

Intracerebral Hemorrhage

A plain-English guide for you and your family

WHAT IS HAPPENING

Normally, blood vessels inside the brain carry oxygen-rich blood to brain cells without leaking a drop. High blood pressure over years can weaken small arteries deep in the brain until one bursts. In older adults, a protein called amyloid can build up in vessel walls and make them fragile. Sometimes the break is from a tangled knot of abnormal vessels (an AVM), a brain tumor bleeding into itself, or blood thinners keeping the blood too thin to clot. Once a vessel ruptures, blood pours into the brain tissue and forms a clot that grows like a bruise. That clot takes up space, squeezes nearby brain cells, and raises pressure inside the skull. The brain is trapped in a hard skull, so any extra volume—blood, swelling, or fluid—pushes everything inward. You see a sudden, severe headache (the worst of your life), vomiting (pressure on the brainstem's throw-up center), weakness or numbness on one side (the clot crushing the movement or feeling pathways), trouble speaking (if the bleed hits the language area), and worsening drowsiness or confusion (rising pressure squeezing the brain's awake-centers). Every second counts: lower the blood pressure gently to stop more bleeding, reverse blood thinners, watch the pressure inside the skull with close neuro checks or a monitor, and get a CT scan right away to see the bleed. If the clot is large, near the surface, and the brain is starting to shift, neurosurgery may drain it to save the brain. This is not a stroke from a blocked vessel—this is bleeding that destroys brain tissue directly and can kill if pressure is not controlled.

What you might feel

- Sudden weakness or numbness on one side of the body
- Severe headache that comes on suddenly
- Trouble speaking or understanding words (aphasia)
- Sudden vision problems (blurred vision, double vision, or loss of part of the visual field)
- Loss of balance or trouble walking
- Nausea and vomiting
- Confusion or difficulty staying awake (altered level of consciousness)
- Seizures

- High blood pressure (hypertension) at the time of the bleed

Call the doctor right away if...

- Sudden, severe headache described as 'the worst headache of my life'
- Rapid worsening of confusion, weakness, or loss of consciousness
- Seizure in someone with no prior seizure history
- Signs of brainstem injury: trouble breathing, very slow or irregular heartbeat, or pupils that do not respond to light
- Symptoms appearing suddenly in someone taking blood thinners (anticoagulants or antiplatelet drugs)

What the care team will do

- Check airway, breathing, and oxygen saturation every 15 minutes; keep oxygen saturation above 94% and position patient on their side if vomiting or unconscious.
- Measure blood pressure every 15 minutes and notify the provider immediately if systolic pressure is above 140 mmHg; prepare IV nicardipine or clevidipine infusion as ordered.
- Perform full neurologic assessment using Glasgow Coma Scale (eye opening, verbal response, and motor response scores) and NIH Stroke Scale every hour and immediately report any worsening weakness, confusion, pupil changes, or decreased consciousness.
- Elevate the head of the bed to 30 degrees with the neck in neutral midline position and avoid hip flexion above 90 degrees.
- Hold all anticoagulants and antiplatelet drugs and prepare reversal agents: vitamin K 10 mg IV and four-factor prothrombin complex concentrate for warfarin patients, idarucizumab for dabigatran, or andexanet alfa for apixaban or rivaroxaban as ordered.
- Keep the patient calm and quiet; avoid painful procedures without sedation; give sedation as ordered if the patient is agitated; prevent straining with bowel movements by giving stool softeners.
- Monitor for signs of increased intracranial pressure: worsening headache, repeated vomiting, new confusion, decreased consciousness, or Cushing triad (high blood pressure with wide pulse pressure, slow heart rate, and irregular breathing); prepare mannitol 0.25 to 1 gram per kilogram IV or 3% hypertonic saline as ordered.
- Maintain normoglycemia (normal blood sugar) by checking blood glucose every 4 hours and treating levels above 180 mg/dL with insulin; avoid low blood sugar (hypoglycemia) below 70 mg/dL.

Medicines you may be given — and why

Nicardipine

Nicardipine relaxes the smooth muscle cells wrapped around blood vessels so the vessels widen and pressure drops quickly. After a brain bleed, high blood pressure pushes harder on the torn vessel and can make the bleeding worse. Nicardipine is given through an IV and works fast enough to bring systolic pressure down to less than 140 within minutes, which helps stop the bleed from getting bigger.

