Approach to the adult with nausea and vomiting

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INTRODUCTION

Nausea, the unpleasant sensation of being about to vomit, can occur alone or can accompany vomiting (the forceful expulsion of gastric contents), dyspepsia, or other gastrointestinal symptoms. Nausea can occur without vomiting and, less commonly, vomiting occurs without nausea. Nausea is often more bothersome and disabling than vomiting. Retching differs from vomiting in the absence of expulsion of gastric content. In addition, patients may confuse vomiting with regurgitation, which is the return of esophageal contents to the hypopharynx with little effort [1]. (See "Clinical manifestations and diagnosis of gastroesophageal reflux in adults".)

The recommendations made in this topic are generally consistent with the American Gastroenterological Association (AGA) guidelines for nausea and vomiting [2]. The pathophysiology of nausea and vomiting and the overall approach to the patient with these symptoms will be reviewed here. The prevention and treatment of chemotherapy-induced nausea and vomiting and characteristics of antiemetic drugs are discussed separately. (See "Prevention of chemotherapy-induced nausea and vomiting in adults" and "Characteristics of antiemetic drugs".)

PATHOPHYSIOLOGY

Normal function of the upper gastrointestinal tract involves an interaction between the gut and the central nervous system. The motor function of the gut is controlled at three main levels: the parasympathetic and sympathetic nervous systems; enteric brain neurons; and smooth muscle cells. A discussion of the anatomy and physiology of gastric motor function is discussed separately. (See "Pathogenesis of delayed gastric emptying".)

Nausea — Gastric rhythm disturbance is a peripheral mechanism underlying nausea from various causes. Nausea correlates with a shift in the normal three cycle per minute gastric myoelectrical activity to increased frequency (tachygastria) or reduced frequency (bradygastria). In motion sickness induced by vection (rotating a drum with black and white vertical stripes around seated stationary subjects), tachygastria precedes nausea, which is proportional to the degree of tachygastria. Drug-induced normalization of tachygastria improves nausea [1,3,4].

Vomiting — Vomiting is a reflex that allows an animal or person to rid itself of ingested toxins or poisons. It can be activated by humoral or neuronal stimuli, or both [5]. Multiple afferent and efferent pathways exist which induce vomiting; the following are the major components of these pathways:

- The area postrema in the floor of the fourth ventricle which contains a "chemoreceptor trigger zone" that is sensitive to many humoral factors, including neurotransmitters, peptides, drugs, and toxins.
- An area in the medulla known as the nucleus tractus solitarius (NTS) which may serve as a central pattern generator for vomiting; information from humoral factors via the area postrema and visceral afferents via the vagus nerve may converge at this site [6].
- The central pattern generator presumably projects to the various motor nuclei to elicit the sequential excitation and inhibition that controls the vomiting reflex.

Vagal afferent nerves from the gastrointestinal tract synapse in the NTS. From there, some neurons extend to the area postrema; other neurons from the NTS ascend to the paraventricular nuclei of the hypothalamus and the limbic and cortical regions, where gastric electromechanical events are perceived as normal sensations or symptoms such as nausea or discomfort. Afferent sympathetic neurons mediating nociceptive stimuli synapse in the spinal cord and ascend to brainstem nuclei and the hypothalamus (figure 1).

The presence of gastrointestinal and multiple nongastrointestinal trigger areas can result in vomiting with numerous disparate disorders (table 1). Five principle neurotransmitter receptors mediate vomiting: muscarinic M1, dopamine D2, histamine H1 5-hydroxytryptamine

(HT)-3 serotonin, and neurokinin 1 (NK1) substance P [7]. (See "Characteristics of antiemetic drugs".)

Studies of vomiting in dogs reveal that gastric content is expelled as a result of gastric and lower esophageal sphincter relaxation, retrograde contraction in the proximal small bowel and antrum, abdominal muscle contraction, and initial cricopharyngeus contraction followed by relaxation seconds before vomiting [8]. Retching occurs when the glottis closes and respiratory muscles counteract abdominal muscle contraction to prevent the expulsion of gastric content.

