Setting up new medical services

Developing comprehensive stroke services: an evidence-based approach

Peter Langhorne

Summary
The recent interest in the development of services for stroke patients reflects an increasing optimism about stroke management and the recognition that properly organised care can improve outcomes after stroke. A comprehensive stroke service should provide early assessment and investigation of stroke disease in both in-patient and out-patient settings, acute care for stroke in-patients to manage their medical and surgical problems, and rehabilitation for patients with persisting functional problems. Other components may include out-patient, day hospital or domiciliary rehabilitation facilities and continuing care and support facilities for patients discharged from hospital. This article discusses the evidence to support different components of a comprehensive stroke service and emphasises the need for flexible approaches to different local conditions.

Keywords: stroke services, stroke unit, stroke outcome

Stroke patients: requirements
<p><i>mild stroke/TIA</i></p> <ul style="list-style-type: none"> • diagnosis and assessment • advice • secondary prevention <p><i>moderate/severe stroke</i></p> <ul style="list-style-type: none"> • acute medical/surgical care • multidisciplinary assessment/rehabilitation • secondary prevention <p><i>devastating stroke</i></p> <ul style="list-style-type: none"> • diagnosis and assessment • terminal care

Box 1

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Stroke disease is the third commonest cause of death, and commonest cause of adult disability in the UK.¹ Stroke also presents a major healthcare cost, consuming about 5% of the National Health Service budget.² Despite this, services for stroke patients have traditionally been fragmented, haphazard, poorly tailored to patients' needs, and lacking in evidence of effectiveness.³ More recently there has been renewed interest in stroke services and stroke disease has been made a priority target in the UK Government's Health of the Nation initiative.⁴ This recent interest in stroke care reflects the increasing realisation that the therapeutic nihilism which previously surrounded stroke care is now unjustified and there are several aspects of stroke management which have good evidence of effectiveness.

This article outlines briefly the types of problems experienced by stroke patients; these dictate the key requirements of a comprehensive stroke service. The evidence supporting various components of stroke services will then be discussed, as will some more novel approaches to stroke care.

What are the needs of stroke patients?

Stroke disease can result in a wide variety of outcomes. Before discussing the components of a comprehensive stroke service, it is important to consider the requirements of different stroke patient groups (box 1).⁵ The priorities for an individual who has suffered a transient ischaemic attack or minor stroke with no residual disability are to obtain an accurate diagnosis, appropriate advice and counselling, and to institute effective secondary prevention measures. Patients with significant residual disability following stroke are likely to require acute medical care and a few will need neurosurgical intervention; this should be followed by multidisciplinary assessment and rehabilitation. Secondary prevention measures are also relevant for the majority of these patients. A small number of individuals who suffer a devastating stroke (usually resulting in prolonged unconsciousness) require an accurate diagnosis and appropriate terminal care. Most of the randomised trials of the effectiveness of stroke services have focused on patients in the moderate/severe severity group.

What are the key components of a comprehensive stroke service?

The key components of a comprehensive stroke service follow logically from the requirements of a stroke patient and are outlined in figure 1. These components are:

- Fast-track out-patient assessment (neurovascular/cerebrovascular clinic) for the prompt assessment and investigation, initiation of secondary prevention, and follow-up of patients not admitted to hospital.
- An acute stroke assessment area for the admission of patients to assess and manage their acute medical problems and to identify those needing neurological intervention.
- A stroke rehabilitation unit for patients with persisting functional problems.
- Out-patient rehabilitation facilities (usually clinic, day hospital or domiciliary) for patients who do not need admission to hospital, and for follow-up of disabled patients discharged from hospital.
- Continuing care for severely dependent patients (both institutional and in the community).
- Close links with primary healthcare, social services, and the voluntary sector.

