



National Audit Office

**DEPARTMENT OF HEALTH**  
Reducing Brain Damage:  
Faster access to better stroke care

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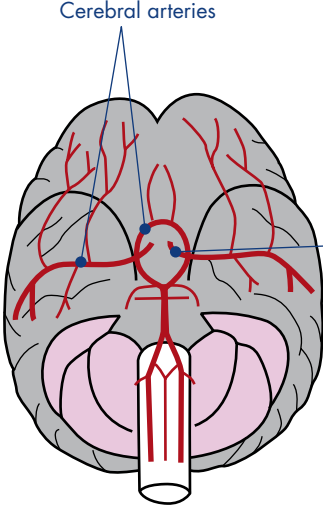
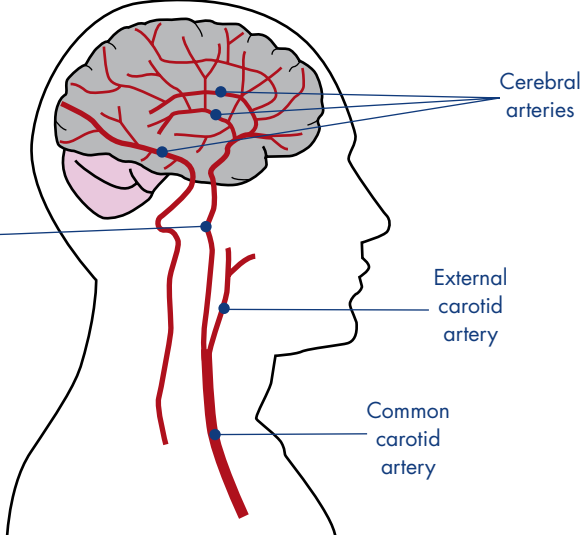
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# SUMMARY

**1** A stroke is the brain equivalent of a heart attack. Stroke is one of the top three causes of death in England and a leading cause of adult disability. Approximately 110,000 strokes and a further 20,000 transient ischaemic attacks (TIAs) occur in England every year. There are at least 300,000 people in England living with moderate to severe disabilities as a result of stroke. Stroke care costs

the NHS about £2.8 billion a year in direct care costs – more than the cost of treating coronary heart disease – and costs the wider economy some £1.8 billion more in lost productivity and disability. Additionally, the annual informal care costs (costs of home nursing and care borne by patients’ families) are around £2.4 billion. **Figure 2** outlines other key facts about stroke.

**1** What is a stroke?

A stroke is a type of brain injury. Most commonly a stroke is caused when blood flowing to the brain is blocked (by a clot or when blood vessels have become too narrow). Strokes of this kind, which account for around 85 per cent of all strokes, are called *ischaemic*. In a *haemorrhagic* stroke the blood vessel bursts. In both cases, the disruption of the blood supply to the brain causes brain cells to die.

Strokes range in severity from getting better within 24 hours – known as a *transient ischaemic attack* (TIA) or a ‘mini stroke’ – to a stroke which may cause severe brain damage or death. A TIA is a strong warning sign that, unless preventative measures are taken, a further and perhaps major stroke, is likely to occur soon. The impact will vary depending on which part of the brain is affected, how many brain cells have died, how many cells that have been damaged can recover, and if other parts of the brain can take over from the areas that died.

**Key symptoms of stroke**

Sudden onset of one or more of:

- Weakness or numbness in face, arm or leg, especially on one side of the body;
- Difficulty speaking or understanding;
- Loss of balance or coordination such as difficulty walking.

**Risk factors for stroke**

- High blood pressure;
- Previous stroke or TIA, or a family history of stroke;
- Atrial fibrillation (irregular heart rhythm);
- High blood cholesterol;
- Diabetes;
- Smoking;
- Advancing age;
- Unhealthy diet.