Clevidipine

Clevidipine works just like nicardipine—it blocks calcium from entering the smooth muscle cells in artery walls, so the arteries relax and blood pressure drops. The difference is that clevidipine breaks down in the blood within minutes, which means you can dial the dose up or down and see the change almost instantly. This ultra-short action makes it easier to hit the exact target pressure (systolic less than 140) without overshooting.

Labetalol

Labetalol blocks two kinds of receptors—beta receptors (which normally speed up the heart and make it pump harder) and alpha receptors (which normally tighten blood vessels). By blocking both, labetalol slows the heart a bit and relaxes arteries, so blood pressure drops. It is given by IV push or infusion and brings pressure down within minutes, helping keep systolic pressure below 140 to reduce the risk of re-bleeding.

Vitamin K (phytonadione)

Vitamin K is a helper molecule the liver needs to finish building four clotting proteins (factors II, VII, IX, and X). Warfarin works by blocking vitamin K, so those clotting factors run low and blood becomes thin. Giving vitamin K by IV lets the liver start making fresh, working clotting factors again. It takes several hours to see the full effect because the liver has to build new proteins, but vitamin K reverses warfarin's blood-thinning over 12-24 hours.

Prothrombin complex concentrate (PCC, four-factor)

PCC is a concentrated mix of the four vitamin-K-dependent clotting factors (II, VII, IX, X) that warfarin depletes. When you give PCC by IV, it instantly replaces those missing factors so the blood can clot normally again within minutes. This emergency reversal is critical after a brain bleed in someone on warfarin, because waiting hours for vitamin K to work means more bleeding and more brain damage.

Idarucizumab

Idarucizumab is a tiny protein designed to grab onto dabigatran molecules in the blood and lock them up so they cannot block thrombin (the enzyme that turns fibrinogen into fibrin clots). Within minutes of giving idarucizumab by IV, dabigatran is pulled out of circulation and the blood can clot normally again. This instant reversal is life-saving for a brain bleed in someone taking dabigatran.

Andexanet alfa

Andexanet alfa is a fake version of factor Xa (one of the clotting proteins). Drugs like rivaroxaban, apixaban, and edoxaban work by blocking real factor Xa. Andexanet acts as a decoy—it soaks up all those Xa-inhibitor molecules so they leave the real factor Xa alone. Once the inhibitors are mopped up, real factor Xa can work again and the blood clots normally within minutes. This reversal is critical for brain bleeds in patients on rivaroxaban or apixaban.

Mannitol

Mannitol is a sugar molecule that stays in the bloodstream and pulls water out of brain tissue by osmosis (water flows toward higher concentration of particles). After a brain bleed, the tissue around the clot swells, and that swelling raises pressure inside the skull. Mannitol draws the extra water into blood vessels, shrinking the swollen brain tissue and lowering intracranial pressure within 15–30 minutes. This buys time to get to surgery or for the swelling to settle.

Hypertonic saline (3% or 23.4% sodium chloride)

Hypertonic saline works just like mannitol—by raising the salt concentration in the blood, it pulls water out of swollen brain tissue through osmosis. The salty blood draws fluid from brain cells into blood vessels, shrinking the tissue and lowering pressure inside the skull. Hypertonic saline can be given as a continuous infusion (3%) or a fast bolus (23.4%) and works within minutes. It is often preferred over mannitol because it does not cause diuresis (extra urination) or dehydration as quickly.

Levetiracetam

Levetiracetam calms overexcited brain cells by binding to a protein called SV2A on the surface of neurons. SV2A helps control the release of neurotransmitters (chemical messengers between nerve cells). When levetiracetam binds SV2A, it slows down the burst of signals that can turn into a seizure. After a lobar (surface) brain bleed, blood and breakdown products irritate the cortex (the brain's outer thinking and movement layer), making seizures more likely. Levetiracetam helps prevent that runaway electrical activity.

Phenytoin

Phenytoin stops seizures by blocking voltage-gated sodium channels on the surface of nerve cells. These channels open when a neuron fires, letting sodium rush in and triggering the next electrical signal. Phenytoin keeps the channels closed longer after each signal, so neurons cannot fire over and over in the rapid, uncontrolled way that causes a seizure. It is sometimes used to prevent seizures after a lobar brain bleed, though levetiracetam is now more common because it has fewer side effects.

Where this information comes from

- AHA/ASA Guideline for the Management of Spontaneous Intracerebral Hemorrhage 2022
- Cochrane Systematic Reviews (acute stroke intervention)
- NEJM clinical review: Intracerebral Hemorrhage
- CDC Stroke Facts and Guidelines

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