Intracerebral Hemorrhage

Spontaneous ICH · Control the pressure, reverse the anticoagulant, stop the expansion

TARGET SBP 140
range 130–150

THE FIRST 60 MINUTES *hematoma expansion is what you are racing*

CONFIRM AND SIZE IT

Non-contrast CT head immediately. Note location (deep, lobar, cerebellar, brainstem), volume, **intraventricular extension**, and midline shift. A **CT angiogram spot sign** predicts expansion and helps identify an underlying vascular lesion.

SCREEN THE COAGULATION

Complete blood count, PT/INR, aPTT, and a careful drug history for **warfarin, DOACs, antiplatelets and heparin**. Anticoagulant-associated ICH expands more and carries worse outcomes, so this determines your next drug.

ASSESS AND ESCALATE

GCS and NIHSS, airway protection if obtunded, and **early neurosurgical and critical care involvement**. **Cerebellar hemorrhage with deterioration, brainstem compression, or hydrocephalus needs surgical evacuation**, not observation.

BLOOD PRESSURE *smooth and sustained beats fast and deep*

Presenting SBP	Approach
150–220 mmHg	**Target SBP 140 mmHg**, maintaining a range of **130–150**, achieved **within 1 hour** of starting treatment and begun **within 2 hours of onset**. Acute lowering in this group is safe and can improve functional outcome.
≥ 220 mmHg	Lower more cautiously. **Avoid dropping SBP by more than 70 mmHg within the first hour.**
Safety limits	**Keep cerebral perfusion pressure ≥ 60 mmHg** at all times, and **avoid reducing SBP by more than 20% in the first 48 hours**, which increases renal adverse events.
How to do it	**Smooth, sustained control with minimal variability** is what reduces hematoma expansion and improves outcome — so use a titratable infusion such as **nicardipine or clevidipine** rather than intermittent boluses, and monitor continuously.

WHY NOT LOWER STILL?

INTERACT2 suggested benefit from intensive lowering, but **ATACH-2** found that targeting **110–139** was **not superior** to 140–179 and caused **more renal adverse events**. The synthesis is a target of 140 with tight variability control, not the lowest achievable number.

REVERSE THE ANTICOAGULANT *agent-specific, and time-critical*

Agent	Reversal
Warfarin / vitamin K antagonist	**Prothrombin complex concentrate** plus **intravenous vitamin K**. PCC works within minutes; vitamin K sustains the reversal, so **both are needed**. Do not rely on fresh frozen plasma, which is slower and volume-heavy.
Dabigatran	**Idarucizumab** — a specific monoclonal antibody fragment giving immediate reversal.
Factor Xa inhibitors rivaroxaban, apixaban, edoxaban	**Andexanet alfa**. Where unavailable, PCC is used as an alternative. Note the timing of the last dose — reversal is most relevant within a few half-lives.
Heparin	**Protamine sulfate**, dosed against the heparin given and the time elapsed.
Antiplatelets	**Platelet transfusion is not recommended** for antiplatelet-associated ICH in patients not undergoing surgery — it was associated with **harm** in trial data. Discuss with neurosurgery if an operation is planned.

EVERYTHING ELSE THAT CHANGES OUTCOME *the supportive bundle*

IN THE FIRST 48 HOURS

Glucose control, avoiding both hypo- and hyperglycemia · **treat fever** · **swallow screen before anything oral** · head of bed at 30° · **seizures treated but not prophylaxed** — prophylactic antiepileptics are not recommended · reverse and withhold anticoagulation · **VTE prophylaxis with intermittent pneumatic compression from day 1**, adding pharmacological prophylaxis once bleeding has stopped.

SURGERY

Cerebellar hemorrhage with neurological deterioration, brainstem compression or hydrocephalus → **evacuate**. **Hydrocephalus** → external ventricular drain. For supratentorial hemorrhage, **craniotomy versus minimally invasive evacuation depends on the center and surgical experience**, with minimally invasive approaches newer and showing promising evidence.

FIND OUT WHY IT BLED *the location usually tells you*

Pattern	Likely cause and implication
Deep basal ganglia, thalamus, pons	**Hypertensive small-vessel disease** — the commonest cause. Implies long-standing uncontrolled hypertension, so long-term blood pressure control is the key secondary prevention.
Lobar cortical / subcortical	**Cerebral amyloid angiopathy** in older patients, especially with microbleeds in a lobar distribution on gradient-echo or SWI sequences. **High recurrence risk**, which strongly influences whether anticoagulation is ever restarted.
Young patient, or atypical site	Consider **vascular malformation, aneurysm, venous sinus thrombosis, tumor, or sympathomimetic drug use**. **Get vascular imaging** — CT or MR angiography, and consider catheter angiography.

RESTARTING ANTICOAGULATION *the question you will be asked on the rounds*

WEIGH IT DELIBERATELY

Balance the **indication** (mechanical valve and recent VTE are high-thrombotic-risk; atrial fibrillation is more nuanced) against the **recurrence risk**, which is **substantially higher in lobar and amyloid-related hemorrhage** than in deep hypertensive bleeds. **Involve the patient and family explicitly** — this is a preference-sensitive decision.

ALTERNATIVES AND TIMING

Where anticoagulation for atrial fibrillation is judged too risky, **left atrial appendage occlusion** may be considered. Antiplatelet therapy carries a lower bleeding risk than anticoagulation. **Timing is individualized** — usually weeks rather than days, guided by repeat imaging, and best decided with neurology and cardiology together rather than unilaterally on discharge.

PEARLS & PITFALLS

- **Do not transfuse platelets for antiplatelet-associated ICH** in a non-surgical patient — it was associated with worse outcomes.
- **Smooth control matters as much as the target.** Wide swings drive hematoma expansion, so use an infusion, not repeated boluses.
- **Cerebellar hemorrhage is a surgical diagnosis.** Deterioration there is not a reason to observe longer.
- **Give PCC and vitamin K together** for warfarin. PCC alone wears off and the INR rebounds.
- **Do not give prophylactic antiepileptics.** Treat seizures that occur; prophylaxis is not recommended.
- **Delay prognostication.** Early do-not-resuscitate orders and withdrawal become self-fulfilling — give full supportive care for at least the first 48 hours before deciding.

References: 2022 AHA/ASA Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage (Stroke, 2022) · INTERACT2 and ATACH-2 trials · PATCH platelet transfusion trial.

Educational aid; verify doses against local protocol and patient factors.

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