**Stroke is a medical emergency. If you suspect someone is having a stroke, dial 999.**

Source: National Audit Office

## 2 Key facts about stroke

- Stroke accounts for 11 per cent of the deaths in England and Wales a year. Between 20 and 30 per cent of people who have a stroke die within a month. Every five minutes someone in England will have a stroke, and around one in four people can expect to have a stroke if they live to 85 years of age. However, awareness of stroke and how to recognise symptoms is low.
- The incidence of, and mortality rates for, stroke and coronary heart disease have declined in recent years, although stroke mortality has declined at a slower rate. Between 1992 and 2002 stroke death rates in those aged under 75 declined by 30 per cent, and heart disease death rates declined by 44 per cent. However for stroke patients the chance of dying from their stroke has remained constant (at around 24 per cent) over that time, while for heart attack patients the chance of dying from their heart attack has declined by about 1.5 per cent each year.
- There are more than 900,000 people who have had a stroke living in England. Around half of stroke survivors are left dependent on others for everyday activities.
- There is high variability in the average lengths of stay across hospitals. The average length of stay is 28 days, which is a reduction from the 34 day average in 2001. At any one time one in five acute hospital beds, and a quarter of long term beds, are occupied by stroke patients.<sup>1</sup> Stroke patients occupy one of the largest numbers of acute hospital bed days – over 2.6 million per year – of any patient group.
- Stroke will become increasingly expensive as the number of people living with stroke increases. People aged 65 years and over increased by nearly four million between 1952 and 2002 and the percentage of older people in England is projected to rise from 16 per cent in 2003 to 23 per cent in 2031. The total costs of stroke care are predicted to rise in real terms by 30 per cent between 1991 and 2010.<sup>2</sup>
- Stroke affects young people as well as old: a quarter of strokes occur in people aged under 65. People of African or Caribbean ethnicity are at higher risk of stroke, especially of having strokes while young. Incidence rates of first ever stroke adjusted for age and sex have been found to be twice as high in black people compared with white people.
- Patients cared for in a defined stroke unit with organised stroke services are more likely to survive, have fewer complications, return home and regain independence than patients that stay on a general medical ward.

Source: National Audit Office analysis

2 The cost of stroke to both the NHS and the wider economy is clearly high, and the number of people living with or at risk of stroke is significant. We therefore examined whether the NHS is providing effective and high quality stroke care services in England, in terms of acute response, rehabilitation and prevention, and whether the Department of Health (the Department) is managing and supporting the programme of stroke care well. Key parts of our methodology included: a public awareness survey; analysis of data on GP practices; a review of the 2004 National Sentinel Stroke Audit (the Sentinel Audit) published by the Royal College of Physicians; a survey of hospitals to update Sentinel Audit data; economic research to model the burden of stroke and the benefits of different interventions and prevention measures; case study visits; and a patient/carer web forum and focus groups. Further details on our methodology are at Appendix 1.

## Overall conclusions

3 Historically stroke has been seen as an inevitable risk of growing old, with little to be done for those who suffer a stroke other than trying to make them comfortable. However, recent clinical, technological and organisational developments in acute stroke care mean that patients who a few years ago would have died or been seriously disabled after their stroke now have a much better chance of making a good recovery, provided they receive fast and effective access to appropriate care. The Department has responded positively to the emerging evidence base, for example it included some stroke milestones in the Older People's National Service Framework, and there have been real gains in the provision of organised stroke services in NHS hospitals. However, progress in the efficiency and effectiveness of treatment provided to stroke patients varies considerably, with some pockets of excellence but

also areas where the response is not as fast and effective as it could be. Overall we have identified scope for potential savings as a result of more efficient practice: some £20 million annually, 550 deaths avoided and over 1,700 people fully recovering from their strokes each year who would not otherwise have done so. More specifically:

- a** A key feature of effective stroke care is rapid access to specialised acute stroke services, including timely brain scanning. A delay in treatment increases the risk of death and disability. We identified scope for the NHS to prevent more strokes and drastically improve treatment, care and outcomes by re-organising services within hospitals and using more wisely the capacity that is available.
- b** For most patients and carers the impact of stroke starts following discharge from hospital. Over a third of stroke patients are left dependent or moderately disabled requiring support, rehabilitation and nursing care. Many patients feel abandoned. The division of responsibility between health and social services often acts as a barrier to integrated care and the scarcity of health professionals within the community care sector means that patients do not receive the professional support they need. As a result there is a reliance on informal carers and the voluntary sector.
- c** For every patient who experiences a stroke, the cost to the NHS in the UK is around £15,000 over five years, and when informal care costs are included this increases to around £29,000.<sup>3</sup> Campaigns to reduce smoking and improve diet should have a positive impact on primary stroke prevention. However, public awareness of stroke remains very low, as is awareness of the need for an emergency response if stroke is suspected. The new GPs' contract<sup>a</sup> has improved the prevention of stroke although some risk factors are still under-treated. There are also inefficiencies in the organisation of outpatient care where improvements, particularly in accessing scans and specialists, would ensure an appropriate response to transient ischaemic attacks (TIAs) and help prevent secondary strokes.

