

Hyperemesis Gravidarum

Hyperemesis gravidarum is extreme pregnancy vomiting — so bad the mom can't keep food or water down, loses over 5% of her weight, and runs dangerously low on salts and fluid.

THE ONE-LINE TRUTH

The mom throws up so much during pregnancy that she loses weight and her body chemistry goes haywire.

The chain — how it unfolds

1. Pregnancy hormones (hCG, estrogen, placental GDF15) overstimulate the brainstem vomiting center (medulla) — why: The placenta pumps out hCG and estrogen to support the pregnancy, and also makes GDF15, a protein that signals the brainstem's chemoreceptor trigger zone and vomiting center. In hyperemesis, these signals are way too strong — like a smoke alarm screaming nonstop — so the brain tells the stomach and diaphragm to vomit over and over, even when there's no real danger.
2. Mom vomits constantly (often 5 to 20+ times per day) and cannot keep food or water down — why: Because the brainstem vomiting center won't quiet down, every attempt to eat or drink triggers more vomiting. The stomach stays empty, and the body gets no calories, no water, and no salts.
3. Dehydration sets in: blood volume drops (hypovolemia), heart rate rises, mom feels dizzy and weak — why: Each vomit empties the stomach of water, sodium, potassium, and chloride. After days of this, the blood runs low on fluid (hypovolemia), so less blood reaches the brain and muscles. The heart beats faster (tachycardia) trying to push what little blood is left around the body. The kidneys hoard sodium and water, but that only works for a while.

4. Electrolytes crash: low potassium (hypokalemia), low sodium (hyponatremia), low chloride (hypochloremia), blood too alkaline (metabolic too little acid in the blood (alkalosis)) — why: Stomach acid (HCl) is made of hydrogen and chloride. Vomiting dumps that acid out, so the blood loses chloride and hydrogen ions, making it too alkaline (high pH, high bicarbonate). The kidneys try to fix the too little acid in the blood (alkalosis) by dumping bicarbonate into the urine — but to do that, they also throw away potassium. Meanwhile, dehydration and aldosterone (the salt-hoarding hormone) make the kidneys waste even more potassium. Low potassium makes muscles weak and the heart beat irregularly; low sodium makes the brain swell and function poorly.
5. Body switches to burning fat: ketones appear in blood and urine (ketonemia, ketonuria), mom loses more than 5% of her weight — why: With no food coming in, the liver runs out of glucose (blood sugar) and starts breaking down fat for energy. This makes ketones (acetoacetate and beta-hydroxybutyrate), which are acids that pile up in the blood and spill into urine. Ketones are a distress signal: the body is eating its own fat and muscle to survive. Weight drops fast — losing more than 5% of pre-pregnancy weight is the clinical cutoff for severe hyperemesis.
6. Thiamine (vitamin B1) stores run out; if IV glucose is given without thiamine, brain cells die → Wernicke encephalopathy (confusion, eye paralysis, loss of coordination (ataxia), coma) — why: Thiamine is the key vitamin brain cells need to turn glucose into energy. Days of vomiting and starvation deplete the body's small thiamine reserve. If a well-meaning team gives IV dextrose (sugar water) to 'feed' the mom, her brain tries to use that glucose, burns through the last bit of thiamine instantly, and brain cells — especially in the thalamus (the brain's relay station) and mammillary bodies (memory centers) — run out of fuel and die. This causes Wernicke encephalopathy: confusion, wobbly walk (ataxia), paralyzed eye muscles (ophthalmoplegia), and sometimes coma. It can be permanent if not caught immediately. The rule: always give IV thiamine BEFORE any glucose.
7. Repeated hard vomiting tears the esophagus (Mallory-Weiss tear) → vomiting blood (hematemesis), worsening anemia and fluid loss — why: The esophagus (food tube) has a delicate lining. Forceful, repeated vomiting spikes pressure inside it, tearing the mucosa (inner layer), usually near the stomach junction. Blood vessels in the tear bleed, so the mom vomits bright red or coffee-ground blood. This adds blood loss and iron-deficiency anemia on top of dehydration, making her even weaker.

8. If the cycle isn't broken, the final dominoes fall: fatal heart arrhythmia (from low potassium), permanent brain damage (from Wernicke), fetal growth restriction or loss (from mom's starvation and dehydration) — why: Every one of these problems — dehydration, low potassium, low sodium, ketones, thiamine depletion — is the body's emergency response trying to keep the brain and heart alive. But compensation has limits. Once potassium drops below 2.5 mEq/L, the heart can develop torsades de pointes (a twisting, deadly rhythm). Once thiamine is gone and glucose floods in, brain cells die within hours. And if the mom stays starving and dehydrated, the placenta can't deliver enough oxygen and nutrients to the baby, risking growth restriction or pregnancy loss. The key is recognizing the pattern early — intractable vomiting plus weight loss plus ketonuria plus low potassium equals hyperemesis gravidarum — and intervening with IV fluids, thiamine (100 mg IV before any glucose), potassium and electrolyte repletion, and antiemetics (ondansetron, metoclopramide, or promethazine) to stop the vomiting and break the cycle before any domino crashes.