The comprehensive stroke service outlined in figure 1 could cope with a range of different patient needs. Variations on this approach may be justified; eg, smaller hospitals, with smaller numbers of stroke patients, may consider incorporating a neurovascular clinic within a broader vascular assessment clinic (although it is important that some specialist interest and expertise exists in the differential diagnosis of transient ischaemic attacks). In-patient care could also follow several

*Neurosurgical care usually provided in separate specialist unit

Figure 1 Outline of a comprehensive stroke service. Modified from Dennis and Langhorne.⁵

different models. In some cases, stroke units have incorporated both acute assessment and rehabilitation within the same ward,⁶ whereas others describe a system where the rehabilitation unit is separate from acute stroke care.⁵

Evidence for effectiveness of services

The discussion so far has outlined a ‘common sense’ approach to the development of services based on the widely recognised needs of stroke patients. However, what evidence exists to suggest that these services are indeed effective? To date there has been no adequate evaluation of a complete stroke service because no randomised controlled trial has been carried out and non-random comparisons of services are subject to major bias.⁷ However, it is possible to examine the evidence supporting different components of such a service. For the purposes of this review, all available and relevant randomised controlled trials have been identified through a variety of systematic literature search strategies.⁸

Neurovascular/cerebrovascular clinic

No randomised trials have examined the effectiveness of a neurovascular clinic but there is compelling evidence to support many components of such a service. Firstly, the differential diagnosis of transient ischaemic attacks can be very difficult¹ and so specialist interest in stroke disease is desirable. Secondly, patients who have suffered a minor stroke or transient ischaemic attack, even if they are not admitted to hospital, require urgent assessment for the prevention of future stroke. The risk of a more serious stroke is highest in the weeks immediately following a transient ischaemic attack with an overall risk of 12% in the first year.⁹ Thirdly, fast-track assessment clinics enable selection of patients who require rapid access to specialist investigations such as cranial computed tomography (CT) scanning, carotid Doppler ultrasound and echocardiography. Finally, good evidence is available regarding the effectiveness of several secondary prevention measures; antiplatelet therapy,¹⁰ anticoagulation in atrial fibrillation,¹¹ and carotid surgery for severe carotid artery stenosis.¹² For these reasons a fast-track assessment clinic with specialist interest in stroke disease and rapid access to investigations is clearly advisable (boxes 2 and 3).

Reasons for specialist fast-track assessment clinic

- many patients do not require in-patient care
- complex differential diagnoses
- greatest risk of stroke recurrence early after stroke/TIA
- specialist investigation requirements
- effective secondary prevention available

Box 2

Secondary prevention measures

- risk factor modification
- antiplatelet therapy
- anticoagulation for atrial fibrillation
- carotid endarterectomy for severe, symptomatic, carotid artery stenosis

Box 3

Figure 2 Statistical overview of 11 randomised trials. Results are expressed as the odds ratio (99% confidence interval) of a poor outcome in a stroke unit versus general medical ward care. An odds ratio of <1 indicates an improved outcome in the stroke unit group. The diamonds represent the summary odds ratio and confidence interval for a group of trials. Adapted from Stroke Unit Trialists' Collaboration⁸

In-patient acute assessment area

There is no direct evidence on the effectiveness of an acute in-patient stroke area but there is a consensus¹³ that in-patients with acute stroke should receive rapid assessment and diagnosis, appropriate urgent investigations, skilled nursing care, and secondary preventive therapy. Acute stroke assessment areas have been evaluated in trials of stroke units which combined both acute care and subsequent rehabilitation.^{6,14–17} The main rationale for this combined approach is that it makes the introduction of assessment protocols easier, allows skills to be focused, and facilitates large randomised trials of acute stroke treatments.⁵ Alternatively it can also be argued that, although rehabilitation should start as soon as possible after the stroke, some patients are initially more appropriately cared for in an acute medical ward than in one where the emphasis is on rehabilitation.⁵ The model adopted in different areas is likely to reflect local needs, resources, geography, and politics. To date no randomised controlled trials of stroke intensive care units have been published and so it is not possible to comment on their effectiveness.