<sup>a</sup> The General Medical Services contract for GPs sets out a Quality and Outcomes Framework under which GPs' remuneration is determined by how well they perform on a set of clinical outcome indicators for their patients.

## Key Findings

The Department has encouraged improvements in stroke services but has not given it as high a priority as other conditions

**4** In setting out plans for investing in developing and improving health services it was necessary for the Department to set priorities for action due to the limited resources and management time available. The initial priorities focused on cancer and CHD with the Department publishing separate dedicated strategies to modernise services in these areas, and there is evidence of progress in key areas.<sup>4, 5</sup> The framework for delivering stroke care, however, is part (Standard Five) of the *National Service Framework for Older People* (2001). Its inclusion in the Older People's framework has helped kick-start the widespread development of stroke services in most NHS hospitals. There is now scope to give stroke care increased priority given its impact and cost – the costs of stroke care are more than those for heart disease, and a quarter of strokes occur in people aged under 65.

**5** In most European countries stroke is regarded as a neurological condition first and foremost, rather than an older people's condition. The Department's *National Service Framework for Long-term Conditions* (2005) focuses on the needs of patients with neurological conditions, including those who have neurological damage as a result of a stroke, although it does not specifically mention stroke other than to state that it is covered in the Older People's National Service Framework. Most people who survive a stroke will live for the rest of their lives with minor to major disabilities as a result, and will be dependent to varying degrees on health and social care. However, less than a fifth of the number of consultant sessions a week that the British Association for Stroke Physicians recommends are currently being provided for stroke patients.

**6** There have been some welcome developments. In 2004 the Joint Committee on Higher Medical Training accredited stroke as a sub-specialty which means there is now a formal training structure for a career in stroke medicine. Since July 2004, the Department's Vascular Programme Board assumed responsibility for driving improvements in stroke services, and in 2005 the Department established a Stroke Research Network to coordinate and champion research in stroke.

### An emergency response to stroke with efficient and effective acute care is generally lacking

**7** Research shows that a fast response to stroke reduces the risk of death and disability. Our survey showed that many people do not know how to recognise the symptoms of stroke, or that the correct response if someone is suspected of having a stroke is to dial 999. The Stroke Association has recently introduced a campaign to alert the public to the symptoms of stroke and to call 999 if they suspect someone is having a stroke. The Ambulance Service Association has introduced training and guidance for paramedics in diagnosing and responding to stroke.

**8** Coordination between stroke teams in hospitals and ambulance services can reduce the time between when a stroke starts and accessing a stroke specialist. However, only 16 per cent of hospitals have protocols in place with ambulance services for the rapid referral of stroke patients. In some services the protocol enables ambulances to take the patient direct to a stroke unit, helping to bypass any delay that might occur in the Accident and Emergency department.

**9** The clinically optimal model of stroke care is care delivered in a specialised stroke unit, but the interpretation of what constitutes a stroke unit varies considerably between hospitals. The Department's 2001 target, that 100 per cent of all general hospitals should have a specialised stroke service by April 2004, has nearly been met in 2005. Hospitals told us that two-thirds of patients had access to good or very good specialised stroke services. However, the extent of clinical services provided varies widely (Figure 8 in main report), for example 54 per cent of dedicated stroke beds are rehabilitation only beds.

**10** Overall, the number of patients treated on a stroke unit during their stay in hospital has increased – up from 36 per cent in 2001 to 47 per cent in 2004 – and the mean length of stay has fallen from 34 days in 2001 to 28 days in 2004. Despite this improvement, stroke units are of insufficient size, with only 41 per cent of patients in 2004 spending more than half of their stay there. Economic modelling suggests that if access to stroke units were increased to 75 per cent of patients, then about 550 deaths could be prevented, and 205 more patients would not be disabled and dependent on discharge from hospital, each year. These benefits could be obtained at no additional cost if the average length of stay on a stroke unit was three days shorter than staying in a general medical ward.

**11** Rapid access to a brain scan is critical for stroke patients. Treatments such as aspirin or clot-busting drugs are dangerous to give to a patient with a haemorrhagic stroke as these increase bleeding tendency and may increase the damage. For this reason, getting brain imaging to diagnose the type of stroke is crucial because until this has happened treatment cannot commence safely. Less than 20 per cent of stroke units have access to scans within three hours of admission. Although most hospitals have the capacity to provide CT scans within 24 hours of admission, an audit by the Royal College of Physicians found that in 2004 only 22 per cent of stroke patients had a scan on the same day as their stroke – indeed, most patients waited more than two days. Scans for stroke patients are being delayed, even though 'time lost is brain lost', and recent research shows that scanning all stroke patients immediately is the most cost-effective strategy.

