

- Non pharmacological treatment
  - Holistic management- lifestyle changes, psychological support, avoidance of triggers
- Pharmacological
  - Abortive- prodrome phase use benzodiazepines and antiemetics
  - Supportive – I/VI fluid and electrolyte correction, Analgesics, anxiolytics and antiemetics
  - Prophylactic- TCA first line for prophylaxis
- Nutritional support

## Cyclic vomiting syndrome

- Non pharmacological treatment
  - Holistic management
- Pharmacological treatment
  - Abortive- prochlorperazine
  - Supportive care
  - Prophylactic treatment
- Nutritional management



avoidance of triggers

analgesics and antiemetics

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## Cannabinoid hyperemesis syndrome

- Must include all of the following:
- Stereotypical episodic vomiting resembling cyclic vomiting syndrome (CVS) in terms of onset, duration, and frequency
- Presentation after prolonged use of cannabis
- Relief of vomiting episodes by sustained cessation of cannabis use
- \*Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

1. [theromefoundation.org/rome-iv/rome-iv-criteria](https://theromefoundation.org/rome-iv/rome-iv-criteria)
2. Malagelada et al UEGJ 2025

## Cannabinoid hyperemesis syndrome

- typically, young patient , <50
- Prolonged cannabis use – daily for 2 years
- Compulsive hot baths to relieve symptoms
- Management includes stopping Cannabis, topical capsaicin
- No high-quality data on pharmacological Tx of CHS

1. [theromefoundation.org/rome-iv/rome-iv-criteria](https://theromefoundation.org/rome-iv/rome-iv-criteria)

2. Malagelada et al UEGJ 2025

## Rumination Syndrome Rome IV

- Must include all of the following:
- Persistent or recurrent regurgitation of recently ingested food into the mouth with subsequent spitting or re-mastication and swallowing
- Regurgitation is not preceded by retching
- \*Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

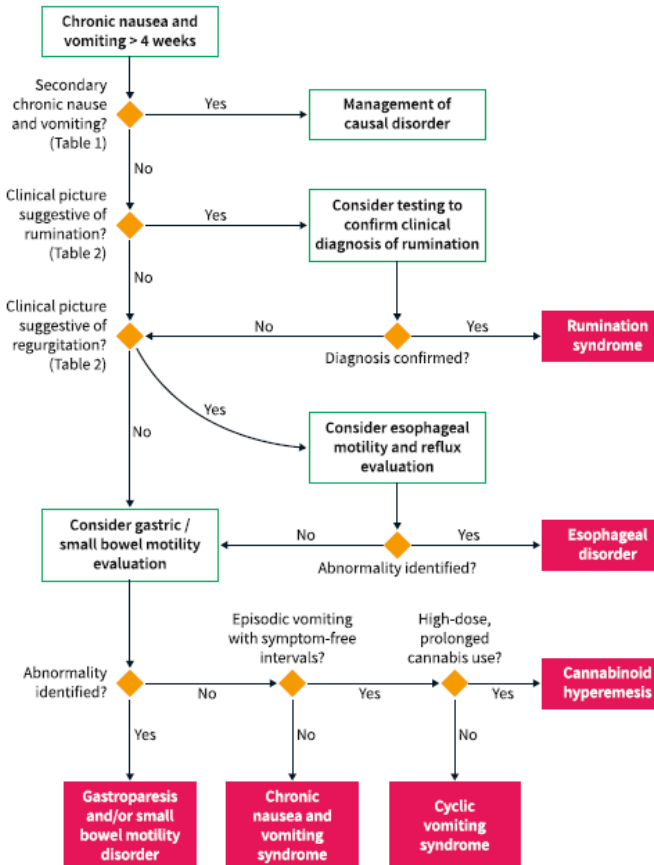
. [theromefoundation.org/rome-iv/rome-iv-criteria/](https://theromefoundation.org/rome-iv/rome-iv-criteria/)

## Rumination Syndrome

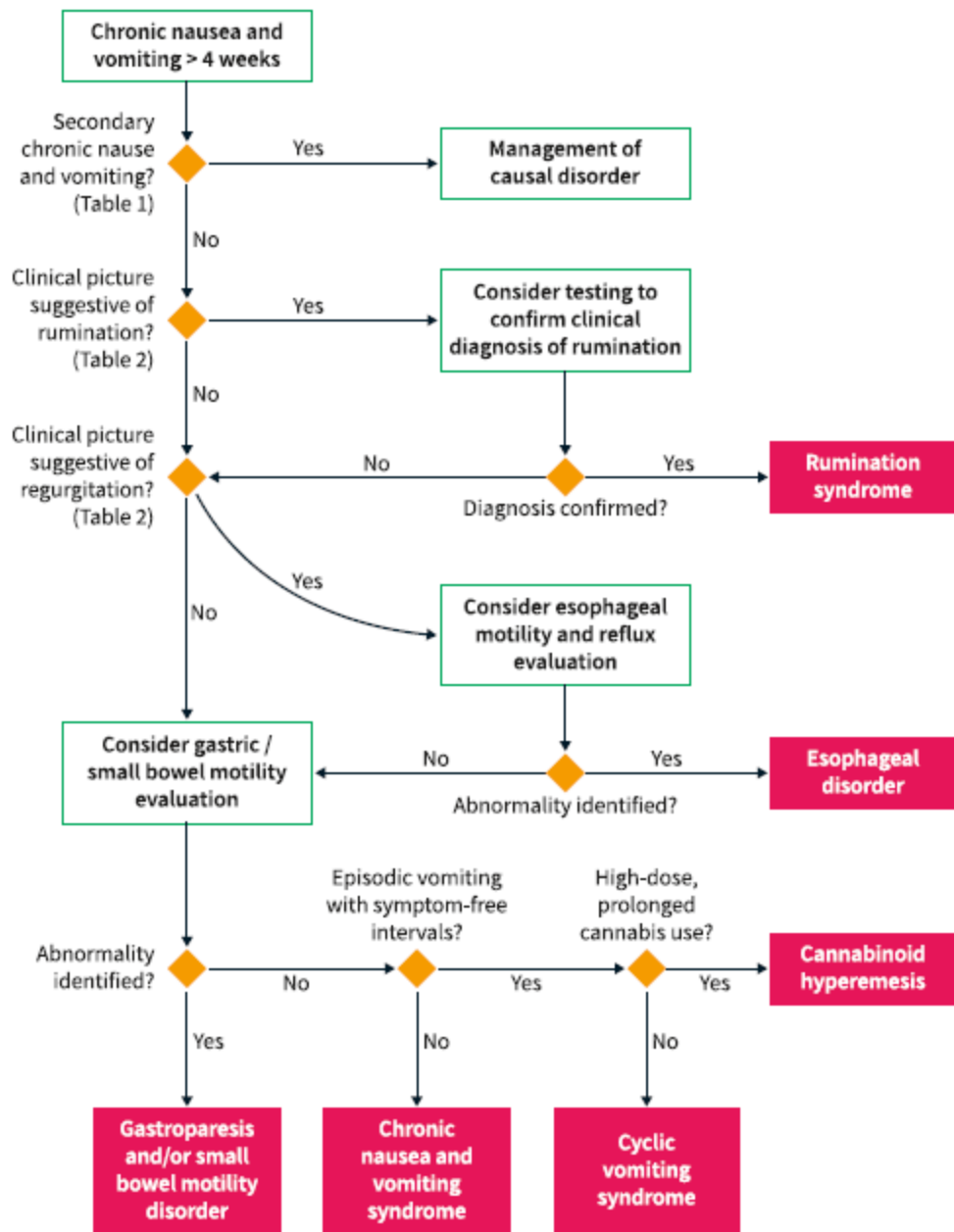
- Epidemiology
  - Adult general population 0.5-5.8%
  - Dyspeptic symptoms and minor weightless are common
  - Non pharmacological mx- Diaphragmatic breathing with visual or verbal feedback
  - Pharmacological mx- Baclofen or TCA