APPROACH TO MANAGEMENT

Patients with acute vomiting, typically for hours to a few days, most often present to an emergency department, whereas patients with chronic symptoms are more often initially evaluated in outpatient office settings. Emergency department physicians should expeditiously exclude life-threatening disorders such as bowel obstruction, mesenteric ischemia, acute pancreatitis, and myocardial infarction (table 1). In both urgent care and routine outpatient settings, the following three steps should generally be undertaken in patients with nausea and vomiting [1].

- The etiology should be sought, taking into account whether the patient has acute nausea and vomiting or chronic symptoms (at least one month in duration) [9].
- The consequences or complications of nausea and vomiting (eg, fluid depletion, hypokalemia, and metabolic alkalosis) should be identified and corrected.
- Targeted therapy should be provided, when possible (eg, surgery for bowel obstruction or malignancy). In other cases, the symptoms should be treated.

History and physical examination — An initial careful history and physical examination should be performed. In most cases, the cause of the nausea and vomiting can be determined from the history and physical examination and additional testing is not required [9-11]. If additional testing is needed, it should be guided by the symptom duration, frequency, and severity, as well as the characteristics of vomiting episodes and associated symptoms.

The following clinical features are especially important:

- Drug use can cause nausea and vomiting, particularly opioids and cannabis [12,13]. (See 'Functional nausea and vomiting disorders' below.)

- Abdominal pain with vomiting often indicates an organic etiology (eg, cholelithiasis). (See "Acute calculous cholecystitis: Clinical features and diagnosis".)

- Abdominal distension and tenderness suggest bowel obstruction. (See "Etiologies, clinical manifestations, and diagnosis of mechanical small bowel obstruction in adults" and "Acute colonic pseudo-obstruction (Ogilvie's syndrome)".)

- Vomiting of food eaten several hours earlier and a succussion splash detected on abdominal examination suggest gastric obstruction or gastroparesis. (See "Gastroparesis: Etiology, clinical manifestations, and diagnosis" and "Gastric outlet obstruction in adults".)

- Vomiting of blood or coffee ground-like material indicates upper gastrointestinal bleeding. (See "Approach to acute upper gastrointestinal bleeding in adults".)

- Heartburn with nausea often indicates gastroesophageal reflux disease (GERD), and GERD can present as chronic nausea without typical reflux symptoms [14]. (See "Clinical manifestations and diagnosis of gastroesophageal reflux in adults".)

- Early morning vomiting is characteristic of pregnancy [15]. (See "Clinical manifestations and diagnosis of early pregnancy" and "Nausea and vomiting of pregnancy: Treatment and outcome".)

- Feculent vomiting suggests intestinal obstruction or a gastrocolic fistula. (See "Etiologies, clinical manifestations, and diagnosis of mechanical small bowel obstruction in adults" and "Acute colonic pseudo-obstruction (Ogilvie's syndrome)".)

- Vertigo and nystagmus are typical of vestibular neuritis and other causes of vertigo. (See "Vestibular neuritis and labyrinthitis" and "Causes of vertigo".)

- Bulimia is associated with dental enamel erosion, parotid gland enlargement, lanugo-like hair, and calluses on the dorsal surface of the hand [16-18]. (See "Eating disorders: Overview of epidemiology, clinical features, and diagnosis".)

- Headache may indicate migraine-associated vomiting. Neurogenic vomiting may be positional and is usually associated with other neurologic signs or symptoms. (See "Pathophysiology, clinical manifestations, and diagnosis of migraine in adults" and "Overview of the clinical features and diagnosis of brain tumors in adults".)

- A similar illness suffered concurrently by people in personal contact with the patient or who had ingested food or liquid from the same source at about the same time suggests a common viral or bacterial pathogen. (See "Acute viral gastroenteritis in adults" and

"Causes of acute infectious diarrhea and other foodborne illnesses in resource-abundant settings", section on 'Clinical clues to the microbial cause'.)

- Nausea, sometimes with vomiting, can follow passive motion or the visual perception of motion. (See "Motion sickness".)

