

Hypothyroidism Severe

Myxedema coma needs IV levothyroxine right away. Give IV hydrocortisone to cover the adrenal glands. Keep the patient warm, breathing, and stable. Hunt for the trigger — infection, cold exposure, sedatives, heart attack, or stopping thyroid medicine.

THE ONE-LINE TRUTH

This is a life-threatening drop in thyroid hormone that shuts down the body's engine.

The chain — how it unfolds

1. Thyroid hormone drops to a dangerously low level. — why: The thyroid gland (damaged by autoimmune disease, surgery, or radioactive iodine) can barely make any T4 or T3. A stressor like infection or cold pushes the person over the edge, and now there is almost no thyroid hormone in the blood to keep cells running.
2. Every cell in the body slows down its work. — why: Without thyroid hormone docking onto receptors in the cell nucleus, genes that control metabolism stay turned off. Cells stop burning fuel efficiently, so they make less energy and less heat.
3. Body temperature drops (hypothermia). — why: Cells are not burning fuel to make heat, and the hypothalamus (the brain's thermostat) is also running slow, so it does not trigger shivering or other warming responses. Core temperature falls below 95°F (35°C) and keeps dropping.
4. The heart beats very slowly (bradycardia) and weakly. — why: Thyroid hormone normally keeps the SA node (the heart's natural pacemaker) firing quickly and keeps heart muscle strong. Without it, the electrical signals slow down, the heart muscle contracts weakly, and cardiac output (the amount of blood pumped per minute) drops.
5. Breathing becomes shallow and slow (hypoventilation). — why: The brainstem respiratory centers (in the medulla) are sluggish because of low thyroid hormone, hypothermia, and poor blood flow. The diaphragm and chest muscles are weak. Carbon dioxide builds up in the blood (hypercapnia), and oxygen levels fall (hypoxemia). This can lead to respiratory failure.

6. Sodium level in the blood drops (hyponatremia). — why: The kidneys cannot excrete free water properly because of low cardiac output, and ADH (antidiuretic hormone, also called vasopressin) is released even when it should not be. Water is retained, diluting the sodium in the blood. Also, the cold and slow circulation damage the kidneys' ability to regulate salt balance.
7. Blood sugar falls (hypoglycemia). — why: The liver is not making new glucose efficiently (a process called gluconeogenesis that depends on thyroid hormone), and the adrenal glands may be failing too, so cortisol (which normally keeps blood sugar up) is low. With less fuel in the blood, the brain starts to starve.
8. The person becomes confused, then unresponsive (altered mental status or coma). — why: The brain is cold, low on oxygen, low on sodium, and low on glucose — all at once. Neurons (brain cells) cannot fire properly, so thinking slows, then stops. The person may be drowsy, confused, or slip into a deep coma.

Spot it — what you see, and why

- Puffy face and swollen eyelids: When thyroid hormone (the body's speed-control messenger) runs very low, a thick gel called mucin (a sticky protein mix) piles up under the skin, especially around the eyes and cheeks, making the face look bloated even though it's not water or fat.
- Body temperature drops (hypothermia): Thyroid hormone tells every cell how fast to burn fuel. Without enough, cells slow down and make less heat, so body temperature can drop below 95°F—like turning the furnace way down.
- Heart rate slows way down (bradycardia): Thyroid hormone speeds up the heart's pacemaker cells. When levels crash, the heart beats slowly—often under 60 beats per minute—because those pacemaker cells lose their push.
- Extreme tiredness and confusion (altered mental status): The brain needs thyroid hormone to keep neurons firing quickly and to make enough energy. Severe shortage slows brain activity, so thinking gets foggy, speech slows, and some people slip into a sleepy, confused state or even a coma.
- Very slow reflexes (delayed relaxation phase): Muscles need thyroid hormone to relax quickly after they contract. Without it, the relaxation phase drags out—tap the knee and the leg kicks normally but takes several extra seconds to drop back down, like a slow-motion movie.
- Thick, dry skin and hair loss: Thyroid hormone keeps skin cells turning over and hair follicles growing. When it's very low, old skin cells pile up (making skin thick and rough), sweat glands shut down (making skin dry), and hair follicles go to sleep (so hair thins and falls out, especially the outer third of the eyebrows).

Red flags — act now

- Body temperature below 95°F (35°C) or person feels ice-cold to touch
- Confusion, extreme sleepiness, or won't wake up (myxedema coma)
- Breathing is very slow or shallow, lips turning blue
- Heart rate under 50 beats per minute or blood pressure dropping
- Recent infection, surgery, or missed many doses of thyroid medicine

Treat it — in this order

1. IV levothyroxine (T4) 200–400 mcg loading dose, then 50–100 mcg daily until the person can swallow pills → Replaces the missing thyroid hormone so every cell in the body can burn fuel again, make heat, and speed up. This is the root fix. The heart speeds up, the brain wakes up, and body temperature starts to climb over 24–48 hours. Without this, nothing else will save the person.
2. IV hydrocortisone 100 mg every 8 hours (stress-dose steroids) → Protects the adrenal glands (which sit on top of the kidneys and make cortisol, the body's main stress hormone). When thyroid hormone is replaced suddenly, the adrenal glands must work harder. If they cannot keep up, blood pressure can crash — called adrenal crisis. Hydrocortisone prevents this and also treats hidden adrenal failure that severe hypothyroidism can mask.
3. Slow passive rewarming with blankets and warm IV fluids (37°C normal saline) — avoid aggressive external heat → Brings the core body temperature up gently, usually 0.5–1°C per hour. A body that is too cold can develop dangerous heart rhythms (ventricular fibrillation) if warmed too fast. Passive rewarming keeps the heart stable while thyroid hormone restarts the body's internal furnace.
4. Slow IV fluid replacement with hypertonic saline (3% NaCl) if sodium is very low (below 120 mEq/L) — raise sodium by no more than 6–8 mEq/L in 24 hours → Corrects the diluted blood caused by the kidney holding too much water. Raising sodium slowly wakes up the brain and heart without causing osmotic demyelination syndrome (brain cells swell and burst if sodium rises too fast). Also give IV normal saline to restore blood volume if the person is dehydrated.
5. Find and treat the trigger: check for infection (blood cultures, urinalysis, chest X-ray) and give antibiotics if infection is present; review medications (stop drugs that suppress thyroid like amiodarone or lithium); ask about missed levothyroxine doses or recent surgery, heart attack, or stroke → Removes the reason the thyroid crashed in the first place. Infection (pneumonia, urinary tract infection, sepsis), skipped thyroid pills, surgery, or certain drugs are the most common triggers. Treating the infection or stopping the culprit drug prevents the person from crashing again once thyroid hormone is replaced.

Your top priorities at the bedside

1. Secure the airway and monitor respiratory rate every 15 minutes; keep intubation equipment at bedside — why: Severe hypothyroidism weakens the respiratory muscles and decreases the brain drive to breathe; patients can stop breathing suddenly due to carbon dioxide buildup and need emergency breathing tube placement
2. Place the patient on continuous cardiac monitoring and check vital signs every 15 minutes, watching for a slow heart rate (bradycardia) below 50 and low blood pressure (hypotension) — why: Low thyroid hormone slows the heart rate (bradycardia) and drops blood pressure because the heart muscle contracts weakly; severe a slow heart rate (bradycardia) can lead to cardiac arrest
3. Start passive rewarming with warm blankets and warmed IV fluids to 98.6°F; avoid active heating like warming blankets or hot packs — why: Hypothermia happens because metabolism is too slow to generate body heat; aggressive rewarming dilates blood vessels suddenly and can cause dangerous blood pressure drops and heart rhythm problems