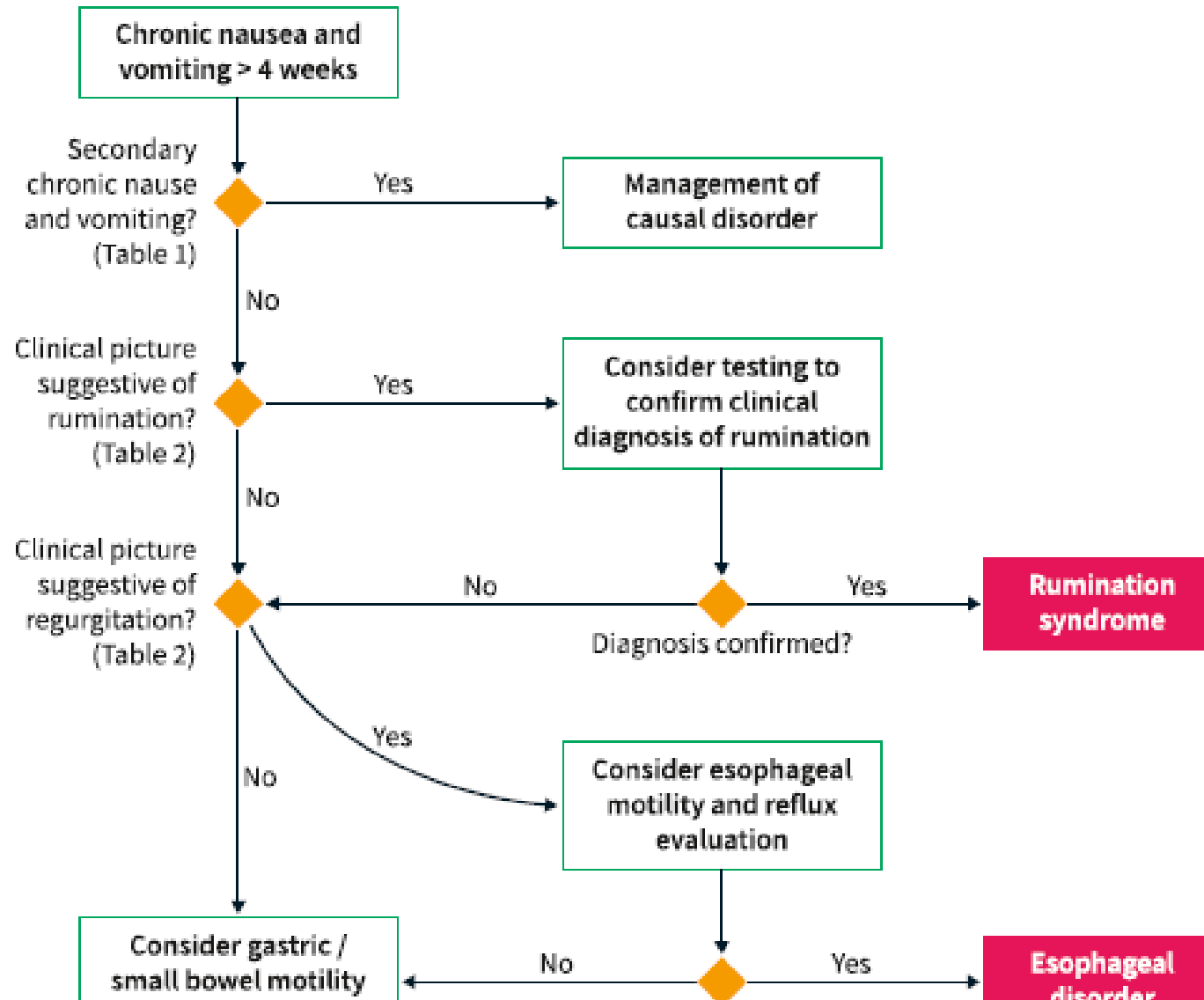
# Chronic Nausea and Vomiting

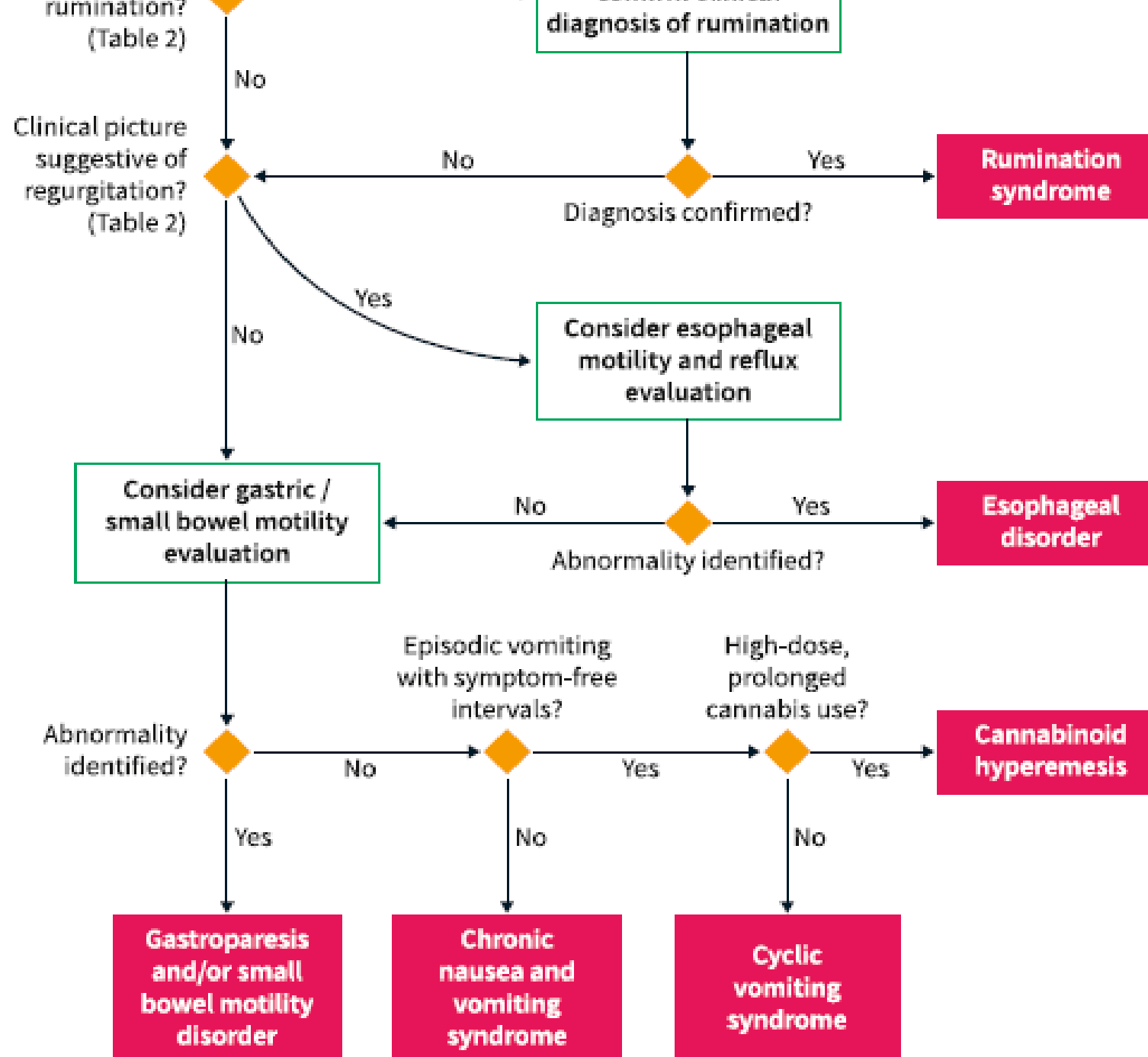
- Chronic Nausea and vomiting



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**TABLE 2. Select Antiemetic and Prokinetic Agents**

Medications	Adverse effects
Serotonin 5-hydroxytryptamine antagonists (ondansetron, granisetron)	Mild headache, constipation, QT interval prolongation
Phenothiazines (prochlorperazine, promethazine)	Extrapyramidal symptoms (dystonia, tardive dyskinesia), QT interval prolongation
Anticholinergic (scopolamine)	Dry mouth, vision changes, urinary retention, constipation
Antihistamines (meclizine, diphenhydramine, cyproheptadine, hydroxyzine)	Drowsiness, xerostomia
Corticosteroids (dexamethasone, methylprednisolone)	Hypertension, diabetes, metabolic bone disease, weight gain, insomnia, mood changes
Benzodiazepines (lorazepam, alprazolam)	Sedation, unsteadiness (older patients), dizziness, dependence
Neurokinin 1 receptor antagonists (aprepitant, fosaprepitant)	Asthenia, diarrhea, headache
Benzamides (metoclopramide, trimethobenzamide)	Extrapyramidal symptoms (dystonia, tardive dyskinesia), hyperprolactinemia

.J Tome et al Mayo clin Proc 2022

# Summary of treatment for nausea and vomiting syndromes

**TABLE 3** | First- and second-line pharmacological and behavioural therapeutic options for gut-brain interaction disorders with predominant rumination/nausea/vomiting.

