



The Medical **Bulletin**

In Neurology

Top 10 take-home messages for the management of patients with spontaneous intra-cerebral hemorrhage guideline

1. The organization of health care systems is increasingly recognized as a key component of optimal stroke care. This guideline recommends development of regional systems that provide initial intra-cerebral hemorrhage (ICH) care and the capacity, when appropriate, for rapid transfer to facilities with neurocritical care and neurosurgical capabilities.
2. Hematoma expansion is associated with worse ICH outcome. There is now a range of neuroimaging markers that, along with clinical markers such as time since stroke onset and use of antithrombotic agents, help to predict the risk of hematoma expansion. These neuroimaging markers include signs detectable by non-contrast computed tomography, the most widely used neuroimaging modality for ICH.
3. ICHs, like other forms of stroke, occur as the consequence of a defined set of vascular pathologies. This guideline emphasizes the importance of, and approaches to, identifying markers of both micro-vascular and macro-vascular hemorrhage pathogenesis.
4. When implementing acute blood pressure lowering after mild to moderate ICH, treatment regimens that limit blood pressure variability and achieve smooth, sustained blood pressure control appear to reduce hematoma expansion and yield better functional outcome.
5. ICH while anti-coagulated has extremely high mortality and morbidity. This guideline provides updated recommendations for acute reversal of anticoagulation after ICH, highlighting use of protein complex concentrate for reversal of vitamin K antagonists such as warfarin, idarucizumab for reversal of the thrombin inhibitor dabigatran, and andexanet alfa for reversal of factor Xa inhibitors such as rivaroxaban, apixaban, and edoxaban.
6. Several in-hospital therapies that have historically been used to treat patients with ICH appear to confer either no benefit or harm. For emergency or critical care treatment of ICH, prophylactic corticosteroids or continuous hyperosmolar therapy appears to have no benefit for outcome, whereas the use of platelet transfusions outside the setting of emergency surgery or severe thrombocytopenia appears to worsen outcome. Similar considerations apply to some prophylactic treatments historically used to prevent medical complications after ICH. Use of graduated knee- or thigh-high compression stockings alone is not an effective prophylactic therapy for prevention of deep vein thrombosis, and prophylactic anti-seizure medications in the absence of evidence for seizures do not improve long-term seizure control or functional outcome.



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7. Minimally invasive approaches for evacuation of supratentorial ICHs and intraventricular hemorrhages, compared with medical management alone, have demonstrated reductions in mortality. The clinical trial evidence for improvement of functional outcome with these procedures is neutral, however. For patients with cerebellar hemorrhage, indications for immediate surgical evacuation with or without an external ventricular drain to reduce mortality now include larger volume (>15 mL) in addition to previously recommended indications of neurological deterioration, brainstem compression, and hydrocephalus.
8. The decision of when and how to limit life-sustaining treatments after ICH remains complex and highly dependent on individual preference. This guideline emphasizes that the decision to assign do not attempt resuscitation status is entirely distinct from the decision to limit other medical and surgical interventions and should not be used to do so. On the other hand, the decision to implement an intervention should be shared between the physician and patient or surrogate and should reflect the patient's wishes as best as can be discerned. Baseline severity scales can be useful to provide an overall measure of hemorrhage severity but should not be used as the sole basis for limiting life-sustaining treatments.
9. Rehabilitation and recovery are important determinants of ICH outcome and quality of life. This guideline recommends use of coordinated multidisciplinary inpatient team care with early assessment of discharge planning and a goal of early supported discharge for mild to moderate ICH. Implementation of rehabilitation activities such as stretching and functional task training may be considered 24 to 48 hours after moderate ICH; however, early aggressive mobilization within the first 24 hours after ICH appears to worsen 14-day mortality. Multiple randomized trials did not confirm an earlier suggestion that fluoxetine might improve functional recovery after ICH. Fluoxetine reduced depression in these trials but also increased the incidence of fractures.
10. A key and sometimes overlooked member of the ICH care team is the patient's home caregiver. This guideline recommends psychosocial education, practical support, and training for the caregiver to improve the patient's balance, activity level, and overall quality of life.

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