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Citation

Authors' objectives
The purpose of this report is to systematically review the available literature in the field of acute stroke evaluation and treatment in the following three areas: (1) what interventions in acute stroke (<24 hours from onset) are effective in reducing morbidity and mortality? (2) how does the safety and effectiveness of these interventions vary by timing in relation to onset of symptoms? (3) what is the evidence that specific systems of care improve outcomes of acute stroke?

Authors' conclusions
Currently, available data do not support a role for surgery in the treatment of acute intracerebral hemorrhage. Results, however, do not preclude benefit from surgery which involves modalities other than those studied in the acute trials (e.g., minimally invasive technologies) or treatment of hemispheric hematoma at very early timeframes. Further, the available literature did not comment on cerebellar hematoma and thus this analysis does not apply to infratentorial hemorrhage.

In spite of potential importance, availability of therapy and ease of administration of antihypertensive agents, very little data exists to suggest that their use is of benefit (or results in harm) in the setting of acute ICH. A similar situation exists regarding glucose management for acute ischemic stroke. Further studies are required in both these areas.

IV thrombolysis with tPA is effective and efficacious for acute ischemic stroke within 3 hours of symptom onset. The effectiveness is strongly linked to time since onset of symptoms with shorter times demonstrating significantly better outcomes. Patient level meta-analysis suggests that treatment may be effective up to 270 minutes with treatment increasing the odds of death beyond 270 minutes. Further work is needed to define the risks and benefits of treatment outside the 3 hour window prior to advocating widespread use in these patients. Intra-arterial therapy remains an option for a subgroup of patients with large vessel occlusions principally in the middle cerebral artery distribution. The evidence for this intervention, however, remains less robust than for IV therapy. Limited data is available regarding patient characteristics predicting outcome. The system changes required to ensure prompt delivery of appropriate therapy are complex and operate on multiple levels. In spite of their critical role, little data exists regarding the efficacy of these interventions and, in particular, the relative efficacy of various components with regard to patient outcomes.

Ultrasound for enhancement of thrombolysis in the setting of MCA occlusion has suggested efficacy in 2 studies and a definitive trial to demonstrate the benefit and risks is required.

CT and MRI imaging for patient selection and prediction of outcome in thrombolysis has yet to be prospectively evaluated. The two included CT studies differ in onset to evaluation time with only a weak correlation between CT changes and outcome seen in the trial enrolling patients from 0-6 hours. Neither study quantified CT changes. The ASPECTS score is an easily quantifiable scoring system for early infarct changes. Retrospective evaluation of the ASPECTS score suggests that values below 7 correlate with poorer outcomes. As CT is widely available this system deserves further exploration. Additional information relevant to treatment decisions may be provided by CT angiography. Occlusion of proximal vessels is associated with higher rates of infarction and thus may influence treatment modalities.

MRI DWI lesions correlate with the presence of infarcts in small cohorts of patients and time to peak measures on early...
scans may correlate with recanalization after IV tPA treatment. These findings require reproduction and further evaluation. The multiplanar abilities and potential for acquisition of multiple parameters are potentially attractive features of this modality and may assist in selecting patients with a greater ratio of benefit to harm in intravenous and intra-arterial treatment paradigms.

The narrow time window for thrombolysis in acute stroke as well as the relationship between time to treatment and outcome has led to the exploration of a number of strategies for optimization of outcomes. Community education programs regarding the symptoms of stroke have not been independently evaluated but rather studied in the context of more comprehensive system changes. Thus it is unclear if these programs are effective in improving patient outcomes. Further exploration is also required regarding the content and targeting of such programs. Descriptions of designated treatment centers have shown the feasibility of this approach but an evaluation of published criteria for and marginal effectiveness of such designations remains to be performed.

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