	1st line	2nd line
Cyclic nausea and vomiting (prophylaxis)	Tricyclic antidepressants	Zonisamide, levetiracetam, L-carnitine, coenzyme Q10, aprepitant
Cannabinoid hyperemesis	Quitting use of cannabinoids Acute vomiting phase: Benzodiazepines, haloperidol	Acute vomiting phase: Topical administration of capsaicin
Rumination syndrome	Diaphragmatic breathing (+/- biofeedback)	Baclofen, tricyclic antidepressants
Nausea and vomiting syndrome	Tricyclic antidepressants, mirtazapine, dopamine D2 antagonists, 5-HT3 antagonists	Gabapentin, olanzapine, NK-1 antagonists

# Gastroparesis: paralysis of the stomach

## Definition

- Motility disorder characterized by symptoms and objective documentation of delayed gastric emptying of standard test meal without mechanical obstruction.

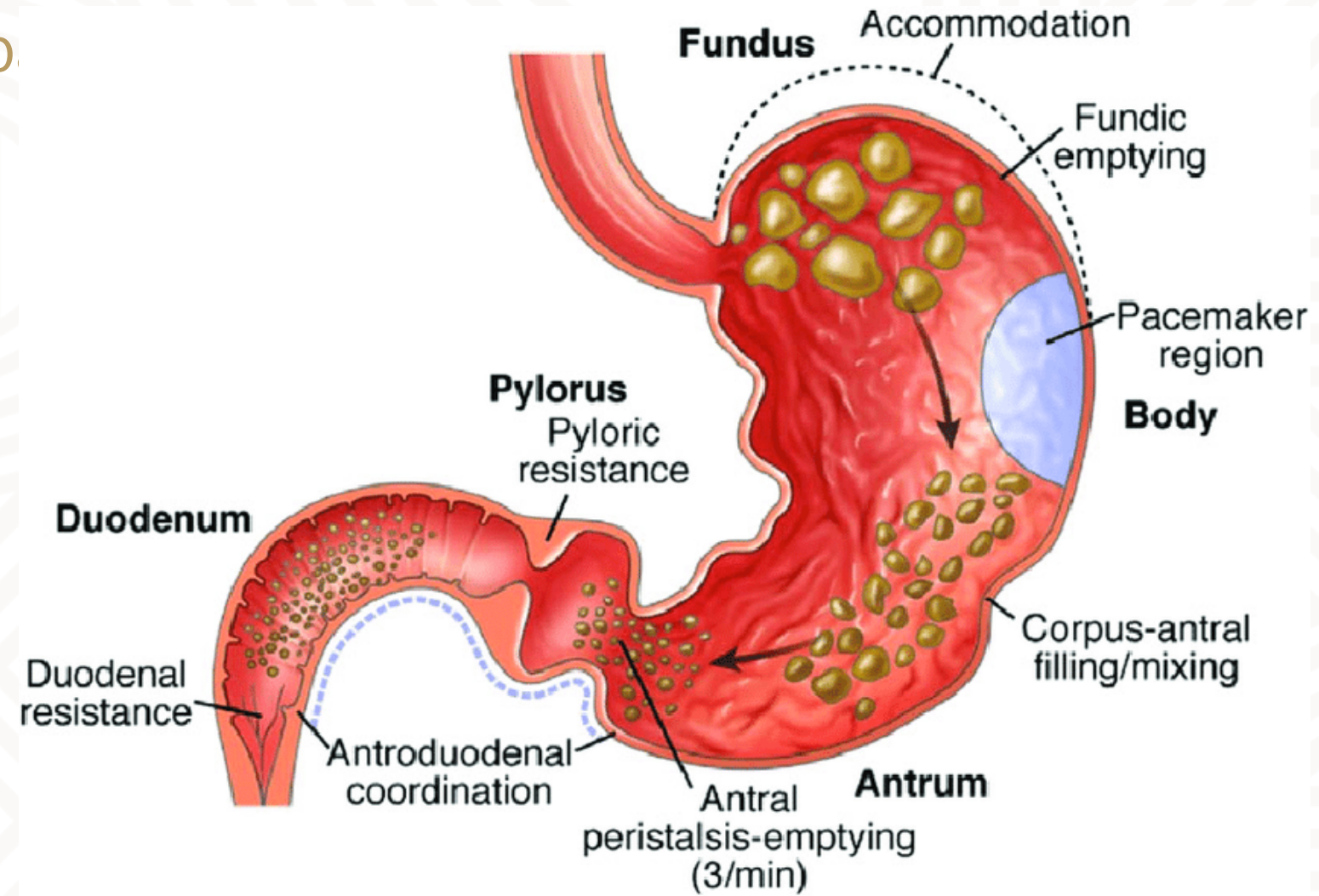


## Gastroparesis

- Prevalence - 37,8/100000 women > 9,6/100000 for men in the US
- Common Sensorimotor disorder of the stomach shared with functional dyspepsia(FD)
- underestimated
- Most common causes
  - Idiopathic – largest etiologic group
  - Diabetes

Lacy et al AGA 2022

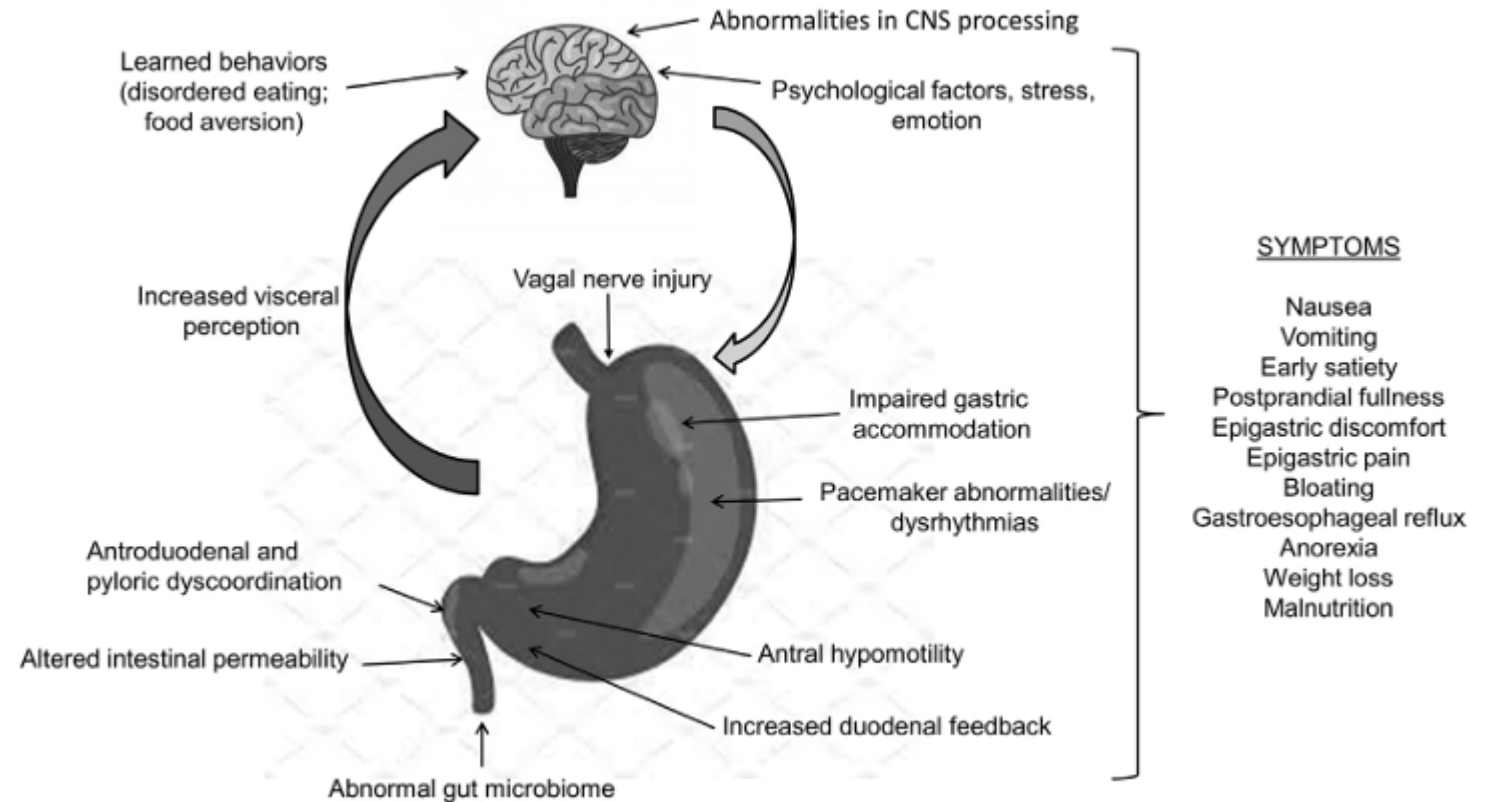
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S Brandstaeter et al dec 2018