**12** CT scans show whether brain damage is caused by a clot or a haemorrhage, but there can be further delays in getting the diagnosis if no one is available to read the scan once it has been done. Hospitals need to provide not only access to scanning equipment and to radiographers, but also access to staff who can read and interpret the scan itself (such as radiologists, neuroradiologists or stroke consultants who have been trained in this area). Such access is rarely available 24 hours a day and seven days a week.

**13** The development in the late 1990's of thrombolytic (clot-busting) drugs, which can reduce mortality and morbidity in eligible patients, was an important step forward in the acute treatment of stroke. Although such drugs have had a conditional license in England since April 2003, thrombolytic treatment is not yet a routine part of acute stroke care despite evidence showing it would benefit a significant minority of stroke patients. In leading hospitals in Australia around nine per cent of patients are thrombolysed and about 40 per cent of these patients then fully recover from their strokes. Rates of thrombolysis in England are below one per cent. Achieving rates of thrombolysis in England in line with those currently being achieved in leading Australian hospitals could generate net savings to the health service of over £16 million a year in care costs avoided, with more than 1,500 patients fully recovering from their strokes each year who would not otherwise have done so.

**14** Current thrombolytic drugs should only be given within a few hours of the onset of stroke and the patient must have a brain scan to determine whether the treatment is possible. The low rate of thrombolysis in England is partly due to a lack of public awareness of the fact that stroke is a medical emergency, and that appropriate treatment within the first few hours can make the difference between recovery and serious disability. It is also partly due to the fact that Ambulance Trusts, Accident and Emergency departments, Radiology departments and specialist stroke teams do not routinely provide an effective, integrated emergency response to stroke that includes rapid triage and access to scanning.

### Following discharge patients need improved access to rehabilitation and support services

**15** Stroke patients require services and therapies from many disciplines in health and social care. If people do not get good rehabilitation after their stroke, such as early access to physiotherapy to restore movement, their paralysis or weakness can produce stiffness and spasticity which in turn can lead to painful spasms and abnormal posture. Many stroke survivors have difficulty speaking and communicating. However, access to professionals such as psychologists, dietitians, physiotherapists, occupational and speech therapists and social workers can be patchy within and between stroke units, even though access to social work and occupational therapy

is likely to result in fewer delayed discharges. This is in strong contrast to the leading examples of rehabilitative care provided in Sweden.

**16** A third of acute stroke patients are left dependent or moderately disabled. During their hospital stay, patients have access to on-call help and care, however on discharge they have to adjust suddenly to the impacts of the stroke on their life at home. Hospitals told us that around half of patients receive rehabilitation services that meet their needs in the first six months after discharge, but this falls to around a fifth of patients in the 6-12 months after discharge. Data from South London showed that only 26 per cent of patients in need received physical and occupational therapy and 14 per cent received speech and language therapy 3-12 months after discharge. Early Supported Discharge, facilitated by a multi-disciplinary team, reduces length of stay – thereby increasing inpatient bed capacity – and can help the patient adapt to their life at home.

**17** There is also a serious impact on carers which is inadequately addressed. The Sentinel Audit recognises that carers are a vital resource and it is known that carers' morbidity is high, with around one third experiencing problems with their jobs and just under two thirds experiencing physical and mental health problems. Yet in over half of cases in the Sentinel Audit, carers' needs were not assessed, despite carers now having a legal entitlement to request an assessment. Recent research<sup>6</sup> indicates that providing carers with training improves their psychological outcomes. It also reduces the total health and social care costs of the patient and carer, in particular the costs of the patient needing to be re-admitted to hospital. There is scope to increase the numbers of carers receiving training: over a third of carers in the Sentinel Audit did not receive training.

**18** There is a lack of coordination of support services for stroke patients after they are discharged from hospital which can leave patients feeling abandoned. The Department has recognised that stroke survivors need to access many different health and social care services, and that the lack of clarity of responsibilities between health and social services is a barrier to the delivery of person-centred care. But these issues are still unresolved despite the fact that it is in the months and years after discharge that patients, their families and carers will experience the full impact of the stroke.