Endoscopy — Most patients with chronic nausea and vomiting that is unexplained after routine evaluation should undergo esophagogastroduodenoscopy to identify gastric obstruction or other disorders that should have specific therapy.

However, endoscopy and other routine tests are often normal, suggesting an idiopathic (functional) etiology. (See "Functional dyspepsia in adults".)

Assessment of gastric emptying — In patients with chronic nausea and vomiting, if no mechanical obstruction is found by endoscopy, a scintigraphic gastric emptying test or alternative procedure can identify delayed emptying. However, postprandial fullness, early satiation, nausea, and vomiting overlap in patients with functional dyspepsia with or without demonstrated gastroparesis. The usefulness of identifying delayed emptying is further limited by the lability of gastric emptying results over time. For example, of 944 tertiary care patients with chronic upper gastrointestinal symptoms, 42 percent of patients with initial gastroparesis no longer had abnormal emptying 48 months later, and 37 percent of patients with initial normal emptying had gastroparesis at 48 weeks [19]. In addition, there is poor correlation between the severity of delayed emptying and symptom severity, lack of correlation between improvement in gastric emptying and symptom response to prokinetic therapy, and the roles of impaired accommodation and visceral hypersensitivity that are documented by testing that is less widely performed [20,21]. (See "Gastroparesis: Etiology, clinical manifestations, and diagnosis".)

DIFFERENTIAL DIAGNOSIS

Numerous disorders are associated with nausea and vomiting. The following table lists the main causes (table 1).

SPECIFIC DISORDERS

Acute disorders

Infectious causes — Acute gastroenteritis is second only to the common cold as a cause of lost productivity [22]. Bacterial, viral, and parasitic pathogens cause this illness which is characterized by diarrhea and/or vomiting. Vomiting is especially common with infections caused by rotaviruses, enteric adenovirus, norovirus, and *Staphylococcus aureus*. (See "Norovirus" and "Causes of acute infectious diarrhea and other foodborne illnesses in resource-abundant settings", section on 'Vomiting'.)

Infection with the acute respiratory syndrome coronavirus 2 (SARS-Cov-2) virus (COVID-19) often causes gastrointestinal symptoms, especially diarrhea, abdominal pain, anorexia, nausea, and vomiting, and these symptoms can precede respiratory manifestations. (See "COVID-19: Clinical features" and "COVID-19: Issues related to gastrointestinal disease in adults".)

Postoperative nausea and vomiting — About one-third of surgical patients have nausea, vomiting, or both after receiving general anesthesia. Most research has been directed toward prevention rather than therapy of established symptoms [23]. Risk factors include female sex, nonsmoker status, previous history of postoperative nausea and vomiting, and use of postoperative opioids. (See "Overview of post-anesthetic care for adult patients" and "Postoperative nausea and vomiting".)

Vestibular neuritis — This acute labyrinthine disorder is characterized by rapid onset of severe vertigo with nausea, vomiting and gait instability. (See "Vestibular neuritis and labyrinthitis".)

Chemotherapy-induced nausea and vomiting — Nausea and vomiting are common side effects of cancer chemotherapy. Anticipatory antiemetic therapy is indicated when highly emetogenic chemotherapy regimens are given. (See "Prevention of chemotherapy-induced nausea and vomiting in adults".)

Chronic disorders

Nausea and vomiting of pregnancy — Up to 74 percent of pregnant women suffer nausea and/or vomiting, and 50 percent have vomiting alone. Risk factors include low education or income, African-American ancestry, female fetus, increased gravidity, multiple gestation, gestational trophoblastic disease, fetal triploidy, trisomy 21, hydrops fetalis, a personal history of the disorder in a previous pregnancy, and a history of motion sickness, migraine headaches, or nausea associated with use of estrogen-containing contraceptives [15].

This disorder nearly always begins within the first nine weeks of pregnancy; onset after the initial nine weeks should direct especially careful evaluation for another cause within the differential diagnosis of nausea and vomiting in nonpregnant patients. The diagnosis of

hyperemesis gravidarum is applied to the most severely affected patients, up to 1 percent of pregnancies. (See "Nausea and vomiting of pregnancy: Clinical findings and evaluation".)