## Symptoms

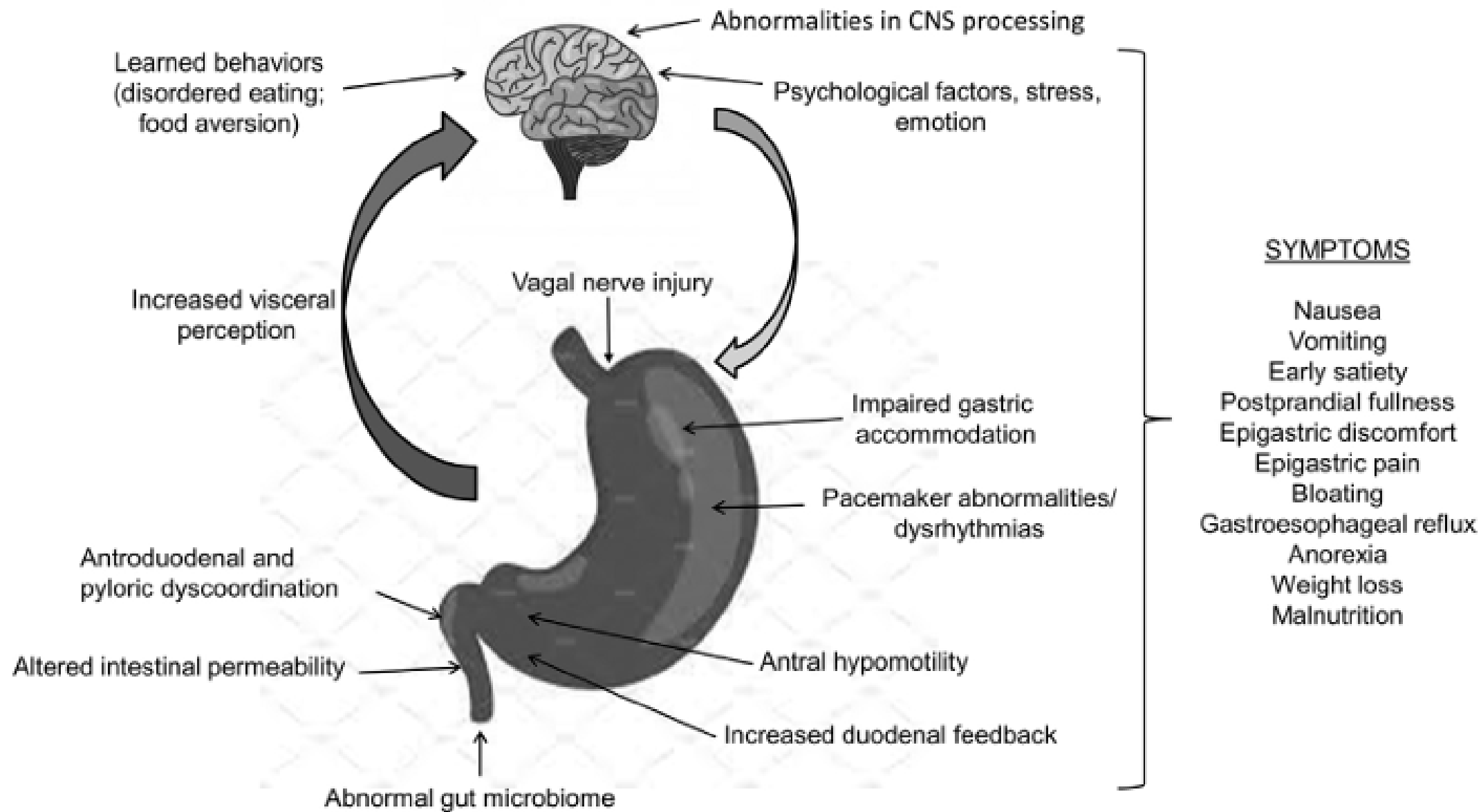
- Nausea and vomiting
- Early satiety
- Bloating
- Post prandial fullness
- Abdominal pain
- Weight loss



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# Sym

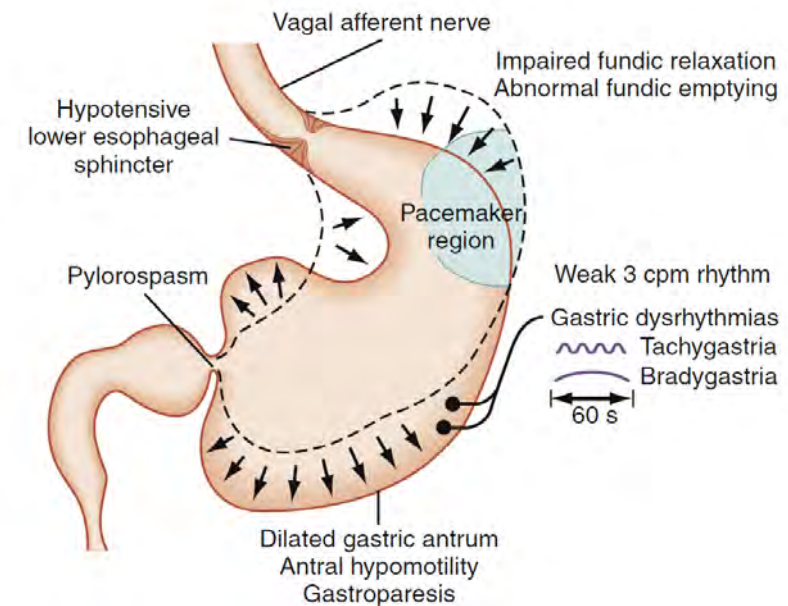
- Na
- Ea
- Blc
- Po
- Ab
- We



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## Pathophysiology of gastroparesis

- Number of mechanisms that control gastric emptying
  - Any disruption to these mechanism can lead to delayed Gastric emptying
- Loss of the interstitial cells of Cajal (ICC)
- Enteric nervous system ENS dysfunction
- Autonomic (Vagal) neuropathy
- Smooth muscle dysfunction
- Pyloric dysfunction



Sullivan et al Springer 2020

Feldman M, Sleisenger and Fordtran's, 2020

## Diabetic Gastroparesis

- Accounts for ~30% of gastroparesis cases
- More common in Type 1 vs Type 2 diabetes
- Female predominance
- Typically occurs after >10 years of diabetes
- Associated with microvascular complications
- No clear increase in mortality, but significant ↓ quality of life

## Diabetic Gastroparesis

- **Pathogenesis (Multifactorial)**
- Autonomic (vagal) neuropathy
- Interstitial cells of Cajal loss → impaired gastric pacemaker activity
- ↓ neuronal nitric oxide synthase (nNOS) → impaired relaxation
- Hyperglycaemia effects:
  - ↓ antral motility
  - ↑ pyloric tone

## Causes

Condition	Specific Causes
<b>Diabetes</b>	Type 2 : Type 1 (1:5)
<b>Post-infectious</b>	CMV, EBV, HSV
<b>Post-surgery (vagal nerve injury)</b>	Whipple procedure, lung transplantation, oesophagectomy; Roux-en-Y gastric bypass, cholecystectomy; Nissen fundoplication
<b>Metabolic disorders</b>	Hypokalaemia, hypomagnesaemia, hypophosphataemia; Hypothyroidism; Cystic fibrosis, adrenal insufficiency
<b>Musculoskeletal disorders</b>	Scleroderma, amyloidosis, mixed connective tissue disease
<b>Neurological disorders</b>	Parkinson's disease, multiple sclerosis; Autoimmune gastrointestinal dysmotility
<b>Medication-induced</b>	Opioids, anticholinergics, TCAs, CCB, octreotide, levodopa, lithium, GLP-1 analogs, cyclosporine
<b>Mechanical</b>	Superior mesenteric artery syndrome; Median arcuate ligament syndrome
<b>Paraneoplastic</b>	Type 1 anti-neuronal nuclear antibodies (anti-Hu)
<b>Idiopathic</b>	3–50% of cases

## Investigations

- Initial Evaluation – Exclude Mechanical Obstruction
- Upper gastrointestinal endoscopy (OGD)
  - Exclude luminal obstruction, strictures, malignancy
  - Retained food after fasting may suggest delayed gastric emptying
- Cross-sectional imaging
  - CT abdomen if concern for extrinsic obstruction or malignancy
- Laboratory tests to identify reversible causes:
  - Glucose / HbA1c
  - Thyroid function
  - Electrolytes
  - Medication review- opiates, GLP 1

Sullivan et al Springer 2020

## Diagnosis

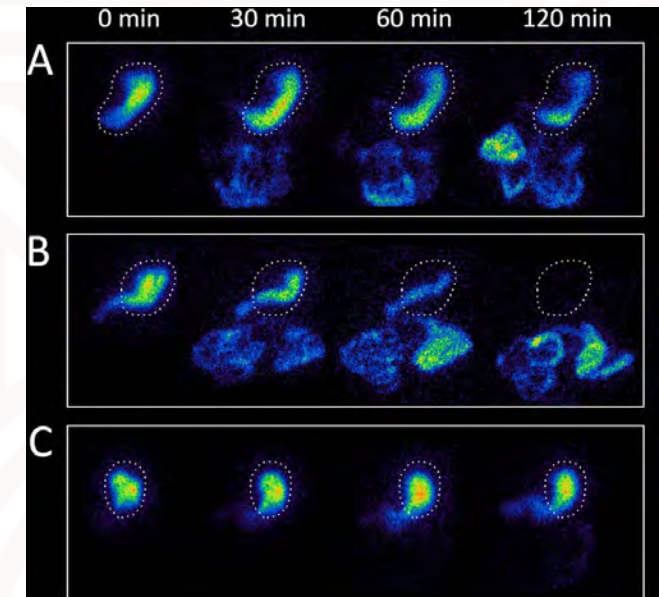
3 features need to be met:

- Typical symptoms
- Absence of mechanical obstruction
- Delay in gastric emptying

Pasricha PJ, et al. Clin Gastroenterol Hepatol 2017;15:1184-1190.

