

Intracranial Hemorrhage

A plain-English guide for you and your family

WHAT IS HAPPENING

An intracranial bleeding (hemorrhage) is bleeding inside the skull. Your brain floats in fluid inside a bony box that cannot stretch. Normally, the brain, blood, and fluid balance perfectly—like three roommates sharing one apartment with exactly enough space. When a blood vessel bursts from a head injury, very high blood pressure, a weak bulge in the artery wall (aneurysm), tangled vessels you were born with (arteriovenous malformation), a tumor, or blood that is too thin from medicine, blood spills into a space where it does not belong. That puddle of blood takes up room, squeezes brain tissue, and blocks oxygen. The brain swells like a bruise. You might see sudden terrible headache, confusion, weakness on one side of the body, slurred speech, trouble walking, seizures, or passing out. The body tries to keep blood flowing by raising blood pressure, but that can make the bleeding worse or trigger a second bleed. If doctors do not find the bleed fast with a CT scan, stop any blood thinners, lower dangerously high pressure gently, drain the blood if it is big, clip or coil a burst aneurysm, and watch for swelling, the pressure inside the skull can crush the brain stem—the part that keeps you breathing—and the person can die. Every step is a race to find the leak, stop it, and give the brain room to survive.

What you might feel

- Sudden, severe headache (often called 'the worst headache of my life')
- Nausea and vomiting
- Confusion or trouble staying awake
- Weakness or numbness on one side of the body
- Slurred speech or trouble understanding words
- Seizure
- Stiff neck and pain when bending the head forward
- Vision changes—blurry vision, double vision, or loss of part of the visual field

Call the doctor right away if...

- Sudden, thunderclap headache—the worst headache of your life, peaking in seconds

- Fainting or collapsing, especially right after the headache starts
- Rapidly worsening confusion, sleepiness, or inability to wake someone up
- New weakness, numbness, or paralysis on one side of the face or body
- Seizure in someone with no prior seizure history

What the care team will do

- Check neurologic status every 15 minutes using the Glasgow Coma Scale (a 3-to-15 point scoring system measuring eye opening, verbal response, and motor response), and immediately alert the provider if the score drops by 2 or more points.
- Keep the head of the bed elevated to 30 degrees and the patient's head in neutral midline position, not turned to either side.
- Measure blood pressure every 5 to 15 minutes and titrate IV nicardipine or labetalol to keep systolic pressure between 130 and 150 mmHg, never lowering it faster than 20 mmHg per hour.
- Reverse any anticoagulation immediately: give vitamin K 10 mg IV slow push plus prothrombin complex concentrate 25 to 50 units per kilogram IV for warfarin, idarucizumab 5 grams IV for dabigatran, or andexanet alfa per dosing protocol for apixaban or rivaroxaban.
- Keep the patient NPO (nothing by mouth) and place at aspiration precautions with suction at the bedside, turning the head to the side if vomiting occurs.
- Monitor for seizure activity and keep lorazepam 2 to 4 mg IV at the bedside; pad the side rails and keep the bed in the lowest position.
- Avoid any straining, coughing, or Valsalva maneuvers by giving stool softeners like docusate 100 mg twice daily and controlling pain and nausea with scheduled acetaminophen and ondansetron, not waiting for the patient to ask.
- Prepare for emergency CT scan (computed tomography, a special X-ray showing brain slices) immediately, and have large-bore IV access (18-gauge or larger) in place for possible urgent surgery or transfer to the ICU.

Medicines you may be given — and why

Prothrombin Complex Concentrate (PCC) or Fresh Frozen Plasma (FFP)

Warfarin blocks the liver from making clotting proteins. When a bleed starts in the brain, you need those clotting proteins right away to stop the bleeding. PCC or FFP gives you instant clotting factors—the proteins your blood needs to form a strong clot. Think of it like adding cement mix back into wet concrete so it can harden and seal a crack.

Idarucizumab (Praxbind)

Dabigatran blocks thrombin, the enzyme that turns fibrinogen into fibrin strands to form a clot. Idarucizumab is a special antibody that grabs onto dabigatran molecules like a magnet and locks them up, pulling them out of circulation. Once dabigatran is trapped, thrombin is free again and clotting can restart.

Andexanet Alfa (Andexxa)

Factor Xa inhibitors block factor Xa, an enzyme in the clotting cascade that makes prothrombin turn into thrombin. Andexanet alfa is a decoy—it looks just like factor Xa, so the drug sticks to andexanet instead of the real factor Xa. Once the inhibitor is soaked up by the decoy, your own factor Xa is free to work and clotting restarts.

Vitamin K (phytonadione)

Warfarin blocks the liver from recycling vitamin K, which it needs to make clotting factors. Giving vitamin K by IV or mouth restocks the liver's supply so it can start making clotting factors again. Think of it like refilling the ink cartridge in a printer—the liver can now print clotting proteins. Vitamin K takes hours to work, so it is given alongside PCC or FFP for immediate reversal.

Platelet Transfusion

Antiplatelet drugs like aspirin and clopidogrel block platelets from clumping together to form the first plug at a bleeding site. Transfusing fresh platelets gives the patient a new supply of working platelets that are not blocked by the drug. These fresh platelets can stick to the torn vessel wall and help stop the bleed.

Nicardipine or Labetalol (IV)

After a brain bleed, very high blood pressure can make the bleeding worse by pushing more blood out of the torn vessel. Nicardipine relaxes the smooth muscle in artery walls by blocking calcium channels, widening the arteries and lowering pressure. Labetalol blocks adrenaline receptors in the heart and blood vessels, slowing the heart and relaxing vessels. Both drugs bring blood pressure down in a controlled, smooth way.

Mannitol or Hypertonic Saline (3% or 23.4% NaCl)

A large bleed in the brain takes up space and squeezes the brain tissue, raising pressure inside the skull (intracranial pressure, or ICP). Mannitol and hypertonic saline are very concentrated solutions that pull water out of swollen brain tissue by osmosis—water moves from the tissue into the bloodstream because the blood becomes saltier. This shrinks the swelling and lowers the pressure, protecting the brain from further damage.

Levetiracetam (Keppra)

Blood and clot in the brain irritate the surrounding neurons, making them fire chaotically and trigger seizures. Levetiracetam binds to a protein called SV2A on the surface of nerve terminals, which helps control the release of neurotransmitters (the chemical messengers neurons use to talk). By stabilizing this release, levetiracetam calms overexcited neurons and prevents seizure activity.

Nimodipine

After a subarachnoid bleeding (hemorrhage) (bleeding around the brain from a ruptured aneurysm), blood in the subarachnoid space irritates arteries and causes them to clamp down (vasospasm), starving brain tissue of oxygen. Nimodipine blocks L-type calcium channels in the smooth muscle of these arteries, preventing them from contracting. This keeps the vessels open and preserves blood flow, reducing the risk of stroke from vasospasm.

Where this information comes from

- American Heart Association / American Stroke Association Guidelines for the Management of Spontaneous Intracerebral Hemorrhage (2022)
- American Heart Association / American Stroke Association Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage (2023)
- Neurocritical Care Society
- CDC Stroke Facts

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