Gastroparesis — The term gastroparesis applies to delayed gastric emptying as found from scintigraphic gastric emptying testing or other procedure in the absence of mechanical obstruction. Idiopathic and diabetic gastroparesis are the two most common groups. A noninvasive method of recording gastric myoelectrical activity or slow waves from cutaneous leads placed over the stomach (electrogastrography) reveals abnormalities in some patients, but the role of this procedure in management is uncertain [20]. (See "Gastroparesis: Etiology, clinical manifestations, and diagnosis" and "Treatment of gastroparesis".)

Gastroesophageal reflux — Nausea can occasionally be the presenting symptom of gastroesophageal reflux disease and usually responds to management of GERD [14]. (See "Clinical manifestations and diagnosis of gastroesophageal reflux in adults", section on 'Clinical manifestations' and "Medical management of gastroesophageal reflux disease in adults".)

Gastric outlet obstruction — Pyloric stenosis can occur from malignancy or peptic ulcer disease. Inflammatory edema associated with ulcers may respond to acid suppression therapy and nasogastric suction. However, fibrotic strictures may persist after ulcer healing. Endoscopic balloon dilation, surgery, and self-expanding metal stenting are treatment options. (See "Overview of complications of peptic ulcer disease" and "Gastric outlet obstruction in adults".)

Eosinophilic gastroenteritis — Benign eosinophilic infiltration of the gut is uncommon, but its diagnosis is especially important as steroid therapy is usually effective. (See "Eosinophilic gastrointestinal diseases".) The disease can occur from the esophagus to the colon, and the symptoms depend upon the extent and layer(s) of bowel involved. Gastric mucosal disease is typically associated with nausea and vomiting. (See "Eosinophilic gastrointestinal diseases".)

Chronic idiopathic intestinal pseudo-obstruction — Chronic intestinal pseudo-obstruction is usually secondary to an underlying disorder affecting neuromuscular function that suggests mechanical bowel obstruction of the small or large bowel in the absence of an anatomic lesion that obstructs the flow of intestinal contents. (See "Chronic intestinal pseudo-obstruction: Etiology, clinical manifestations, and diagnosis".)

Functional nausea and vomiting disorders — The Rome IV criteria identify three nausea and vomiting disorders, each of which requires fulfillment of the criteria for at least three months with symptom onset at least six months before diagnosis [13] (see "Cyclic vomiting syndrome"):

Chronic nausea and vomiting syndrome (must include all criteria):

- Bothersome (ie, severe enough to impact on usual activities) nausea, occurring at least one 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 that is likely to explain the symptoms on routine investigations (including at upper endoscopy).

Cyclic vomiting syndrome (Rome IV criteria must include all criteria) [13] (see "Cyclic vomiting syndrome", section on 'Adult criteria'):

- Stereotypical episodes of vomiting regarding onset (acute) and duration (less than one week).
- At least three discrete episodes in the prior year and two episodes in the past six months, occurring at least one week apart.
- Absence of vomiting between episodes, but other milder symptoms can be present between cycles
- A history or family history of migraine headaches further supports the diagnosis.
- The American Neurogastroenterology and Motility Society and Cyclic Vomiting Association characterize a typical four-phase cycle [24]:
    - Prodrome of intense nausea, sometimes with panic symptoms, diarrhea, cold and hot flashes, and profuse sweating;
    - Vomiting/retching phase, sometimes with migraine headache, photosensitivity, and phonosensitivity;
    - Recovery phase lasting hours to days; and
    - Inter-episodic phase.

Cannabinoid hyperemesis syndrome (must include all criteria):

- Stereotypical episodic vomiting resembling cyclic vomiting syndrome in terms of onset, duration, and frequency.
- Presentation after prolonged excessive cannabis use.
- Relief of vomiting episodes by sustained cessation of cannabis use.
- Supportive remarks:
    - May be associated with pathologic bathing behavior (prolonged hot baths or showers).
    - Following a systematic literature review, Venkatesan et al proposed these criteria be modified to require at least three episodes per year, cannabis use for greater than one year before symptom onset and average use greater than four times per week, and

resolution after cessation of cannabis use for at least six months or at least equal to a duration that spans three typical cycles in the patient [25].

