

GERD and Peptic Ulcer Disease

GERD and PUD mean acid in the wrong place. Stop the acid with a PPI (proton pump inhibitor, a medicine that turns off acid pumps in the stomach) and kill *H. pylori* bacteria if it is there.

THE ONE-LINE TRUTH

GERD and peptic ulcer disease happen when stomach acid ends up in the wrong place — either splashing up into the esophagus (the food tube) or eating a hole in the stomach or duodenum (the first part of the small intestine).

The chain — how it unfolds

1. The lower esophageal sphincter (LES) relaxes too often or a hiatal hernia pulls it open. — why: Normally the LES stays closed to trap acid in the stomach; when it opens without a swallow (transient LES relaxation) or is mechanically stretched by a hernia, acid flows up into the esophagus, which has no mucus shield and burns immediately.
2. Acid touches the esophageal lining, causing heartburn and regurgitation. — why: The esophagus is lined with squamous epithelium (flat cells) designed for swallowing, not for acid; hydrochloric acid burns these cells, triggering pain signals (heartburn) and sometimes washing back into the mouth (regurgitation) or throat (sour taste).
3. Acid vapor or droplets reach the throat and airways, causing chronic cough, hoarseness, or asthma-like wheezing. — why: Even tiny amounts of acid or acidic gas irritate the larynx (voice box) and can trigger bronchospasm (airway tightening) through vagal reflexes (nerve signals that make airways squeeze shut); this is called laryngopharyngeal reflux or atypical GERD.
4. Meanwhile, *H. pylori* bacteria or NSAIDs break the mucus-bicarbonate shield in the stomach or duodenum. — why: *H. pylori* secretes urease, ammonia, and toxins (VacA, CagA) that punch holes in the mucus layer and damage epithelial cells; NSAIDs block prostaglandin E₂, so the stomach stops making mucus and bicarbonate and mucosal blood flow drops, leaving the lining naked.

5. Stomach acid digs into the unprotected lining, forming an ulcer (a crater in the mucosa). — why: Without the mucus shield, hydrochloric acid and pepsin (a protein-digesting enzyme) erode the epithelium down to the submucosa or even the muscle layer; you feel this as gnawing epigastric pain, often worse when the stomach is empty because acid has nothing else to digest.
6. If the ulcer erodes into a blood vessel, bleeding begins — you see vomiting blood (hematemesis) (vomiting blood), black tarry stool (melena) (black, tarry stool from digested blood), or anemia. — why: Blood vessels run through the submucosa; when acid eats deep enough to hit a vessel, it opens and bleeds; small bleeds cause chronic anemia, large bleeds cause sudden vomiting of blood or passage of black stool.
7. If the ulcer burns all the way through the stomach or duodenal wall, perforation occurs — a hole opens into the abdominal cavity. — why: The wall is only a few millimeters thick; if acid and pepsin digest through all layers (mucosa, submucosa, muscle, serosa), stomach contents spill into the peritoneum, causing sudden, severe pain (peritonitis) and free air under the diaphragm on X-ray.
8. Chronic inflammation and healing cycles cause scarring; in the stomach, scar tissue can block the pylorus (gastric outlet obstruction); in the esophagus, it can narrow the tube (stricture). — why: Every time the lining heals, it lays down collagen (scar tissue); repeated cycles build up thick scar that does not stretch, so food cannot pass easily — you feel early satiety and vomiting (gastric outlet obstruction) or trouble swallowing (dysphagia) and food sticking (esophageal stricture).

Spot it — what you see, and why

- Burning feeling behind the breastbone (heartburn) that often comes after eating or when lying down: The ring of muscle at the bottom of the esophagus (the lower esophageal sphincter, which normally acts like a one-way gate) relaxes too much or at the wrong times, so stomach acid splashes backward up into the esophagus (the swallowing tube). The esophagus lining isn't built to handle acid, so it feels like burning.
- Sour or bitter taste in the mouth (acid regurgitation): Stomach acid and partly digested food flow back up into the throat and mouth when the lower esophageal sphincter (the one-way gate at the bottom of the esophagus) opens when it shouldn't. You literally taste the acid.
- Pain in the upper middle belly (epigastric pain), often a gnawing or burning feeling that comes and goes with meals: An ulcer (a sore spot or crater) has formed in the lining of the stomach or duodenum (the first part of the small intestine right after the stomach). Stomach acid touches the raw spot, causing pain. The pain may ease right after eating (if the ulcer is in the duodenum, because food buffers the acid) or get worse after eating (if the ulcer is in the stomach).

