

Acute Intracranial Bleed

A plain-English guide for you and your family

WHAT IS HAPPENING

Normally, blood vessels deliver oxygen-rich blood to your brain, and your skull acts like a hard protective helmet. The brain sits in a fixed box that cannot stretch. When a blood vessel bursts—whether into the brain tissue itself (intracerebral bleeding (hemorrhage)), the space around the brain (subarachnoid bleeding), between the skull and outer brain covering (epidural a pooled collection of blood (hematoma), usually from a head injury), or just beneath that covering (subdural a pooled collection of blood, often from a torn vein)—that leaked blood takes up space. Because the skull is rigid, the extra blood squeezes the brain and raises the pressure inside (intracranial pressure, or ICP). Your body tries to help by raising your blood pressure to force blood into the squeezed brain (a reflex called the Cushing reflex), but this can actually make the bleed worse. As pressure climbs, the brain may shift downward (herniation), crushing the brainstem that controls breathing and heart rate. You might see a sudden severe headache, vomiting, confusion, weakness on one side, seizures, unequal pupils, or loss of consciousness. These signs tell us the brain is under dangerous pressure. Emergency treatment focuses on controlling blood pressure to a safe target (usually systolic 140 or lower for most bleeds), reversing blood thinners if you are taking them, and sometimes surgery to remove the blood clot before the brain suffers permanent damage.

What you might feel

- Sudden severe headache
- Nausea and vomiting
- Altered mental status or loss of consciousness
- Weakness, numbness, vision loss, or trouble speaking
- Seizure
- Unequal pupils
- Cushing triad: high blood pressure, slow heart rate, and irregular breathing
- Stiff neck and sensitivity to light
- Abnormal posturing: arms and legs stiffen in strange positions

Call the doctor right away if...

- Sudden thunderclap headache—worst headache of your life, peaks in seconds (classic for burst aneurysm and subarachnoid bleeding (hemorrhage))
- Rapidly declining level of consciousness—person goes from awake to drowsy to unresponsive in minutes to hours
- Unequal or non-reactive pupils—one pupil bigger than the other and doesn't shrink in bright light (sign that brain is shifting and squeezing cranial nerve III)
- Cushing triad: very high blood pressure, slow heart rate, and irregular breathing (brain is about to herniate)
- New seizure or continuous seizure activity that won't stop with first medicine

What the care team will do

- Elevate head of bed to 30 degrees and keep head in midline neutral position without neck flexion or rotation.
- Monitor neurologic status every 15 minutes using Glasgow Coma Scale (GCS, a scoring system for alertness and responses) and check pupil size, symmetry, and reaction to light.
- Maintain strict blood pressure control with continuous IV nicardipine or clevidipine infusion to keep systolic BP below 140 mmHg, checking BP every 5 minutes during titration.
- Keep patient NPO (nothing by mouth) and maintain aspiration precautions with suction at bedside, positioned on side if vomiting.
- Avoid stimulation, keep room quiet and dim, cluster care activities, and prevent Valsalva maneuvers (straining, coughing, bearing down) by giving stool softeners.
- Establish large-bore IV access (18-gauge or larger) and prepare for rapid administration of reversal agents based on home anticoagulant: 4-factor PCC plus vitamin K for warfarin, idarucizumab for Pradaxa, or andexanet alfa for Xarelto or Eliquis.
- Monitor for signs of increased ICP: worsening headache, repeated vomiting, a slow heart rate (bradycardia) with high blood pressure (hypertension) (Cushing reflex), irregular breathing patterns, or sudden agitation followed by lethargy.
- Prepare for emergency head CT without contrast and possible CT angiography, keeping patient on continuous cardiac and oxygen saturation monitoring during transport.

Medicines you may be given — and why

Nicardipine (IV drip)

Blood vessels have rings of muscle wrapped around them like elastic bands. When those muscles squeeze tight, the vessel narrows and blood pressure climbs. Nicardipine blocks tiny

gates called calcium channels on those muscle cells. Without calcium flowing in, the muscles cannot squeeze. They relax, the vessel opens wider, and pressure drops smoothly. This matters in a brain bleed because sky-high pressure can tear more small vessels and make the bleeding worse.

Clevidipine (IV drip)

Clevidipine works exactly like nicardipine: it blocks calcium gates so artery muscles relax and pressure drops. The difference is speed. Enzymes in your blood chop up clevidipine in minutes. Turn off the drip and pressure climbs back in five to fifteen minutes. This makes it easier to steer pressure precisely in an emergency.

Vitamin K (phytonadione, IV or by mouth)

Your liver builds clotting factors—proteins that help blood clot. Four of them (factors II, VII, IX, and X) need vitamin K to finish construction. Warfarin (a blood thinner) blocks vitamin K, so those factors cannot be built. When someone on warfarin has a brain bleed, you give vitamin K back so the liver can restart making factors. This reverses warfarin, but it takes six to twelve hours because the liver needs time to build fresh proteins.