Rumination syndrome — The rumination syndrome is distinct from vomiting, but misdiagnosis as vomiting, gastroparesis, or gastroesophageal reflux disease is common. It is a behavioral disorder that is most commonly identified among mentally-disadvantaged children, although it is increasingly recognized among adolescents and adults of normal mental capacity.

According to the Rome IV criteria, the diagnosis of rumination syndrome requires the presence of all of the following criteria for at least three months (with symptom onset at least six months prior to diagnosis) [13]:

- Persistent or recurrent regurgitation of recently ingested food into the mouth with subsequent spitting or remastication and swallowing
- Regurgitation is not preceded by retching

Supportive remarks:

- 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

The primary treatment is behavioral modification, principally using diaphragmatic breathing techniques. (See "Rumination syndrome", section on 'Management'.)

TREATMENT

The management of acute and chronic nausea and vomiting may differ, and vomiting can be more responsive than nausea [1]. Drug treatment is standard practice. Dietary interventions and the treatment of hypovolemia are discussed elsewhere. (See "Treatment of gastroparesis", section on 'Dietary modification' and "Maintenance and replacement fluid therapy in adults" and "Treatment of severe hypovolemia or hypovolemic shock in adults".)

Drug therapy — Few high-quality therapeutic trials have compared the efficacy of different drugs in patients presenting acutely with nausea and vomiting. A systematic review identified eight randomized clinical trials in patients presenting to emergency departments, of which three trials compared a single dose of drugs with placebo and reported the primary outcome as the change in visual analogue scale for nausea severity from baseline to 30 minutes. Metoclopramide (three trials), ondansetron (two trials), prochlorperazine (one trial), and droperidol (one trial) were tested, and only droperidol in a study of 48 participants revealed a

significant improvement compared with placebo. Acute gastroenteritis is the most common underlying disorder in patients seeking emergency department care, but participants had various etiologies for their symptoms, limiting the usefulness of these studies in guiding therapy of patients with specific causes [26]. In many patients, treatment is based upon patient preference, costs, and safety.

Antiemetics and prokinetics — Acute or chronic nausea and vomiting can often be helped by antiemetic or prokinetic drugs [27]. The antiemetic drug therapy generally recommended varies according to the etiology (table 2). The efficacy of the available prokinetic drugs is limited [1]. (See "Characteristics of antiemetic drugs".)

- Prochlorperazine is an antiemetic that often partially alleviates acute nausea and vomiting (eg, acute gastroenteritis), but is associated with risks of hypotension and extrapyramidal side effects. Prochlorperazine should usually be considered in such cases before trying serotonin receptor antagonists or prokinetic drugs.

- The dopamine receptor antagonist, metoclopramide, has combined antiemetic and prokinetic properties. However, it can be associated with extrapyramidal side effects. It can be given orally or intravenously. When given intravenously, using a slow infusion over 15 minutes is associated with a lower incidence of akathisia compared with bolus dosing, without a decrease in efficacy [28].

  Another dopamine antagonist, domperidone, penetrates the blood-brain barrier poorly. As a result, anxiety and dystonia are much less common than with metoclopramide. Domperidone is not approved for use in the United States. However, the Food and Drug Administration has encouraged "physicians who would like to prescribe domperidone for their patients with severe gastrointestinal disorders that are refractory to standard therapy to open an Investigational New Drug Application." The FDA domperidone investigational new drug section can be contacted at DomperidoneIND@fda.hhs.gov. (See "Treatment of gastroparesis", section on 'Domperidone'.)

- Agents with mainly prokinetic properties include erythromycin (motilin receptor agonist) and bethanechol (muscarinic receptor agonist).

  Erythromycin has a narrow therapeutic window, above which abdominal pain and nausea are common. Thus, it can improve gastric emptying without improving nausea. A systematic review of published clinical trials of oral erythromycin therapy for various types of gastroparesis revealed that all studies were methodologically weak and that improvement occurred in fewer than 50 percent of patients [29].

