Health policy and health outcomes research are closely linked covering the field of research that studies the impact of health care on patients and populations using a whole range of outcomes including mortality, physical and psychological impairment, participation, quality of life and health economics. This article reviews articles and policy documents published over the last year that cover issues that are of relevance to healthcare planners and those interested in the impact of stroke on both populations and individual patients.

**Burden of Stroke**

Any planning process for health development ought to be based on a thorough understanding of the health needs of the population. Although the impact of stroke has been well documented in developed countries with several well conducted population-based epidemiological studies, less is known about the disease in developing countries. An estimate of the global burden of disease suggests that the top 3 causes of death globally are ischemic heart disease (7.2 million deaths), stroke (5.5 million) and lower respiratory diseases (3.9 million) of a total of 56 million deaths. The leading causes of disability adjusted life years (DALY) are those that affect predominantly younger patients such as perinatal conditions (7.1% of global DALY), lower respiratory infections (6.7%), and diarrheal diseases (4.7%). Ischemic heart disease and stroke rank sixth and seventh, respectively, as causes of global disease burden. It is therefore a common misperception that stroke is predominantly a disease of developed countries.

Given that it is the second most frequent cause of death in developing countries (compared with the third in developed countries), it is disappointing that very little has been published addressing how effective stroke care can be delivered in countries with low per capita income. One article of interest reports on stroke prevention, treatment, and rehabilitation in Sub-Saharan Africa. The risk factors for stroke are largely the same as in developed countries with hypertension being the most important treatable cause. Population-based health education programs and appropriate public health policy coupled with high-risk strategies targeting hypertensive persons and stroke patients must be developed in the same way as they have been in many developed countries.

The authors call for a broad partnership of key players, innovative funding mechanisms, and increased national and international commitment for the prevention and control of stroke in Sub-Saharan Africa and other developing countries. Not only is more information needed on epidemiology and effective treatment strategies of stroke in developing countries, but with increasing mobility of populations the impact of migration on disease incidence also becomes important. It has been reported before that black populations living in the US and the UK have a higher incidence of stroke than their white counterparts. A recent article, however, shows that the risk of stroke in black Caribbeans is higher in South London than Barbados with the risk in Barbados approaching that in the white population in South London, suggesting that migration can increase susceptibility to stroke. Further research on the genetic and environmental factors that result in this dramatic change in incidence is needed to explain and indicate how it can be prevented.

**The Economic Burden of Stroke**

A number of recent studies have reported the high cost of stroke. The National Audit Office in England produced data suggesting the annual cost to the nation as being £7 billion with £2.6 billion attributed to direct health costs. Modeling the impact of improving the quality of care by increasing the proportion of patients managed in stroke units, increasing thrombolysis rates and improved prevention showed that very significant savings could be made in the longer term by investing in prevention, acute care and rehabilitation. Similar calculations have been made in Australia and the Netherlands that has estimated the potential for a 13% reduction by the introduction of a nationwide specialist stroke care model, even in the context of a projected increase in the burden of stroke attributable to the ageing population. Differences in the projected costs of stroke between ethnic groups in the US over the next 50 years also indicate the need to target initiatives to improve stroke prevention and treatment at high-cost groups. The per capita cost of stroke is highest in blacks ($25 782), followed by Hispanics ($17 201) and non-Hispanic whites ($15 597). Loss of earning is expected to be the highest cost contributor in each race-ethnic group. An exactly similar situation has been described among the American Indians and Alaska Natives where the rates of heart
disease and stroke are now higher than in the general US population. A German study projects the costs of stroke to increase significantly until 2025 because of increasing incidence and healthcare costs with lifetime costs being higher in men than women. The unifying messages in all these articles are the importance for healthcare planners to invest in stroke prevention targeted at high-risk groups and the provision of specialist acute and rehabilitative stroke care for all.

Setting Standards
Eleven years ago a pan European consensus meeting on stroke management was held in Helsingborg, Sweden to examine the latest evidence and set targets for 2005. The resulting Helsingborg declaration was published in 1996 and set out a strategy for developing stroke services over the ensuing 10 years. In March 2006, the second consensus conference was held and the targets set for 2015. This document published on the WHO Europe website is remarkably similar to the 1st Helsingborg declaration and covers 5 aspects of stroke management, organization of stroke services, acute stroke, prevention, rehabilitation and evaluation of stroke outcome and quality assessment. Perhaps the most important target set in Helsingborg is that all patients in Europe with stroke will have access to a continuum of care for organized stroke units in the acute phase to appropriate rehabilitation and secondary prevention measures by 2015. Many of the recommendations could be achieved with little additional financial resource and just a little political commitment. However, it is difficult to know how much effect such documents have, particularly where some targets seem optimistic even in the most well resourced European health economies let alone in countries currently struggling to provide basic healthcare. The value is perhaps in raising the political profile of stroke, providing healthcare planners with a template on which to develop services, and giving an international framework for measuring how effectively stroke management is developing. A “bill of rights” for stroke services, acute stroke, prevention, rehabilitation and evaluation of stroke outcome and quality assessment. Perhaps the most important target set in Helsingborg is that all patients in Europe with stroke will have access to a continuum of care for organized stroke units in the acute phase to appropriate rehabilitation and secondary prevention measures by 2015. Many of the recommendations could be achieved with little additional financial resource and just a little political commitment. However, it is difficult to know how much effect such documents have, particularly where some targets seem optimistic even in the most well resourced European health economies let alone in countries currently struggling to provide basic healthcare. The value is perhaps in raising the political profile of stroke, providing healthcare planners with a template on which to develop services, and giving an international framework for measuring how effectively stroke management is developing. A “bill of rights” for stroke rehabilitation in Canada has been developed by a group of physicians that would be equally applicable internationally, and quality standards for acute stroke care have been produced by the German Stroke Registers Study Group.