## Gastric Scintigraphy

- Gold standard
- Ingestion of radiolabelled solid/ semisolid meal- <sup>99m</sup>Techneium colloid- labelled meal
- Imaging performed 1h,2h and 4 hours
- Prokinetic drugs should be stopped
- >60% at 2 h or >10% 4 h diagnosis
- Non invasive
- Radiation exposure
- Meals used may not mimic real-life meals

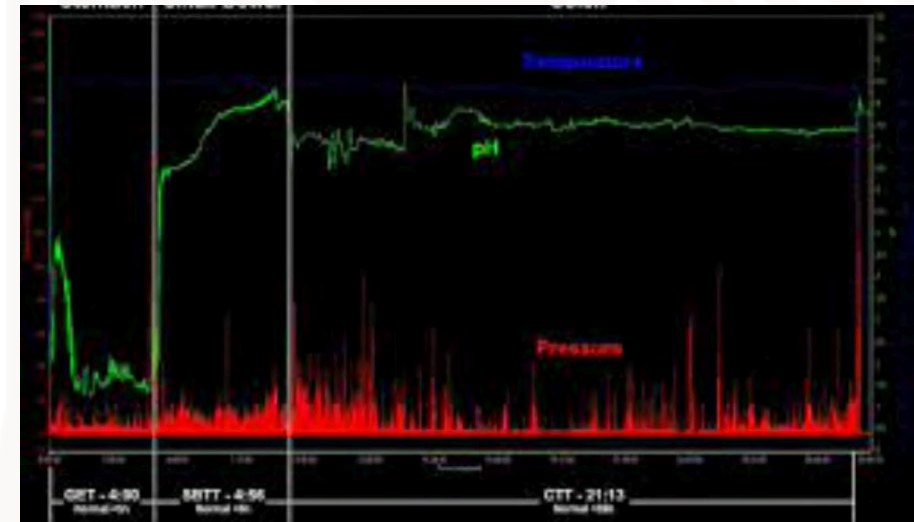


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- Tougas protocol (4 hr T99 labelled solid meal)
  - Overnight fast, stop all meds, no smoking
  - In females, first 10 days of menstrual cycle
  - Glycemic control
  - Meal: egg whites, 2 slices toasted white bread, 30g jam, 120ml water eaten in 10 min or less (255cal)
  - Images with patient standing 0, 1, 2, 4 hours

## Wireless motility capsule

- Single use device
- Measure PH, temperature and pressure
- Patient eats a standardised low-fat meal , Followed by capsule then fast for 6 h
- Changes in pH determines the Gastric emptying.
- Delayed motility - > 5 hours in stomach



## Breath test-<sup>13</sup>C-gastric emptying breath tests (<sup>13</sup>C-GEBT)

- Ingestion of a radiolabelled carbon containing meal - egg
- Simple and economical, no radiation exposure
- Comparable to scintigraphy
- C13- Spirulina, C13 octanoic acid
- CO<sub>2</sub> is release and can measures in the end tidal breath at 4-6 h

J Keller et al June 2021 Neurogastroenterology and motility

## Gastric contractions- antroduodenal manometry

- Invasive motility test
- Technically difficult
- Water-perfused multi-lumen catheter inserted nasally or orally
- Endoscopic or fluoroscopic guidance required for placement

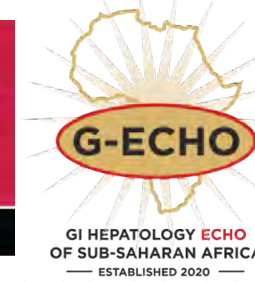
### Procedure

- Recordings performed over several hours
- Allows assessment of fasting motor activity including phases of the Migrating Motor Complex
- Additional recordings taken after a test meal to assess postprandial motility

## Management

- **Goals of management**
- Improve symptoms (nausea, vomiting, early satiety)
- Maintain adequate nutrition and hydration
- Improve gastric emptying
- Treat underlying causes
- Prevent complications (malnutrition, electrolyte imbalance)

# Gastroparesis



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## Management

### Stepwise approach

- Conservative measures
- Pharmacologic therapy
- Nutritional support
- Pyloric-directed therapies
- Advanced interventions

## Non pharmacotherapy

- **First-line therapy for mild symptoms**

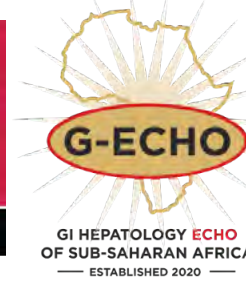
Dietary modifications:

- Small frequent meals (4–6 per day), Low-fat diet , Liquid or pureed meals
- Avoid symptom triggers
- Avoid Carbonated beverages
- Lifestyle-Avoid lying down for 2 hours after a meal to reduce reflux

- Glycaemic control in diabetes
- Nutritional support – include dietician
  - Malnutrition
  - Electrolyte disturbances
  - Micronutrient deficiencies

If severe symptoms and failure of oral intake

- Surgical jejunostomy, PEG with jejunal extension
- Enteral feeds



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# Pharmacotherapy

Mechanism:

- Increase gastric motility
- Enhance antral contractions
- Promote gastric emptying

## Pharmacotherapy

Prokinetic agents:

- Metoclopramide
- Erythromycin- tachyphylaxis, Prolong QTc, drives antibiotic resistance
- Domperidone Prolonged QTc
- Prucalopride
- Aprepitant

## Pyloric directed therapies

- Botox injection
- Endoscopic balloon dilation/ stenting
- G- PEOM – refractory gastroparesis

Other advanced therapies-For refractory gastroparesis

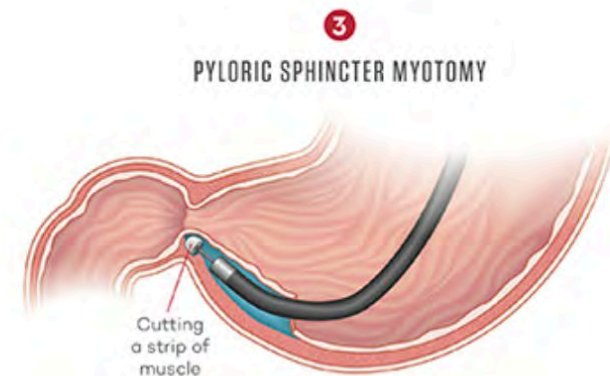
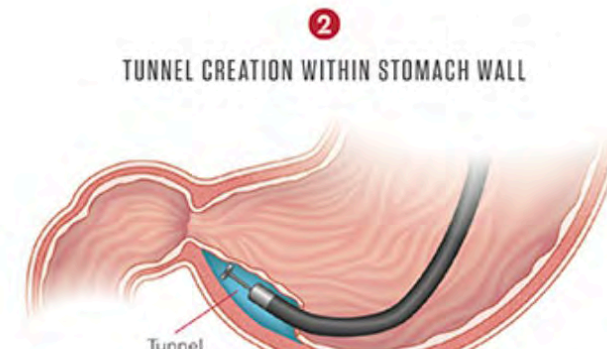
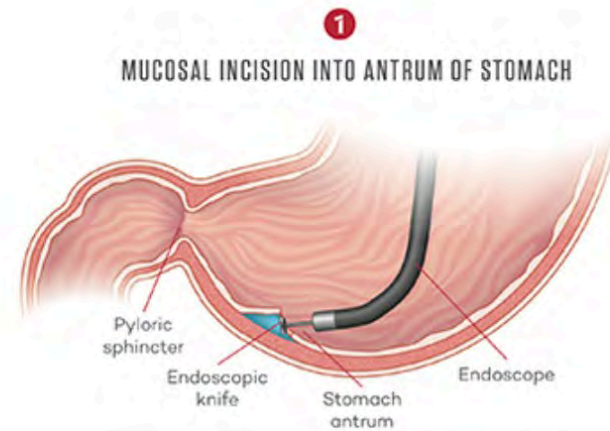
- Gastric electrical stimulation
- Surgical pyloroplasty
- Partial gastrectomy