The side effects of bethanechol are similar to those of erythromycin, and trial data are even more limited.

- The serotonin antagonists form the cornerstone of therapy for the control of acute emesis with chemotherapy agents and can also be used for other causes of nausea and vomiting (table 2). (See "Characteristics of antiemetic drugs", section on 'Serotonin receptor antagonists' and "Prevention of chemotherapy-induced nausea and vomiting in adults", section on '5-HT3 receptor antagonists'.)

Antidepressants — Tricyclic antidepressants (eg, amitriptyline) have a role both as abortive treatment and as prophylaxis for cyclic vomiting syndrome [24]. (See "Cyclic vomiting syndrome", section on 'Abortive medications (for prodrome)' and "Cyclic vomiting syndrome", section on 'Prophylactic medications'.)

Gastric electrical stimulation — Gastric electrical stimulation via implanted electrodes has been applied to highly selected patients with gastroparesis that is refractory to conventional therapy. A device is available in the United States for humanitarian use, and open-label studies in patients with gastroparesis of various etiologies have found benefit. However, results of controlled trials in patients with diabetic or idiopathic gastroparesis are conflicting, and there are no published trials in patients with chronic unexplained nausea and vomiting with normal gastric emptying [30]. (See "Electrical stimulation for gastroparesis".)

Surgical therapy — Gastrostomy, pyloroplasty, jejunostomy, and gastrectomy have been performed in patients with postsurgical, diabetic, and idiopathic gastroparesis, but the reports were uncontrolled, unblinded, and retrospective, and the benefit was unconvincing, except possibly for completion gastrectomy in patients with postsurgical gastroparesis [31,32]. (See "Treatment of gastroparesis".)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Nausea and vomiting".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given

condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "Patient education: Nausea and vomiting in adults (The Basics)" and "Patient education: Upper endoscopy (The Basics)" and "Patient education: Motion sickness (The Basics)")
- Beyond the Basics topics (see "Patient education: Upper endoscopy (Beyond the Basics)")

SUMMARY AND RECOMMENDATIONS

- **Pathophysiology** – Nausea, the unpleasant sensation of being about to vomit, can occur alone or can accompany vomiting (the forceful expulsion of gastric contents), dyspepsia, or other gastrointestinal symptoms. Retching differs from vomiting in the absence of expulsion of gastric content. In addition, patients may confuse vomiting with regurgitation, which is the return of esophageal contents to the hypopharynx with little effort. (See 'Pathophysiology' above.)
- **Etiology** – A variety of disorders can produce nausea with or without vomiting (table 1). The diverse differential diagnosis of nausea and vomiting should be approached initially with a careful history and physical examination. (See 'Differential diagnosis' above.)
- **Evaluation** – In most cases, the cause of the nausea and vomiting can be determined from the history and physical examination and additional testing is not required (eg, in a patient with a history and examination suggestive of gastroenteritis). (See 'History and physical examination' above.)

  Testing should be guided by the symptom duration, frequency, and severity, as well as the characteristics of vomiting episodes and associated symptoms. Most patients with chronic nausea and vomiting that is unexplained should undergo esophagogastroduodenoscopy to identify disorders that should have specific therapy. In patients with chronic nausea and vomiting, if no mechanical obstruction is found by endoscopy, a scintigraphic gastric

emptying test or alternative procedure can identify delayed emptying. (See 'Endoscopy' above and 'Assessment of gastric emptying' above.)

- **Management**

  - The consequences or complications of nausea and vomiting (eg, fluid depletion, hypokalemia, and metabolic alkalosis) should be identified and corrected.

  - Therapy should be directed at the underlying etiology when possible (eg, surgery for bowel obstruction or malignancy). In other cases, symptoms should be treated. Few high-quality therapeutic trials have compared the efficacy of different drugs in specified types of nausea and vomiting. However, acute or chronic nausea and vomiting may be helped by antiemetic or prokinetic drugs depending upon the underlying cause (table 2). (See 'Treatment' above.)