Most developed countries can expect to have to provide significantly more care for stroke patients over the next generation because of the ageing population. A report from Taiwan suggests that current policy is inadequate to cope with the predicted demand and recommends enhancement of community services and education of family caregivers. Provision of increasing numbers of long-term care facilities may not be the answer because another study from Taiwan reports higher mortality rates than expected, even accounting for case mix, in patients institutionalized after stroke.

Overcoming Deficits in Stroke Management and New Models for Stroke Care
One of the major barriers to the development of specialist care for all patients is the shortage of professional expertise. For example, provision of acute care able to deliver thrombolysis safely outside of specialist centers, particularly in rural areas, is a major challenge for all current health systems. One option to overcome the problem is the use of telemedicine. A number of articles have been published in 2006 describing the successful and cost-effective implementation of telemedicine networks. Technology may provide the solution for one of the major recommendations of the Helsingborg Consensus statement that previously looked excessively optimistic.

Introduction of financial incentives for primary care physicians in the UK to improve the quality of stroke care, particularly for secondary prevention, is an experiment that has been watched by many with interest. Payments are made according the proportion of patients achieving target blood pressure levels, lipid concentrations, delivery of advice and support for smoking cessation and use of antiplatelet and anticoagulation medication. Initial results suggest major improvements in the recording and management of quality indicators among patients with stroke with absolute increases for individual indicators ranging from 32% to 52%. However, the system has not yet fully resolved the problem of inequitable care. The biggest improvements in management were seen in the most affluent patients, and women lagged behind men in several aspects of care.

Delivery of safe anticoagulation to patients at high risk of stroke remains a problem with audits showing low percentages of appropriate patients receiving anticoagulation and those that do too often receiving inadequate treatment. A pharmacoeconomics study confirms that treatment with warfarin is cost-effective in patients with atrial fibrillation at moderate-to-high risk of stroke. Failure to maintain optimal anticoagulation places patients at risk of complications, the management of which is a significant cost driver. One way of improving the quality and therefore perhaps reducing the cost of anticoagulation may be to increase the skills of the team delivering care. This has been tested in a scheme in the US comparing usual care (nonspecialist) with treatment provided by dedicated anticoagulation professionals. Using Semi-Markov modeling the specialist model appeared to cost less and provide greater effectiveness than usual care.

Reducing the cost and risks associated with investigation of carotid stenosis could be achieved by replacing intra-arterial angiography with less invasive tests but only if there are sufficient radiologists trained in carotid imaging and services are organized to provide early assessment after transient ischemic attack. In patients investigated late after transient ischemic attack, test accuracy is crucial because patients with 50% to 69% are less likely to benefit from surgery and there may therefore still be a need for the gold standard test.

Measuring Quality of Life
Measurement of quality of life after stroke is fraught with difficulties, particularly where the patients have problems with communication. Resort is therefore often made to a family proxy. An important article examines the correlation between patient and family proxy health-related quality of life (HRQL) responses in 225 patient-proxy pairs enrolled in a trial for poststroke depression. Proxies systematically reported more dysfunction in multiple aspects of HRQL than stroke patients themselves. Agreement between patient and
proxy HRQL scores were low with differences that may be large enough to impact the outcome assessment in stroke clinical trials. At the very least it is clear that trials reporting proxy data should make it clear the extent to which such data are used. Further difficulties in interpreting HRQL data has been identified in a study examining outcomes in a multiracial population of noninstitutionalized stroke survivors. Significant disparities were found between racial and ethnic groups with Hispanics and black patients having lower HRQL scores than whites. Whether this truly reflects differences in outcome or signifies a weakness of the instrument is uncertain.

**Comments**

Many countries have made huge progress in improving stroke care over the last 10 years. Health policy and outcomes research has contributed to the fact that stroke has risen up the political and clinical agenda. However, for many patients worldwide research evidence has yet to be translated into clinical practice, and patients are dying needlessly and surviving with unnecessary disability. The greatest challenge for health policy must be to translate the ideal to the practical and then implementing the policy to reach the largest number of patients.

**Disclosures**

None.

**References**