Spot it — what you see, and why

- Severe nausea and vomiting that won't stop (far worse than typical morning sickness): The hormone hCG (human chorionic gonadotropin, made by the growing placenta) spikes during early pregnancy and triggers the area postrema (the brain's vomiting center in the brainstem); in hyperemesis, the signal is extra strong and unrelenting, so the nausea-vomit cycle never lets up
- Not enough water in the body (dehydration) — dry mouth, dizziness, dark urine, feeling very weak: Relentless vomiting dumps out fluid and the body can't take in enough liquid to replace it, so blood volume drops and tissues dry out like a sponge left in the sun
- Ketones in the urine (ketonuria): Because vomiting blocks food from staying down, the body runs out of sugar for fuel and starts burning its own fat instead; burning fat makes chemicals called ketones that spill into the urine—a sign the body is starving
- Body salts out of balance (electrolyte imbalance) — low potassium, low sodium, or low chloride in the blood: Vomit carries away the body's key salts (potassium, sodium, chloride); without them nerves and muscles can't fire properly, the heart's rhythm can turn dangerous, and the brain can get foggy
- Weight loss — dropping more than 5 percent of body weight from before pregnancy: The body can't hold down calories, so it taps into stored energy (fat and muscle); steady weight loss signals the body is starving despite being pregnant and needing extra fuel for the baby
- Fast heart rate (tachycardia) and low blood pressure: Dehydration shrinks the blood volume like a half-empty water tank, so the heart pumps faster to try to deliver oxygen to all the tissues; blood pressure drops because there's less fluid pushing through the vessels

Red flags — act now

- Cannot keep down any food or liquid for 24 hours or longer
- Blood in vomit or vomit that looks like coffee grounds (a sign of bleeding in the stomach or esophagus)
- Severe belly pain (not just nausea) or fever over 100.4°F
- Confusion, slurred speech, or severe headache (signs of dangerously low sodium or severe dehydration hitting the brain)
- No urine for many hours or urine that is very dark and scanty (a warning that the kidneys are struggling)

Treat it — in this order

1. Thiamine 100 mg IV or IM before giving any dextrose → Thiamine (vitamin B1) is the key that lets brain cells safely burn sugar for energy. Giving thiamine first protects the brain from Wernicke encephalopathy, a type of brain damage that can happen when a starving body suddenly gets sugar without enough thiamine to handle it.
2. IV fluids (normal saline or lactated Ringer solution) with dextrose added after thiamine is given → IV fluids restore the water and salt balance in the blood, bringing sodium, potassium, and chloride back to safe levels so the heart, nerves, and muscles work correctly again. Dextrose (sugar) gives the body fuel so it stops burning fat and making ketones.
3. Pyridoxine (vitamin B6) 10 to 25 mg three to four times daily plus doxylamine 12.5 mg three to four times daily → This combination is the safest first choice for nausea in pregnancy. Pyridoxine and doxylamine work together to calm the vomiting center in the medulla (the base of the brainstem that controls nausea), letting the mom keep food and liquids down.
4. Ondansetron 4 to 8 mg IV or by mouth every 8 hours if pyridoxine-doxylamine is not enough → Ondansetron blocks serotonin receptors (5-HT₃ receptors — docking sites for serotonin, a brain messenger that triggers nausea) in the vomiting center and gut, stopping the nausea signal before it triggers vomiting. This lets the mom eat and drink without throwing up.
5. Metoclopramide 10 mg IV or by mouth every 6 to 8 hours if ondansetron fails or is not safe → Metoclopramide speeds up stomach emptying and blocks dopamine receptors (docking sites for dopamine, a brain messenger) in the chemoreceptor trigger zone (the brain's nausea alarm in the medulla), cutting nausea and helping food move through the gut faster.

Your top priorities at the bedside

1. Give thiamine 100 mg IV or IM before starting any IV fluids that contain dextrose (sugar) — why: Dextrose without thiamine can trigger Wernicke encephalopathy (brain damage) because the brain needs thiamine to use glucose; malnourished patients from vomiting have low thiamine stores already
2. Start IV hydration with normal saline or lactated Ringer solution at 125 to 250 mL per hour, then add dextrose after thiamine is given — why: Severe vomiting causes hypovolemia (low blood volume) and hemoconcentration (thick blood), which reduces blood flow to the placenta and kidneys; dextrose stops ketone production from starvation
3. Check electrolytes (sodium, potassium, chloride, magnesium), kidney function (creatinine, BUN), and urine ketones on admission — why: Vomiting loses stomach acid and causes metabolic alkalosis (the blood turning too alkaline) (blood too basic) and low potassium (hypokalemia) (low potassium), which can cause dangerous heart rhythms; ketones confirm starvation state needing dextrose