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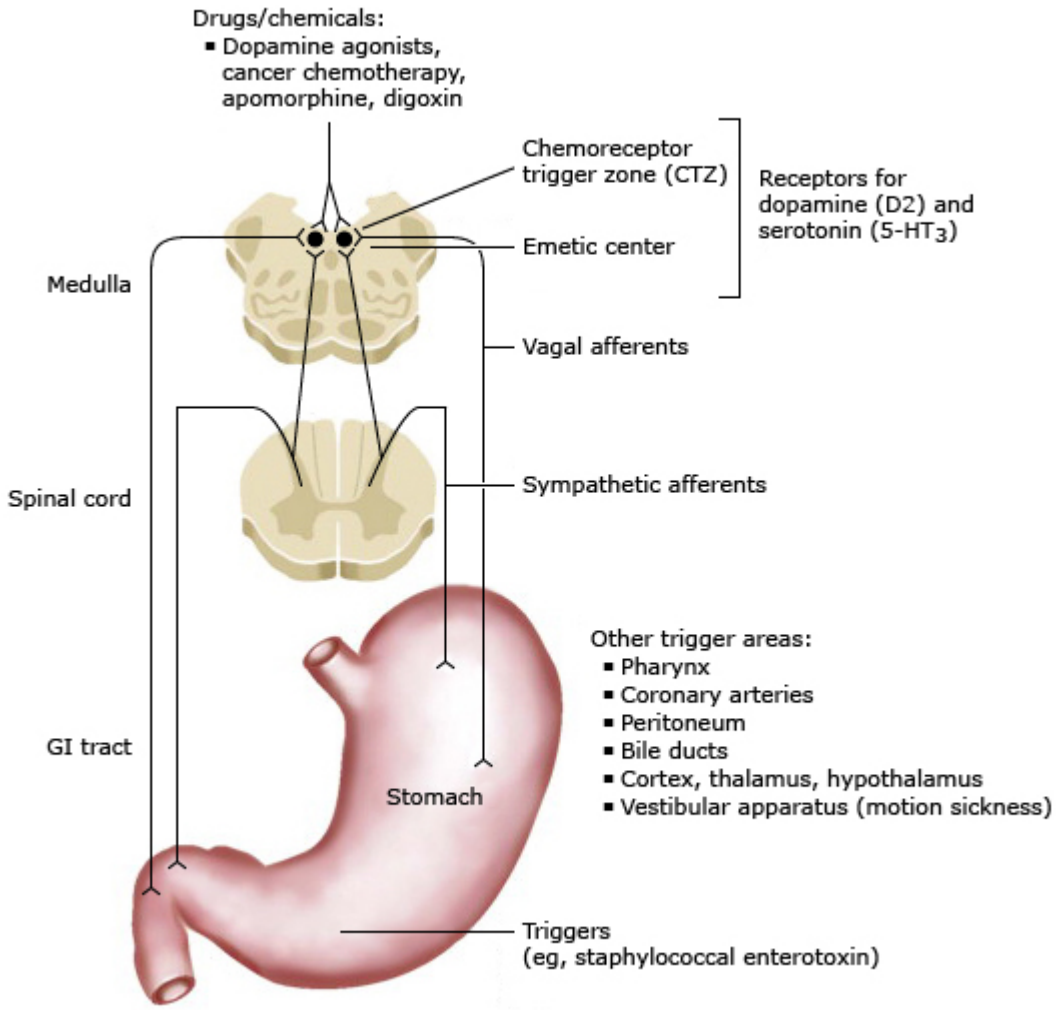
GRAPHICS

Trigger areas for nausea and vomiting



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Graphic 102412 Version 1.0

Differential diagnosis of nausea and vomiting

Medications and toxic etiologies
Cancer chemotherapy
▪ Severe – cisplatinum, dacarbazine, nitrogen mustard
▪ Moderate – etoposide, methotrexate, cytarabine
▪ Mild – fluorouracil, vinblastine, tamoxifen
Analgesics
▪ Aspirin
▪ Nonsteroidal antiinflammatory drugs
▪ Auranofin
▪ Antigout drugs
Cardiovascular medications
▪ Digoxin
▪ Antiarrhythmics
▪ Antihypertensives
▪ Beta blockers
▪ Calcium channel antagonists
Diuretics
Hormonal preparations/therapies
▪ Oral antidiabetics
▪ Oral contraceptives

