

Hyperemesis Gravidarum

A plain-English guide for you and your family

WHAT IS HAPPENING

Early in pregnancy, the placenta (the organ that feeds the baby) pumps out hormones — especially hCG (human chorionic gonadotropin) and estrogen. These hormones help the pregnancy grow, but they also make most moms feel queasy or throw up a little, usually between 6 and 12 weeks. That's normal morning sickness, and it fades by the second trimester. But in hyperemesis gravidarum, something goes wrong with how the mom's brain reacts to these hormones. Scientists think extra-high hCG levels (like with twins or molar pregnancy), a protein called GDF15 made by the placenta, or the mom's own brain chemistry (especially serotonin and dopamine pathways in the brainstem vomiting center) make the nausea signal way too loud. The result: the mom throws up dozens of times a day, can't keep anything down, loses weight fast, and gets dangerously dehydrated. Her blood loses potassium, sodium, and chloride (salts that keep the heart beating right and nerves firing). Her body burns its own fat for fuel and makes ketones (acid waste that piles up in the blood). And if she doesn't get thiamine (vitamin B1) before any sugar goes in, her brain can swell and get permanently damaged — a scary emergency called Wernicke encephalopathy. None of this is the mom's fault or in her head; it's a real, dangerous complication that needs hospital care with IV fluids, anti-vomiting medicine, and close watching until the hormones settle down.

What you might feel

- Severe nausea and vomiting that won't stop (far worse than typical morning sickness)
- Not enough water in the body (dehydration) — dry mouth, dizziness, dark urine, feeling very weak
- Ketones in the urine (ketonuria)
- Body salts out of balance (electrolyte imbalance) — low potassium, low sodium, or low chloride in the blood
- Weight loss — dropping more than 5 percent of body weight from before pregnancy
- Fast heart rate (tachycardia) and low blood pressure
- Very tired and weak, trouble standing or walking

- Increased saliva (ptyalism)

Call the doctor right away if...

- 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)

What the care team will do

- Give thiamine 100 mg IV or IM before starting any IV fluids that contain dextrose (sugar)
- Start IV hydration with normal saline or lactated Ringer solution at 125 to 250 mL per hour, then add dextrose after thiamine is given
- Check electrolytes (sodium, potassium, chloride, magnesium), kidney function (creatinine, BUN), and urine ketones on admission
- Give pyridoxine (vitamin B6) 25 mg by mouth or IV every 8 hours plus doxylamine 12.5 mg every 8 hours as first-line antiemetic (anti-nausea) treatment
- Replace potassium chloride IV if serum potassium is below 3.5 mEq per L, keeping infusion rate at or below 10 mEq per hour through peripheral IV
- Monitor intake and output every shift, daily weights at the same time each morning, and assess mucous membranes and skin turgor every 4 hours
- Keep the patient NPO (nothing by mouth) until vomiting stops for 12 to 24 hours, then advance diet slowly starting with bland crackers or toast
- Administer ondansetron 4 to 8 mg IV every 8 hours or metoclopramide 10 mg IV every 6 hours if first-line treatment fails after 24 hours

Medicines you may be given — and why

Thiamine (vitamin B1)

Thiamine is a vitamin that every cell needs to turn sugar into energy, like fuel for a car. When you vomit so much that you cannot eat for days, your body's thiamine stores run out. If doctors then give you IV fluids with sugar (dextrose) before replacing thiamine, your brain cells try to burn that sugar and use up the last bit of thiamine left — and then they die. This causes

permanent brain damage called Wernicke encephalopathy. Giving thiamine BEFORE or WITH the first sugar-containing IV prevents this disaster.

Intravenous fluids (normal saline or lactated Ringer's solution)

When you vomit many times a day, you lose water and salts (sodium, potassium, chloride) faster than you can drink them back. Your blood volume drops, like a car running low on coolant. Your heart beats faster to try to keep up, your blood pressure falls, and your kidneys cannot filter waste. IV fluids pour water and salts directly into your veins to refill your blood vessels, rehydrate every cell, and restore normal blood flow so your kidneys and heart can work again.

Pyridoxine (vitamin B6) plus doxylamine

Pyridoxine (vitamin B6) helps brain cells make serotonin (a brain messenger that steadies mood and the gut) and GABA (the brain's main calming signal). These messengers quiet the vomiting center in the brainstem. Doxylamine is an antihistamine that blocks histamine H1 receptors (histamine is a wake-up and nausea alarm) in the vomiting center and the chemoreceptor trigger zone. Together they turn down the nausea signals and help the stomach settle.