Stroke unit/stroke rehabilitation unit

This component of stroke care now has overwhelming evidence of effectiveness. Stroke patients who receive specialist in-patient care in a stroke unit have a greater chance of surviving and returning home than those receiving the conventional care in general medical wards.^{8,18} Figure 2 outlines the main evidence currently available in the form of a statistical overview. Although these results are very encouraging they raise two broad questions regarding stroke units:

What kind of stroke unit is effective?

The stroke unit overview included a diverse group of studies evaluating a range of different types of stroke unit, all of which included some component of rehabilitation. Trends towards improved outcomes were observed in a variety of different trials and at present there is no evidence that one particular approach to stroke unit care is more effective than any other providing they include a significant component of rehabilitation. Although mixed rehabilitation units (caring for other disabling illnesses as well as stroke) also showed benefit (figure 2), there are good reasons to believe that focusing care and expertise within dedicated stroke wards may be the optimal model.⁵

What are the characteristics of an effective stroke unit?

Effective stroke unit care appears to be best distinguished from conventional care in general medical wards by the presence of multidisciplinary team care co-ordinated through regular (weekly) meetings, nursing expertise in rehabilitation, physician interest in stroke, routine involvement of carers in the rehabilitation process, routine staff training in stroke, and routine provision of information to patients and carers.¹⁹ These characteristics were observed within a variety of different stroke unit models and can help inform the debate on how best to organise a stroke unit (box 4).

A previous article has discussed practical aspects of stroke unit care.⁵

Out-patient rehabilitation (box 5)

There have been relatively few randomised controlled trials examining the effectiveness of out-patient rehabilitation after stroke. Most of these have recruited patients who had been previously admitted to hospital. Broadly speaking the trials have addressed one of two questions.

Is out-patient rehabilitation effective?

Two high-quality randomised trials have addressed this question. The Northwich Park study²⁰ examined out-patient physiotherapy and occupational therapy in patients recently discharged from hospital, while the Oxford Study²¹ evaluated out-patient physiotherapy provided late after stroke. In both trials, small but statistically significant improvements in functional abilities were recorded and there was reasonably convincing evidence that functional decline was prevented. Both trials studied a selected patient population. Thus, there is reasonably good evidence that out-patient therapy can improve outcomes but questions remain regarding the clinical significance of this effect, and which patients are likely to gain most benefit.

Characteristics of stroke unit

- co-ordinated rehabilitation – multidisciplinary with involvement of carers
- specialist interest in stroke disease and rehabilitation
- training and education programmes for both staff and carers

Box 4

Out-patient rehabilitation

- can improve functional outcomes and prevent deterioration
- unclear which patients benefit and to what degree
- unclear which setting (eg domiciliary, day hospital) is more appropriate

Box 5

Novel stroke service models

- specialist acute home care teams
- early supported discharge schemes
- advice/counselling services: stroke family support worker, liaison health visitor, counsellor

Box 6

Should out-patient rehabilitation be provided in a hospital or domiciliary setting? Two randomised trials have compared domiciliary and hospital-based rehabilitation in stroke patients recently discharged from hospital. The results of these trials have recently been combined²² with the conclusion that, within a selected group of stroke patients, domiciliary rehabilitation is marginally more effective and less expensive, at least in an urban setting. It seems likely that those patients who require only physiotherapy may be best treated within their own homes, whereas those with complex needs requiring multidisciplinary follow-up are likely to require hospital-based services (eg, day hospital).

Future stroke service developments

Previous sections have outlined some relatively conventional aspects of stroke care and the evidence for their effectiveness. This final section introduces and discusses some more novel approaches to stroke service development (box 6).

Specialist acute home care

The rationale for specialist home care stroke teams is that many stroke patients would not require admission to hospital if appropriate support and rehabilitation could be provided in a domiciliary setting. To date, only one non-randomised, controlled clinical trial has evaluated a specialist home-care team,²³ which was compared with conventional care. The patient group with access to the home-care team showed non-significant reductions in the frequency of death, institutionalisation, and disability, but there was no associated reduction in hospital bed use. As a result the home-care team was more expensive than conventional care without clear evidence of improved outcomes. This model of care should still be considered experimental and is currently being evaluated in at least one randomised controlled trial.