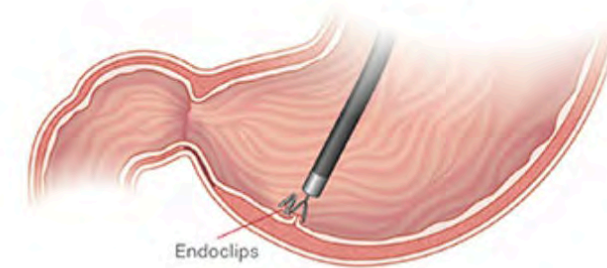
Fig.3 Enterra II electrical gastric stimulator device. Image reproduced with permission from Medtronic inc

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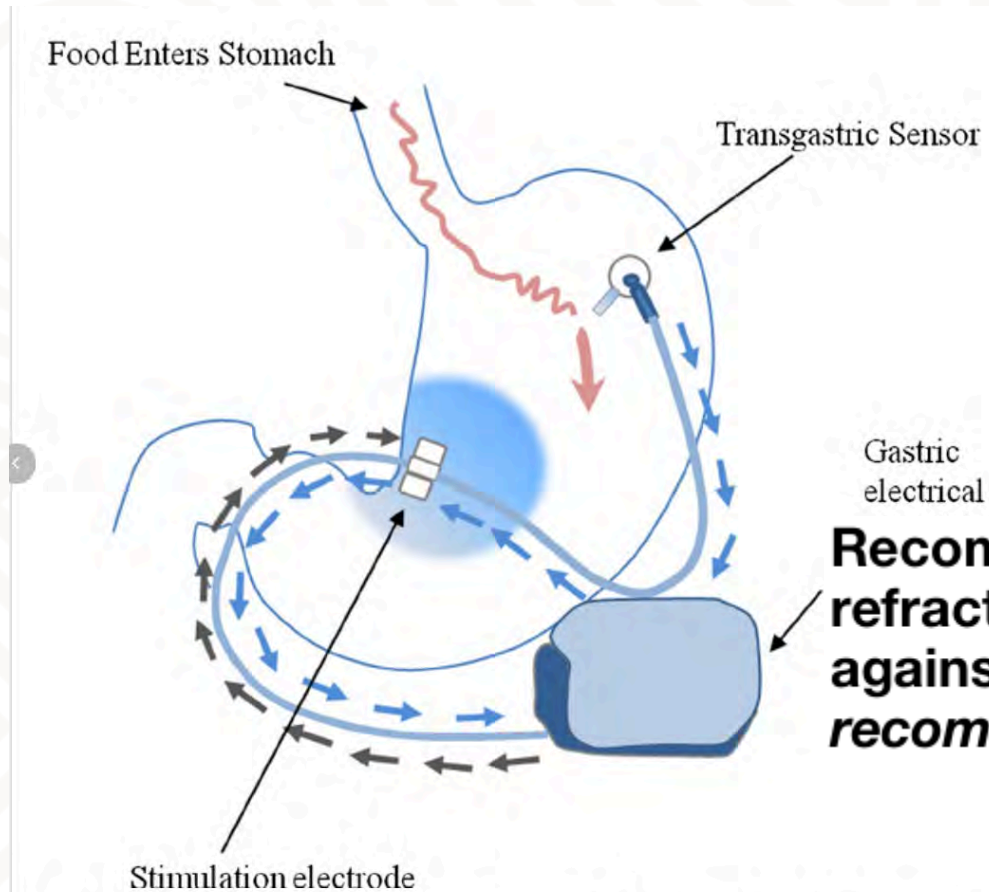
# G Poem



**Recommendation 10: In patients with gastroparesis refractory to medical therapy, the AGA suggests against the routine use of G-POEM. (Conditional recommendation, low certainty of evidence)**



# Gastric electrical stimulation



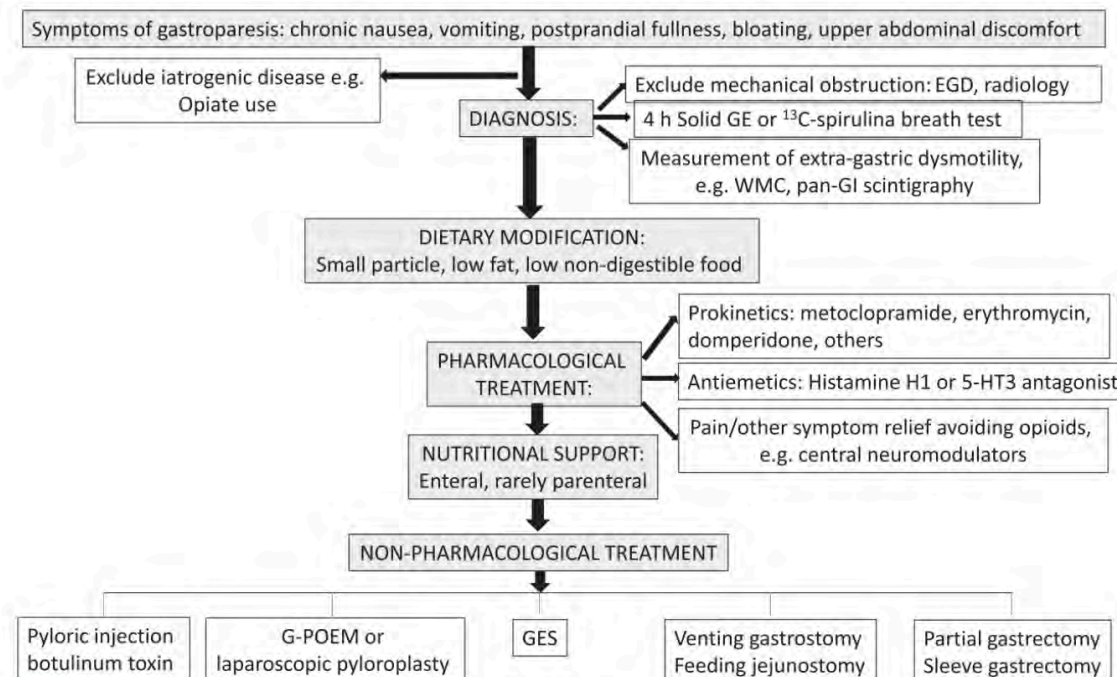
The transgastric sensor detects food entry into the stomach and then triggers the gastric stimulator to deliver therapy at the lesser curvature in the location of the B crow 's foot ^



**Recommendation 12: In patients with gastroparesis refractory to medical therapy, the AGA suggests against the routine use of GES. (Conditional recommendation, very low certainty of evidence)**