## More emphasis is needed on primary and secondary prevention measures

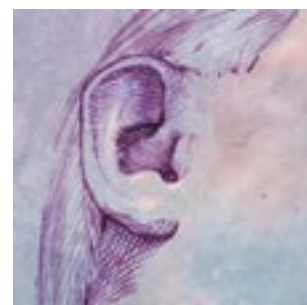
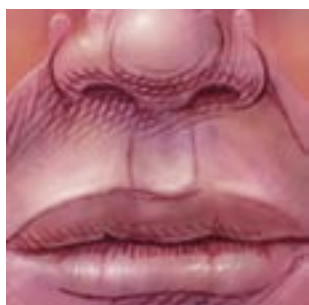
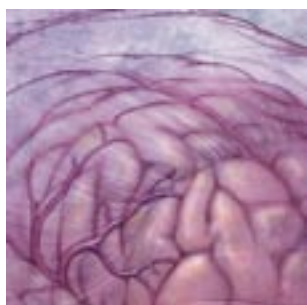
**19** Over three times as many women died of stroke than of breast cancer in England and Wales in 2002, but 40 per cent more women mentioned breast cancer than mentioned stroke when we asked them what the top causes of death were. Indeed, many people still do not realise that strokes are largely preventable and cannot list the main risk factors for stroke, or how to manage them. The Department has run national campaigns which highlight the benefits of a healthy diet and lifestyle, and these may help to reduce the incidence of stroke.

**20** GPs have a key role to play in managing risk factors and the new GPs' contract, in place since April 2004, is focussed on issues that have helped to provide better and more systematic prevention of stroke. We found that people on GP lists were more likely to have their blood pressure and cholesterol recorded than was the case a year previously, that more people who were smokers were receiving cessation advice, and that more people with recorded blood pressure had levels meeting the recommended targets.

**21** Positive changes were also apparent for secondary prevention activities with trends so far suggesting that nearly all the desired GP activities, such as measuring and controlling blood pressure and cholesterol in those people who have had a previous stroke or transient ischaemic attack, will soon be achieved (Figure 14 in main report). There are exceptions, however, such as a very low referral rate for scans for people who have had a stroke (47.5 per cent in 2004 down to 45.5 per cent in 2005 compared with a target of 80 per cent).

**22** Delays in getting appropriate outpatient treatment for patients who have had a TIA mean that strokes are occurring that could have been prevented; and some preventative interventions, such as surgery on the carotid arteries, are being carried out after the time when they would have been of benefit. Ultrasound scans can show if a thickening of the carotid arteries in the neck is the cause of a previous stroke or TIA. If that is the case, surgery should be performed preferably within two weeks of the stroke or TIA. Yet the Royal College of Physicians' stroke audit in 2004 showed that only half of stroke patients had an ultrasound scan within twelve weeks, despite the majority of hospitals having scanning available. Providing carotid surgery within two weeks to patients who are indicated for it could prevent around 250 strokes, and result in a net saving to the health service of around £4 million, each year.

**23** If a person has a stroke or TIA this is a major indicator that there is high risk of further stroke, heart attack and other vascular events. The risk of stroke in the seven days following a TIA can be up to ten per cent – around 45 times the 'normal' risk – and within four weeks of TIA the risk of stroke can be 20 per cent. This increased risk means that patients need to be seen rapidly in a TIA clinic. UK national stroke guidelines recommend that all patients with suspected TIA should be assessed and investigated within seven days. However, only a third of people with TIA are seen in a TIA clinic, and the median waiting time is twice as long as the waiting times recommended in the guidelines.





## RECOMMENDATIONS

**24** Clinical guidelines for optimal stroke care are clear and many of the individual components required for effective stroke services are already in place, but that capacity is largely not being utilised. The Department and NHS must now focus on removing the barriers to the delivery of responsive, integrated stroke care, in order to save lives, reduce disability and reduce the cost of stroke to the health service.

### Preventing more strokes

**a** Incidence rates for vascular disease have fallen over the last decade, probably in part because of greater awareness of the benefits of making lifestyle changes such as eating more healthily and taking more exercise. Public health campaigns such as 'Five a Day' have helped to raise awareness of these issues. There is still more to be done, however, to raise awareness of the fact that such lifestyle changes can prevent strokes as well as heart disease, and in particular, that high blood pressure is a key risk factor for stroke. **The Department should refer explicitly to stroke in more of its campaigns (at no or an insignificant additional cost) to ensure that the public and the NHS benefit from preventing more strokes.** For example, preventing just two per cent of strokes that occurred in England last year would have saved care costs of more than £37 million.