Early supported discharge schemes

It has been proposed that early supported discharge schemes, by providing support and/or rehabilitation in the home, may speed-up discharge from hospital and reduce in-patient costs. Several randomised controlled trials are currently underway and results are not yet available, and for this reason this model of care must also be considered experimental. Comparable trials in a geriatric medical setting²⁴ suggest favourable results.

Advice/counselling services

It has been recognised for some time that conventional stroke services focus on functional recovery and may neglect the psychosocial aspects of rehabilitation.²⁵ For this reason it has been suggested that relief of stroke-related disability and handicap could be achieved through advice and counselling interventions. Randomised trials of social work intervention,²⁶ social support interventions,²⁷ and counselling/education,²⁸ have shown some promise but further evaluation is required. Several randomised trials are currently evaluating a stroke liaison officer/liaison health visitor/family support worker and results should be available in the next two or three years.

Conclusion

In summary, most of the direct evidence on the effectiveness of stroke services concerns specialist in-patient (stroke unit) care, secondary prevention, and some aspects of out-patient rehabilitation. However, a lot of work is currently underway in evaluating other aspects of stroke services and much more information should be available in the next five years. Until then, stroke service development should focus on offering rapid access to assessment and diagnostic facilities, and specialist multidisciplinary rehabilitation.

1 Warlow C. Disorders of the cerebral circulation. In: Walton J, ed. *Brain's diseases of the nervous system*, 10th edn. Oxford: Oxford University Press: 1993.

2 Isard PA, Forbes JF. The cost of stroke to the National Health Service in Scotland. *Cerebrovasc Dis* 1992; 2: 47–50.

3 King's Fund Consensus Conference. Treatment of stroke. *BMJ* 1988; 297: 128.

4 Secretary of State for Health. *The health of the nation*. London: HMSO, 1991. (Cm 1523).

5 Dennis M, Langhorne P. So stroke units save lives: where do we go from here? *BMJ* 1994; 309: 1273–7.

6 Indredavik B, Bakke F, Solberg R, Rokseth R, Haaheim LL, Holme I. Benefit of stroke unit: a randomised controlled trial. *Stroke* 1991; 22: 1026–31.

7 Gompertz P, Pound P, Briffa J, Ebrahim S. How useful are non-random comparisons of outcomes and quality of care in purchasing hospital stroke services? *Age Ageing* 1995; 24: 137–41.

8 Stroke Unit Trialists' Collaboration. A systematic review of specialist multidisciplinary (stroke unit) care for stroke inpatients. In: Warlow C, Van Gijn J, Sandercock P, eds. *Stroke module of the Cochrane Database of Systematic Reviews*. London: BMJ Publishing Group, 1995.