Promethazine

Promethazine blocks two types of alarm signals that trigger vomiting. It blocks histamine H1 receptors (histamine is a wake-up and nausea messenger) and dopamine D2 receptors (dopamine is another nausea trigger) in the brainstem's vomiting center and chemoreceptor trigger zone. By plugging both receptors, it turns down the volume on the nausea alarm and stops the brain from sending the vomit signal.

Metoclopramide

Metoclopramide works in two places. In the brainstem, it blocks dopamine D2 receptors in the chemoreceptor trigger zone, stopping dopamine from turning on the vomiting reflex. In the stomach and upper gut, it also blocks dopamine receptors that normally slow stomach movement, so the stomach squeezes more strongly and empties faster. Food moves forward instead of sitting and causing nausea.

Ondansetron

Ondansetron blocks serotonin 5-HT3 receptors in the chemoreceptor trigger zone (the brain's nausea alarm) and on vagus nerve endings in the gut. When the gut is irritated or damaged by vomiting, cells release serotonin. That serotonin floods 5-HT3 receptors and screams 'vomit now!' to the brain. Ondansetron plugs those receptors so serotonin cannot deliver the alarm, and nausea stops.

Dimenhydrinate

Dimenhydrinate is a mix of diphenhydramine (an antihistamine) and a mild stimulant. It blocks histamine H1 receptors in the vomiting center and the vestibular system (inner ear balance organs). Histamine is a wake-up and nausea signal; blocking it calms the nausea reflex, especially nausea triggered by motion, dizziness, or inner ear problems.

Methylprednisolone

Methylprednisolone is a synthetic version of cortisol, the body's main stress and inflammation-control hormone. In severe hyperemesis, it is thought to quiet overactive immune and inflammatory signals in the gut lining and brainstem that may be ramped up by pregnancy hormones (like hCG and estrogen). By damping down inflammation and immune activity, nausea and vomiting can decrease. The exact way it works in hyperemesis is not fully understood, but steroids turn down many nausea-causing pathways.

Proton pump inhibitors (omeprazole, pantoprazole, lansoprazole)

Proton pump inhibitors (PPIs) shut down the tiny acid-making pumps in the stomach lining. These pumps (called H⁺/K⁺ ATPase enzymes) normally squirt hydrogen ions (acid) into the stomach. When you vomit a lot, acid splashes up into the esophagus and throat, burning the tissue and worsening nausea. PPIs disable most of these pumps, so the stomach makes 90–95% less acid. Less acid means less heartburn and less acid-triggered nausea.

Enteral nutrition (nasogastric or nasojejunal tube feeding)

Enteral nutrition means giving liquid nutrition through a thin tube placed through the nose down into the stomach (nasogastric, NG) or past the stomach into the jejunum, the middle part of the small intestine (nasojejunal, NJ). This bypasses the mouth and the nausea reflex. Liquid formula (containing protein, carbohydrates, fats, vitamins, and minerals) is dripped slowly into the gut. The gut absorbs the nutrients, delivering the calories and building blocks the mother and baby need to survive when vomiting is so severe that the mother cannot eat by mouth.

Parenteral nutrition (total parenteral nutrition, TPN)

Parenteral nutrition means giving all nutrients — glucose (sugar), amino acids (protein building blocks), lipids (fats), electrolytes (salts), vitamins, and trace minerals — directly into a large vein, completely bypassing the gut. A central IV line (usually a PICC line threaded from the arm into a large vein near the heart) is placed. The nutrient solution is infused continuously or over several hours each day. Nutrients enter the bloodstream and fuel all body cells, preventing starvation, muscle breakdown, and life-threatening deficiencies when the gut cannot be used.

Electrolyte replacement (potassium chloride, magnesium sulfate, sodium phosphate)

When you vomit repeatedly, you lose not just water but also crucial minerals (electrolytes) like potassium, magnesium, chloride, and phosphate. These minerals are essential for life: potassium keeps the heart beating in a steady rhythm and nerves firing, magnesium helps muscles relax and hundreds of enzymes work, chloride balances acid in the blood, and phosphate is part of ATP (the molecule that powers every cell). Replacing these minerals by IV or by mouth corrects dangerous imbalances, prevents heart rhythm problems (arrhythmias), muscle weakness, seizures, and confusion, and lets every cell function normally again.

Where this information comes from

- ACOG Practice Bulletin No. 189, 2018 (Nausea and Vomiting of Pregnancy)
- American Journal of Obstetrics & Gynecology
- UpToDate clinical reference
- Cochrane Database of Systematic Reviews

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