- Feeling uncomfortably full or bloated after eating even a small amount of food: Acid irritation and inflammation in the stomach or duodenum can slow the stomach's normal squeezing and emptying (gastric motility). Food sits longer than it should, making you feel stuffed and heavy.
- Nausea or throwing up: Acid irritation and inflammation upset the stomach lining, triggering signals in the vagus nerve (a large nerve that connects the gut to the brainstem's vomiting center). The brain interprets these signals as 'something is wrong' and turns on nausea or vomiting to try to empty the stomach.
- Chronic cough or hoarse voice that won't go away: Acid reflux reaches high enough to touch the vocal cords in the larynx (the voice box) or drip into the trachea (the windpipe), irritating the lining. The vocal cords swell and the airways react by coughing to clear the irritation.

Red flags — act now

- New heartburn or belly pain starting after age 60 (higher risk of cancer)
- Trouble swallowing or feeling like food is sticking in the chest
- Vomiting blood (red or coffee-ground color) or black, tarry stools
- Unintended weight loss (losing 10 pounds or more without trying)
- Anemia (low red blood cell count) or signs of bleeding on blood tests

Treat it — in this order

1. Proton pump inhibitor (PPI) — omeprazole 20–40 mg once daily or equivalent — for 8 weeks in GERD, 4–8 weeks in peptic ulcer disease → PPIs block the hydrogen-potassium pump in stomach cells that makes acid. Turning off that pump drops stomach acid by more than 90%, letting the raw lining in the esophagus or stomach heal and stopping the burn. Healing rates for ulcers reach 90–95% at 8 weeks.
2. H. pylori eradication therapy — standard triple therapy (PPI + clarithromycin 500 mg + amoxicillin 1 g, all twice daily for 14 days) or quadruple therapy (PPI + bismuth + tetracycline + metronidazole for 10–14 days) if resistance is likely → Kills the H. pylori bacteria colonizing the stomach. Without the germ eating away the mucus, ulcers heal and almost never come back (recurrence drops from ~70% to < 5%). Current guidelines prefer 14-day regimens because they work better than 7–10 days, especially with rising antibiotic resistance.

3. Stop NSAIDs (ibuprofen, naproxen, aspirin at high dose) or switch to acetaminophen; if NSAIDs must continue, add PPI daily for protection → NSAIDs block an enzyme (COX-1) that makes protective mucus and blood flow in the stomach lining. Stopping them removes the injury and lets the lining heal. If stopping is not possible (for example, low-dose aspirin for heart protection), a daily PPI cuts ulcer risk by about 80%.
4. Lifestyle changes — lose weight if overweight, raise the head of the bed 6–8 inches, avoid meals within 3 hours of bedtime, stop smoking, limit alcohol, caffeine, chocolate, and fatty foods → Excess belly fat and big meals increase pressure in the abdomen and push stomach contents up. Elevating the head uses gravity to keep acid down at night. Smoking weakens the LES and slows healing. Cutting triggers reduces how often the sphincter relaxes inappropriately.
5. Surgical fundoplication (Nissen or partial wrap) or LINX magnetic sphincter augmentation (for GERD refractory to medical therapy) → Fundoplication wraps the top of the stomach around the lower esophagus to tighten the LES and physically stop reflux. LINX places a ring of magnetic beads around the LES to reinforce closure. Both restore the valve function and can eliminate the need for daily PPI in 85–90% of people at 5 years.

Your top priorities at the bedside

1. Assess for signs of active bleeding: check vital signs for a fast heart rate (tachycardia) (fast heart rate over 100) and low blood pressure (hypotension) (low blood pressure under 90 systolic), examine stool color, and ask about vomiting blood. — why: Bleeding peptic ulcers can cause hypovolemic shock (dangerous drop in blood volume) from blood loss, requiring immediate fluid resuscitation and possible transfusion to maintain tissue blood flow (perfusion) (blood flow to organs).
2. Administer PPI medication on empty stomach 30 to 60 minutes before breakfast as ordered. — why: PPIs (proton pump inhibitors like omeprazole) work best when taken before the first meal because they block acid pumps that activate during eating, reducing stomach acid production by over 90 percent.
3. Teach patient to elevate head of bed 6 to 8 inches using blocks under bed legs, not just pillows. — why: Gravity prevents acid reflux during sleep when lower esophageal sphincter (the valve between esophagus and stomach) relaxes, and proper bed elevation is more effective than pillow props which can increase abdominal pressure.