- 9 Dennis M, Bamford J, Sandercock P, Warlow C. Prognosis of transient ischaemic attacks in the Oxfordshire Community Stroke Project. *Stroke* 1990; 21: 848–53.
- 10 Antiplatelet Trialists' Collaboration. Collaborative overview of randomised trials of antiplatelet therapy. I: Prevention of death, myocardial infarction and stroke by prolonged antiplatelet therapy in various categories of patients. *BMJ* 1994; 308: 81–106.
- 11 EAFT (European Atrial Fibrillation Trial) Study Group. Secondary prevention in non-rheumatic atrial fibrillation after transient ischaemic attack or minor stroke. *Lancet* 1993; 342: 1255–62.
- 12 European Carotid Surgery Trial Collaborative Group. Medical Research Council European Carotid Surgery Trial: Interim results for patients with severe (70–90%) or with mild (0–30%) carotid stenosis. *Lancet* 1989; 1: 175–80.
- 13 Dennis M, Warlow C. Strategy for stroke. *BMJ* 1991; 303: 636–8.
- 14 Garraway WM, Akhtar AJ, Hockey L, Prescott RJ. Management of acute stroke in the elderly: preliminary results of a controlled trial. *BMJ* 1980; 280: 1040–4.
- 15 Wood-Dauphinee S, Shapiro S, Bass E. A randomised trial of team care following stroke. *Stroke* 1984; 5: 864–72.
- 16 Strand T, Asplund K, Eriksson S, Hagg E, Lithner F, Wester PO. A non-intensive stroke unit reduces functional disability and the need for long-term hospitalisation. *Stroke* 1985; 16: 29–34.
- 17 Kaste M, Palomaki H, Sarna S. Where and how should elderly stroke patients be treated: a randomized trial. *Stroke* 1995; 26: 249–53.
- 18 Langhorne P, Williams BO, Gilchrist W, Howie K. Do stroke units save lives? *Lancet* 1993; 342: 395–8.
- 19 Stroke Unit Trialists Collaboration. What is a stroke unit? A survey of the randomised trials. *Cerebrovasc Dis* 1995; 5: 228.
- 20 Smith DS, Goldenberg A, Ashburn A. Remedial therapy after stroke: a randomised controlled trial. *BMJ* 1981; 282: 517–20.
- 21 Wade DT, Collen FM, Robb GF, Warlow CP. Physiotherapy intervention late after stroke and mobility. *BMJ* 1992; 304: 609–13.
- 22 Gladman J, Forster A, Young J. Hospital- and home-based rehabilitation after discharge from hospital for stroke patients: analysis of two trials. *Age Ageing* 1995; 24: 49–53.
- 23 Wade DT, Langton-Hewer R, Skilbeck CE, Bainton D, Burns-Cox C. Controlled trial of a home-care service for acute stroke patients. *Lancet* 1985; i: 323–6.
- 24 Martin F, Oyewole A, Moloney A. A randomized controlled trial of a high support hospital discharge team for elderly people. *Age Ageing* 1994; 23: 228–34.
- 25 Forster A, Young JB. Stroke rehabilitation: can we do better? *BMJ* 1992; 305: 1446–7.
- 26 Christie D, Weigall D. Social effectiveness in two-year stroke survivors: a randomised controlled trial. *Commun Health Stud* 1984; 26–32.
- 27 Friedland JF, McColl MA. Social support intervention after stroke: results of a randomized trial. *Arch Phys Med Rehab* 1992; 73: 573–81.
- 28 Evans RL, Matlock AL, Bishop DS, Stranahan S, Pederson C. Family intervention after stroke: does counselling or education help? *Stroke* 1988; 19: 1243–9.

Medical Anniversary EDITH CAVELL, 4 DECEMBER 1865

(Nurse) Edith Cavell (1865–1915) was born at Swardeston rectory, near Norwich, where her father was rector for 40 years. She was educated mainly at home, and aged 25 years became a governess to a Brussels family. In 1895 she commenced training as a nurse at the London Hospital, and eventually became a notable teacher of nursing. She became matron of a private hospital in Brussels, a bold step for a member of the Church of England, invading the monopoly of Belgian nuns. By 1914 she had become nursing director of three hospitals, well known not only in medical circles but also in Royal circles in Belgium. Moreover she had helped in the emancipation of Belgian womanhood, which also made her internationally known.

During the 1914–18 war, she housed escaped British prisoners in her hospital and helped them to freedom. She was charged by the Germans with high treason, condemned to death, and shot. On 29 October 1915 St Paul's was packed for her memorial service; it included members of the Royal family and representatives from the Government and, indeed, all walks of British life. Ten thousand voices sang *Abide with me*. Her statue stands at the north end of Trafalgar Square. After the war her body was brought back on a gun-carriage to a state funeral at Westminster Abbey and burial at the east end of Norwich Cathedral.

— D Geraint James