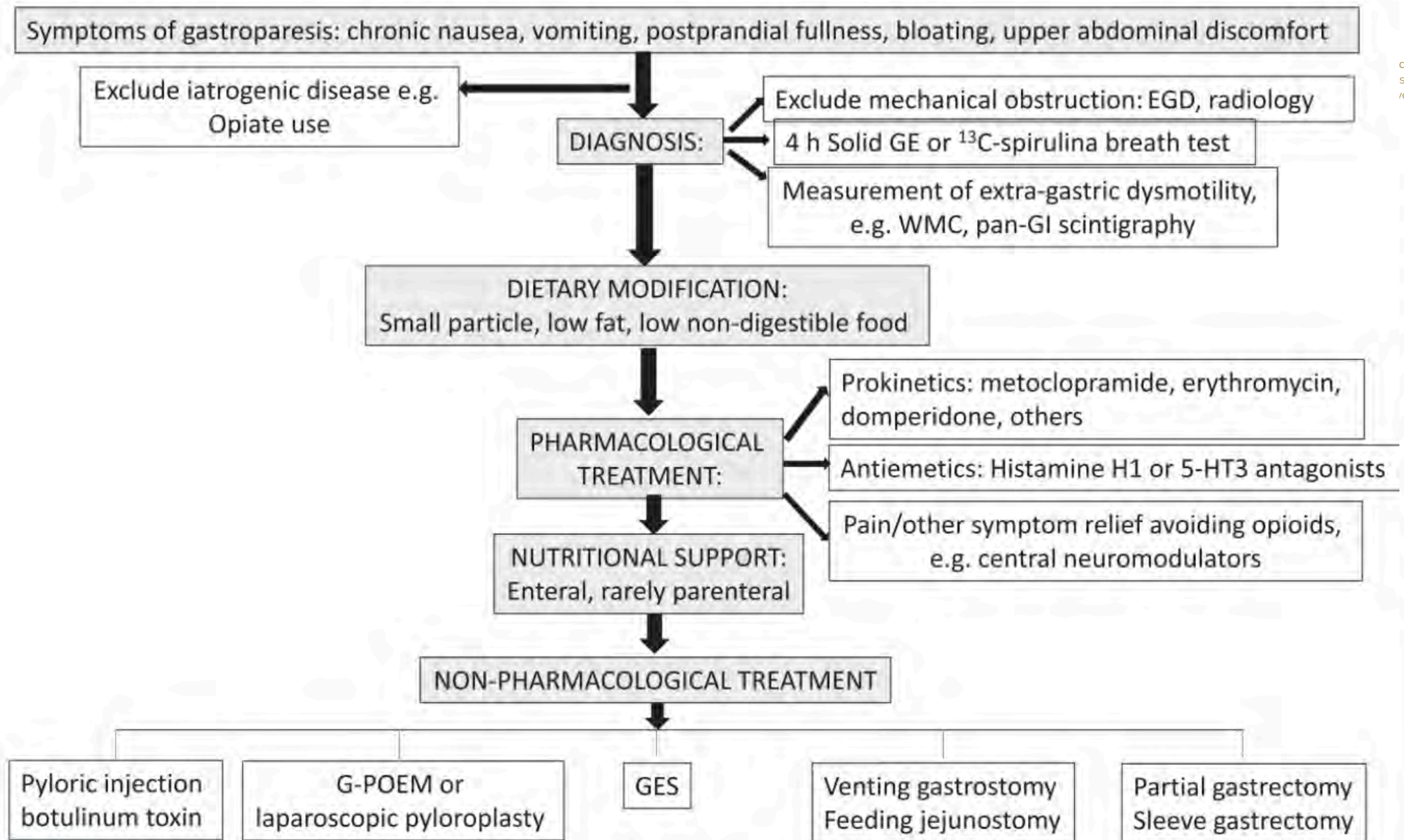
Fig.3 Enterra II electrical gastric stimulator device. Image reproduced with permission from Medtronic inc

# Summary



**Figure 1.** This algorithm updates the algorithm from the 2013 ACG guideline on gastroparesis (1). ACG, American College of Gastroenterology; EGD, esophagogastroduodenoscopy; GE, gastric emptying; GI, gastrointestinal; G-POEM, gastric per-oral endoscopic myotomy; WMC, wireless motility capsule.

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**Figure 1.** This algorithm updates the algorithm from the 2013 ACG guideline on gastroparesis (1). ACG, American College of Gastroenterology, EGD, esophagogastroduodenoscopy; GE, gastric emptying; GI, gastrointestinal; G-POEM, gastric per-oral endoscopic myotomy; WMC, wireless motility capsule.

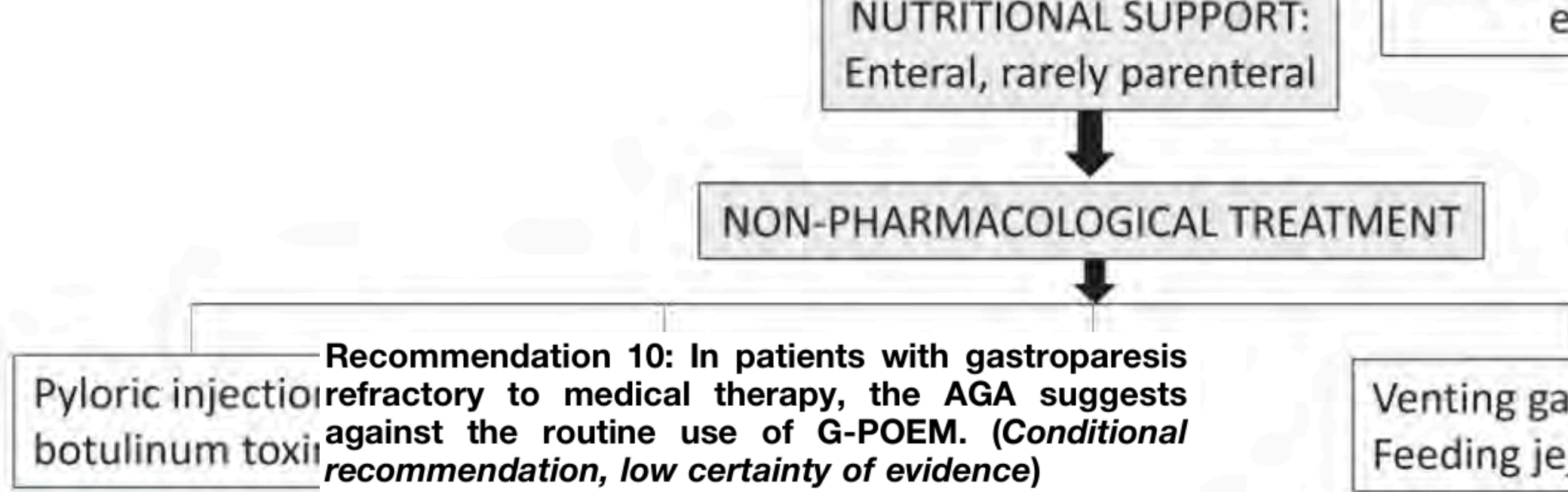
## Summary

**Recommendation 9:** In patients with gastroparesis refractory to medical management, the AGA suggests against the routine use of botulinum toxin injection (BTI). (*Conditional recommendation, very low certainty of evidence*)

FIGURE 4. This algorithm updates the algorithm from the 2013 ACG guidelines for the management of gastroparesis. GE, gastric emptying; GI, gastrointestinal; POEM, peroral endoscopic myotomy; Pyloroplasty, pyloric ring relaxation.