Prothrombin complex concentrate (PCC, Kcentra, Bebulin)

PCC is medicine made from donated blood plasma. It contains the four clotting factors (II, VII, IX, X) that warfarin blocks. When you infuse PCC, you replace those missing factors immediately—within minutes—so blood can clot again. This is critical in a brain bleed because you cannot wait hours for vitamin K to work.

Idarucizumab (Praxbind)

Idarucizumab is a lab-made antibody that grabs dabigatran (Pradaxa, a blood thinner that blocks thrombin, the key clotting enzyme). When idarucizumab wraps around dabigatran molecules in the blood, it locks them up so they cannot block thrombin anymore. Thrombin is free to work again, and blood can clot. The effect happens within minutes.

Andexanet alfa (Andexxa)

Andexanet alfa is a lab-made protein that looks almost exactly like factor Xa (a clotting factor) but has been changed so it cannot actually help blood clot. Blood thinners like apixaban (Eliquis) and rivaroxaban (Xarelto) work by sticking to factor Xa and blocking it. Andexanet acts as a decoy: the drug molecules stick to andexanet instead of the real factor Xa. This frees up real factor Xa to run the clotting cascade, and blood can clot again within minutes.

Platelet transfusion

Platelets are tiny cell fragments that rush to any tear in a blood vessel, stick together, and form a plug to stop bleeding. Antiplatelet drugs like aspirin, clopidogrel (Plavix), or ticagrelor

(Brilinta) disable platelets so they cannot clump. In a brain bleed, giving a bag of donor platelets adds fresh, working platelets to the bloodstream. These new platelets can clump and help seal bleeding vessels. However, studies show platelet transfusion does not clearly improve outcomes in intracerebral bleeding (hemorrhage) and may even raise risk of clots or death, so it is used very selectively—usually only for severe, expanding bleeds or before urgent neurosurgery.

Levetiracetam (Keppra)

Seizures happen when brain cells fire electrical signals out of control. Levetiracetam slows the release of chemical messengers (neurotransmitters) at the connections (synapses) between brain cells. It binds to a protein called SV2A on the tiny bubbles (vesicles) that store neurotransmitters. This makes it harder for the vesicles to dump their cargo all at once, so runaway electrical storms are less likely to start or spread. In brain bleeds—especially lobar intracerebral bleeding (hemorrhage) (bleeding in the outer, cortical part of the brain) and subarachnoid bleeding—the injured tissue and blood touching the cortex can trigger seizures, so levetiracetam is given to prevent them.

Phenytoin (Dilantin) or fosphenytoin (Cerebyx)

Brain cells fire by letting sodium rush in through channels in the cell membrane. Phenytoin slows how fast those sodium channels can reopen after they close. This means a neuron cannot fire over and over in rapid bursts—it is forced to rest longer between signals. That stops the runaway electrical storm of a seizure. Fosphenytoin is a prodrug (inactive form) that the body turns into phenytoin in the blood; it can be infused faster and causes less vein irritation. Both are used to prevent or stop seizures in brain bleeds, especially subarachnoid bleeding (hemorrhage) and lobar intracerebral bleeding.

Mannitol (IV solution, 20% or 25%)

When a brain bleed creates swelling or a clot takes up space, pressure inside the skull rises. If pressure gets too high, the brain is pushed down through the only exit at the skull base (herniation), squashing vital centers that control breathing and heart rate. Mannitol is a sugar alcohol that does not enter brain cells easily. When you infuse it into the blood, it raises the concentration of dissolved particles (osmolality) in the blood vessels. Water inside the swollen brain tissue is drawn out through the blood-vessel walls (osmosis, like water moving toward the saltier side) into the bloodstream. The extra water is then filtered by the kidneys and peed out. Brain tissue shrinks a little, pressure drops, and you buy time for surgery or other treatments.

Hypertonic saline (3% or 23.4% sodium chloride, IV)

Hypertonic saline works on the same principle as mannitol: it raises the concentration of salt (sodium) in the blood, making the blood saltier than the brain tissue. Water is pulled out of

swollen brain cells and tissue into the blood vessels by osmosis. The kidneys remove the extra water. Brain volume shrinks, intracranial pressure drops, and the risk of herniation falls. Hypertonic saline can be given as a continuous drip (3% solution) or as a fast push (bolus) of very concentrated salt (23.4%) for emergency herniation.

Where this information comes from

- AHA/ASA Guideline for the Management of Spontaneous Intracerebral Hemorrhage 2022
- AHA/ASA Guideline for the Management of Aneurysmal Subarachnoid Hemorrhage 2023
- Brain Trauma Foundation Guidelines for the Management of Severe Traumatic Brain Injury 2016
- Neurocritical Care Society

Last reviewed: 2026-07-07