**b** Reducing delays in access to outpatient services, such as diagnostic testing at a neurovascular clinic for patients who have had a TIA, is likely to prevent strokes and hence reduce the overall cost of stroke to the health service. **All Primary Care Trusts should ensure they provide access to an outpatient stroke and TIA service. Primary Care Trusts should also ensure arrangements are in place between GPs and secondary care to ensure outpatients are referred efficiently and effectively.** One way of doing this would be to use the GP contract to lever improvements in the number of TIA patients referred to neurovascular clinics.

### Rapid response to stroke

**c** A key component of effective treatment of stroke is that a suspected stroke should be treated as a medical emergency in the same way a suspected heart attack is. **The Department should work to raise public awareness of the signs of stroke, and the fact that stroke is a medical emergency that requires a 999 response. This should be integrated with the provision of information and guidance to GPs, Accident and Emergency department staff and ambulance staff to prepare for the increased demand and expectations of a more informed public.**



### Improving acute care: brain scanning, thrombolysis and acute stroke units

- d** Greater uptake of thrombolysis would improve stroke outcomes. There are several models of practice that could be adopted to overcome the barriers to delivering thrombolysis routinely for eligible patients. These include: greater use of telemedicine to access expertise in reading brain scans; protocols between Ambulance Trusts and hospitals to ensure that all suspected stroke patients are delivered to a designated hospital that is equipped for thrombolysis; and more widespread training of triage nurses, radiologists and stroke consultants in how to work together to deliver thrombolysis. **The Department should, in conjunction with the National Institute for Health and Clinical Excellence, appraise the costs and benefits of different approaches and provide guidance to the NHS on how to deliver thrombolysis in practice.**
- e** A key requirement for all acute stroke treatment, including thrombolytic treatment, is rapid access to brain scanning. Our audit revealed existing capacity for scanning stroke patients that is being under-used. **The Department should explicitly address the issue of improving emergency scanning capacity in its strategic work on improving stroke management. For example, it should explore the possibility of the extension of training so that stroke consultants can read scans to a sufficient level to be able to make decisions about immediate acute treatment without having to wait for specialist radiological input.**
- f** In commissioning stroke care services, **Primary Care Trusts should ensure that acute stroke services are delivered through acute stroke units. As a minimum, all stroke patients should have a stroke care plan and access to specialist staff. The Department should make available best practice guidance on the provision of an acute stroke unit, to reduce regional variations.** If patients can be admitted more quickly into a stroke unit, to access specialist acute care, damage and deterioration in their condition can be more efficiently controlled, reducing morbidity and mortality. This increase in efficiencies should also reduce overall averages for lengths of stay.

### Coordinating post-acute support services

- g** The Department should ensure that its initiatives to support more coordinated and cohesive health and social care services take into account the need for joined-up services to reduce the disabling impact

of stroke on peoples' lives following discharge from hospital. Arrangements must be put in place to ensure that where responsibilities are divided between health and social services the responsibility is not neglected by either party. **The Department has set out eleven quality requirements for delivering care to people with long term neurological conditions in its *National Service Framework for Long-term Conditions*. These quality requirements apply to people with neurological damage as the result of a stroke, and commissioners should refer to them in planning post-acute stroke services.**

- h** Voluntary and community organisations can provide effective long term support for people who have suffered a stroke. Our report *Working with the Third Sector* (HC 75, 2005-06) sets out how government departments can build effective partnerships with such organisations. **The Department should be informed by the recommendations in that report in working more closely with the voluntary sector on the issues surrounding the provision of long term rehabilitation and support services for stroke patients.**

### Better management of stroke services

- i** Stroke costs the NHS more than heart disease. In order to reduce these costs, it is important that commissioners and clinicians in the NHS are as aware of the need to improve the capacity and responsiveness of stroke care services as they have been for higher-profile diseases. **To support this, the Department should work with the Healthcare Commission and the Royal College of Physicians to build on existing guidelines and audit processes. This should include considering appropriate benchmarks for stroke care – for example, for the proportion of suspected stroke patients receiving a brain scan within three hours, or the proportion of eligible patients receiving thrombolysis – as part of its strategic approach to taking forward an integrated vascular care programme.**
- j** **The Department should take a unified approach to stroke, awarding it appropriate priority and supporting its stroke programme with strong leadership for vascular disease management.** This would build on the *National Service Framework for Coronary Heart Disease*; the stroke section of the *National Service Framework for Older People*; and the quality requirements listed in the *National Service Framework for Long-term Conditions*.