Infectious causes
Gastroenteritis
▪ Viral
▪ Bacterial
Nongastrointestinal infections
▪ Otitis media
Disorders of the gut and peritoneum
Mechanical obstruction
▪ Gastric outlet obstruction
▪ Small bowel obstruction
Functional gastrointestinal disorders
Gastroparesis
Chronic intestinal pseudo-obstruction
Nonulcer dyspepsia
Irritable bowel syndrome
Organic gastrointestinal disorders
▪ Pancreatic adenocarcinoma
▪ Inflammatory intraperitoneal disease
▪ Peptic ulcer disease
▪ Cholecystitis
▪ Pancreatitis

CNS causes
Migraine
Increased intracranial pressure
▪ Malignancy
▪ Hemorrhage
▪ Infarction
▪ Abscess
▪ Meningitis
▪ Congenital malformation
▪ Hydrocephalus
▪ Pseudotumor cerebri
Seizure disorders
Demyelinating disorders
Cranial radiation
Emotional responses
Psychiatric disease
▪ Psychogenic vomiting
▪ Anxiety disorders
▪ Depression
▪ Pain
▪ Anorexia nervosa
▪ Bulimia nervosa
Labyrinthine disorders
▪ Motion sickness
▪ Labyrinthitis

- Antibiotics/antivirals
  - Erythromycin
  - Tetracycline
  - Sulfonamides
  - Antituberculous drugs
  - Acyclovir
- Gastrointestinal medications
  - Sulfasalazine
  - Azathioprine
- Nicotine
- CNS active drugs
  - Narcotics
  - Antiparkinsonian drugs
  - Antiseizure medications
- Antiasthmatics
  - Theophylline
- Radiation therapy
- Ethanol abuse
- Jamaican vomiting sickness
- Hypervitaminosis
  - Hepatitis
  - Crohn disease
  - Mesenteric ischemia
  - Retroperitoneal fibrosis
  - Mucosal metastases
  - Tumors
  - Ménière disease
  - Iatrogenic
  - Fluorescein angiography

Endocrinologic and metabolic causes

- Pregnancy
- Other endocrine and metabolic
  - Uremia
  - Diabetic ketoacidosis
  - Hyperparathyroidism
  - Hypoparathyroidism
  - Hyperthyroidism
  - Addison's disease
  - Acute intermittent porphyria

Miscellaneous causes

- Postoperative nausea and vomiting
- Cyclic vomiting syndrome
- Cannabis hyperemesis syndrome
- Cardiac disease
  - Myocardial infarction
  - Heart failure
  - Radiofrequency ablation of the liver
- Starvation

Radiation therapy to the upper abdomen and lower chest

CNS: central nervous system.

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Selection of antiemetics by clinical situation

Situation	Associated neurotransmitters	Recommended antiemetic
Migraine headache	Dopamine (probably a primary mediator)	For headache and nausea: metoclopramide or prochlorperazine
		For nausea: oral antiemetics, metoclopramide, prochlorperazine, serotonin antagonists
Vestibular nausea	Histamine, acetylcholine	Antihistamines and anticholinergics (equally effective)
Pregnancy-induced nausea	Unknown	For nausea: ginger, vitamin B6
		For hyperemesis gravidarum: promethazine (first-line agent); serotonin antagonists and corticosteroids (second-line agents)
Gastroenteritis	Dopamine, serotonin	First-line agents: dopamine antagonists
		Second-line agents: serotonin antagonists
		Use in children is controversial
Postoperative nausea and vomiting	Dopamine, serotonin	Prevention: serotonin antagonists, droperidol, dexamethasone
		Treatment: dopamine antagonists, serotonin antagonists, dexamethasone

Adapted from: Flake ZA, Scalley RD, Bailey AG. Practical selection of antiemetics. Am Fam Physician 2004; 69:1169.

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