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# Summa

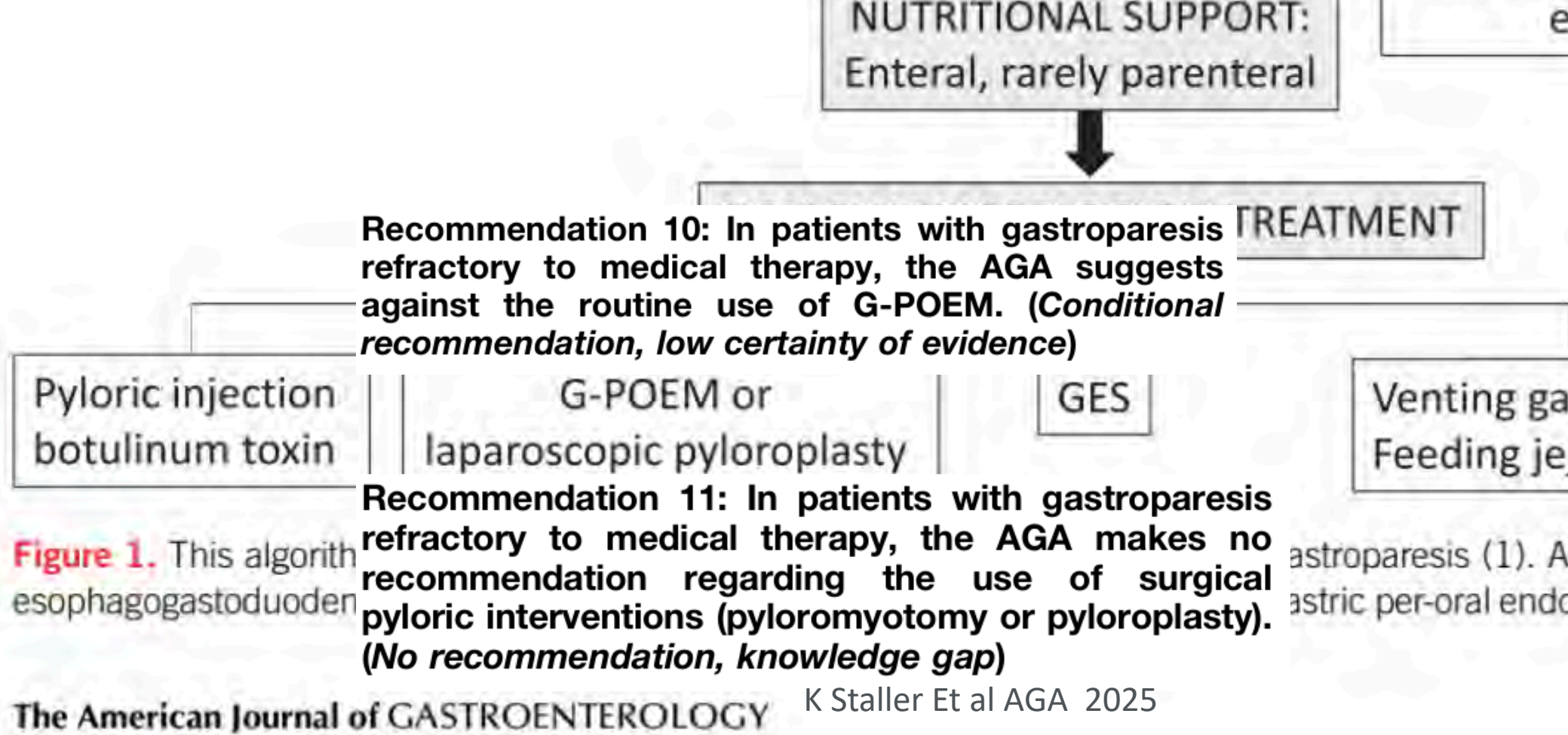


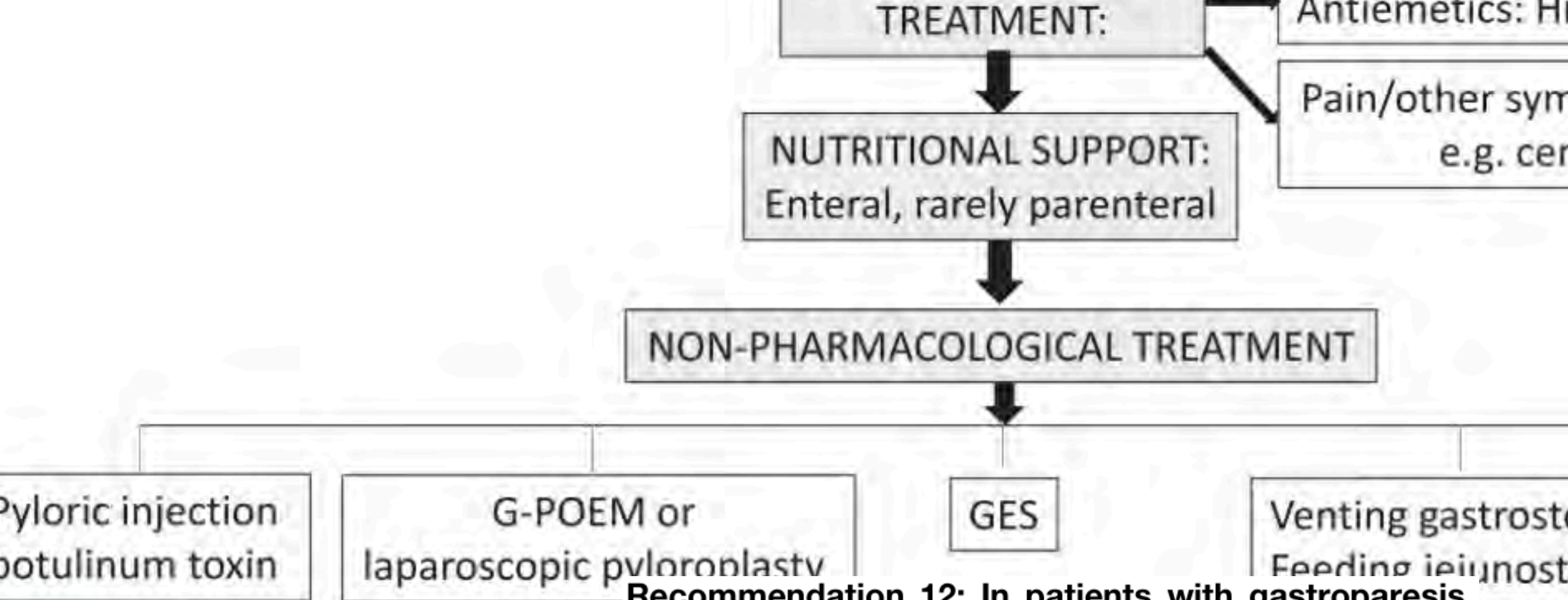
**Figure 1.** This algorithm updates the algorithm from the 2013 ACG guideline on gastroparesis (1). A, esophagogastroduodenoscopy; GE, gastric emptying; GI, gastrointestinal; G-POEM, gastric per-oral endoscopic submucosal dissection.

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# Summa

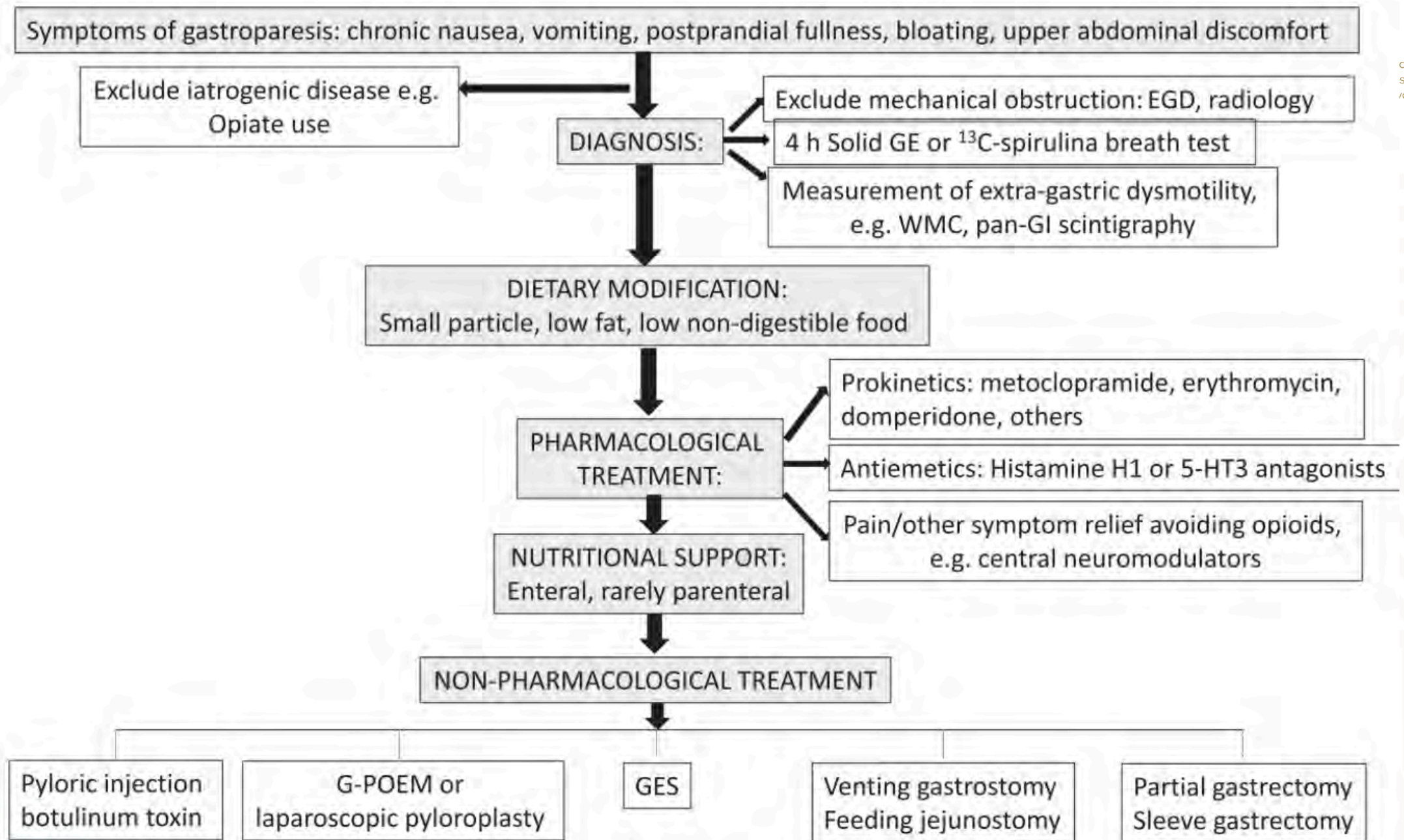




**Recommendation 12: In patients with gastroparesis refractory to medical therapy, the AGA suggests against the routine use of GES. (Conditional recommendation, very low certainty of evidence)**

**Figure 1.** This algorithm updates the algorithm for the use of endoscopic pyloroplasty; GE, gastric emptying scintigraphy; G, Am

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**Figure 1.** This algorithm updates the algorithm from the 2013 ACG guideline on gastroparesis (1). ACG, American College of Gastroenterology, EGD, esophagogastroduodenoscopy; GE, gastric emptying; GI, gastrointestinal; G-POEM, gastric per-oral endoscopic myotomy; WMC, wireless motility capsule.



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forward together  
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saam vorentoe

Thank you  
Enkosi  
Dankie



Photo by Stefan Els