Scoring Systems for the Differential Diagnosis of Ischaemic and Haemorrhagic Stroke

Stroke is the third commonest cause of death and the commonest cause of adult disability in the developed world. Paradoxically, the problem of stroke will be greater in developing countries over the next 25 years because of changing demography, increasing prevalence of vascular risk factors and health services that are not geared to cope with the predicted stroke epidemic. However, little is known about the epidemiology of stroke or the population needs that should be met in many developing countries. There are no reliable systems to identify the number of patients with stroke, the proportion of patients with different types of stroke, the characteristics of patients who suffer different stroke types, or the outcome in patients with ischaemic or haemorrhagic stroke. Paucity of such information prevents a clear picture of stroke and its consequences from emerging in these settings and hampers the planning of preventive, therapeutic and supportive strategies at the public and individual level.

One of the most important aspects of stroke management is the ability to diagnose stroke and its major types accurately for epidemiological, clinical and research purposes. The diagnosis of stroke is relatively simple; the clinical criteria in the definition are reasonably accurate for determining the presence or absence of stroke. The differentiation of pathological types, on the other hand, cannot be achieved reliably on clinical grounds alone and depends upon the availability of brain imaging facilities. Despite the worldwide emphasis on improving services for stroke patients, neuroimaging facilities are expensive, require considerable infrastructure and are not available universally. This is not a problem unique to rural settings in developing countries; even in developed countries, computed tomography (CT) scan and magnetic resonance imaging (MRI) facilities remain a scarce resource to which patient access is limited in many settings. Hence, the challenge is to develop and validate clinical scoring methods that can accurately differentiate between cerebral infarction and cerebral haemorrhage and guide safe clinical management of patients presenting with stroke-like symptoms. This is particularly important because definitive interventions for patients with cerebral infarction (e.g. thrombolysis, anticoagulation or antiplatelet therapy) have disastrous consequences if administered inadvertently to patients with cerebral haemorrhage.

The clinical scoring protocols by Allen and Poungvarin et al. are based on clinical variables shown to be significantly different for haemorrhagic and ischaemic stroke and are the only ones to have been validated against both post-mortem and CT scan results. Despite the initial enthusiasm for the use of these scores in clinical settings, validation studies across the world have consistently shown that neither score is accurate enough to differentiate reliably between haemorrhage and infarction, even when specificity is sacrificed to achieve optimal cut-off points for sensitivity. In addition, the sensitivity and specificity of both scores vary considerably between studies. Larger studies, mostly in developed countries, report a sensitivity of 31%–70% to detect haemorrhage for the Guy’s score and 48%–68% for the Siriraj score. Smaller studies from developing countries report greater accuracy, but still show the possibility of a wrong diagnosis in over 20% of patients assessed by these
Despite its complexity, the Guy’s hospital score (13 variables) correlates very closely with the simpler Siriraj score (5 variables) and is not superior in differentiating between haemorrhage and infarct. The Siriraj score, on the other hand, may have the advantage of being simpler to administer in clinical settings.

The variability between different studies in the diagnostic accuracy of either score reflects not only differences in settings in which these studies were undertaken (teaching hospitals, community registers, rural populations) but also differences in the time of assessment from stroke onset and methods of clinical assessment between these settings. The diagnostic ability of these scoring systems is also affected by inherent weaknesses in the scores themselves, the major one being the lack of formal definitions for some variables included in the scores. For example, both scores lack any method for assessing the level of consciousness despite this being one of the most important weighting factors in both protocols. Many patients who have small haemorrhages will score zero for ‘apoplectic onset’ on both scores. Low overall scores on both systems are biased towards the diagnosis of infarction (misclassification of small haemorrhages). On the other hand, both methods tend to classify severe strokes as haemorrhagic and hence underestimate the number of patients with large infarcts. Because of these limitations, neither score has a role as a diagnostic screening procedure for therapeutic trials or epidemiological studies and there is extreme concern about their use in guiding decisions regarding treatment in ordinary clinical practice.

All current evidence suggests that neuroimaging is the only reliable investigation for the diagnostic evaluation of the type of stroke. The evolution of interventions to treat acute infarction or haemorrhage (e.g. thrombolysis, clot evacuation, surgical recanalization) in recent years has resulted in neuroimaging strategies playing an increasingly important role in the initial evaluation of stroke patients. Many specific techniques—MRI, CT, positron emission tomography, single photon emission tomography, catheter angiography and ultrasound imaging—have been developed and are available for mainstream use. It is now possible to gain early and reliable information on tissue viability (e.g. size, location, vascular distribution, degree of reversibility of ischaemic injury and presence of haemorrhage), vessel status (site and severity of stenoses and occlusions) and cerebral perfusion (size, location and severity of hypoperfusion). In an ideal world and in the not-so-distant future, it will be possible to use objective neuroimaging methods to identify the best candidates for early intervention and guide both immediate and long term treatment decisions for stroke.

Despite optimism in the professional literature, there will continue to remain a gap between what is possible and what can be implemented for widespread use in clinical practice. It is likely that, when resources are limited, CT scanning will be undertaken to assist the diagnosis when the clinical presentation is atypical or haemorrhage is suspected. Clinicians may not request a CT scan when the clinical signs are strongly suggestive of an ischaemic stroke. In populations largely of Caucasian descent, the implications of the inaccuracy occurring with clinical scoring techniques may be minimal due to the relatively high proportion of ischaemic stroke. This may not be true for other populations where the proportion of patients with haemorrhagic stroke is higher, or the relative proportions of different stroke types unknown. Classification errors work both ways: they may prevent the use of a useful therapy for a particular type or they may allow potentially lethal treatments to proceed.

Expensive, cutting-edge diagnostic facilities may never be available, and probably not be necessary, at all levels of healthcare. It would make sense to develop these facilities at specialist centres with transparent and equitable routes of referral from peripheral hospitals and clinics. Such a strategy will make economic sense and provide the critical mass of appropriate patients and trained specialists to develop practice and research in stroke. However, this does not mean that stroke patients who do not live close to such centres or cannot afford access to these facilities are relegated to ‘second class’ care with inadequate investigations and suboptimal care.
reality is that a high proportion of patients with stroke will be old and the vast majority will be treated at peripheral centres, especially in a country like India, where most of the population still lives in rural areas. It becomes the duty of professional bodies and health planners to ensure that doctors at such centres have access to adequate neuroimaging facilities, at least CT scanning, which will help them to provide appropriate care to their patients.

The costs of adequate and appropriate investigations in stroke patients are high; the costs of failure to investigate and inappropriate treatment may be even higher. Stroke causes not only prolonged illness but also long term disability which affects individuals, families and national productivity. It is for the society and healthcare system as a whole to decide the price it is willing to pay to reduce the burden of stroke.

REFERENCES


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