Early, accurate assessment of stroke is essential if patients are to receive timely, effective treatment. Telemedicine can provide rapid access to expert assessment.

Using telemedicine for acute stroke assessment

In this article...

▶ Why prompt thrombolysis treatment is important
▶ How a telestroke service was set up
▶ First-hand patient account of the service

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Authentication

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Abstract

In acute stroke care, urgent specialist assessment and treatment are essential to reduce the risk of death and disability. However, many patients do not receive them due to a lack of specialist services. One solution is to use telemedicine. This can give all patients with acute stroke symptoms access to immediate expert assessment and advice, regardless of when and where they present to hospital.

This article describes a telemedicine system developed and implemented in Lancashire and Cumbria. In its first year of operation, 319 patients received a telestroke video assessment with a consultant stroke physician; 131 of these patients were given thrombolysis.

We discuss how the service was designed, staff training and development, and the implications for nursing practice. The development of a standardised telemedicine toolkit that may facilitate future telemedicine projects is also discussed.

5 key points

1 Administering thrombolysis within 4.5 hours of a stroke occurring reduces the risk of disability
2 Thrombolysis is contraindicated for stroke caused by intracerebral haemorrhage, so assessment for type of stroke is essential
3 Some areas have hubs for specialist stroke care; this is not feasible in rural areas where people are dispersed
4 Telestroke allows doctors to assess patients remotely, speeding up treatment decisions
5 Nurses are essential to ensure smooth delivery of the service. In some trusts, they act as bedside assessors

When patients present to hospital with symptoms suggesting acute stroke, immediate specialist assessment and treatment are essential if they are to receive an accurate diagnosis and appropriate emergency treatment.

In ischaemic stroke, early administration (within 4.5 hours of symptom onset) of the intravenous tissue plasminogen activator (tPA) alteplase, also known as thrombolysis, is effective in reducing the likelihood of disability (Intercollegiate Stroke Working Party, 2012a). However, only 8% of stroke patients in the UK receive this treatment (ISWP, 2012b). Thrombolysis carries a small risk of cerebral bleeding and has a number of contraindications, including stroke caused by intracerebral haemorrhage.

Acute stroke symptoms are diverse and can easily be confused with other differential diagnoses, so it is essential to consult a stroke specialist to confirm the diagnosis of ischaemic stroke and to advise on the use of thrombolysis.

National guidance for acute stroke states that “staff in A&E departments, if appropriately trained and supported, can administer alteplase for the treatment of acute ischaemic stroke provided that patients can be managed within an acute stroke service with appropriate neuroradiological and stroke physician support” (National Institute for Health and Clinical Excellence, 2008).

There are many possible reasons for the low uptake of thrombolysis in stroke, including patients arriving in hospital outside the time window for treatment (Menon et al, 1998). A lack of specialist assessment and support is a major factor.
In some areas, such as London and Manchester, stroke services have been reconfigured into a “hub and spoke”, where patients are initially treated at a specialist hub and transferred to a site closer to their home when stable. However, the population in Lancashire and Cumbria is widely distributed with no major city to use as a central hub to run an out-of-hours rota. It is also not possible to provide a 24-hour on-call stroke specialist service at every acute hospital in the region.

To reduce delays in assessment and treatment out of hours, a telestroke system has been developed and implemented by the NHS cardiac and stroke network. This aims to deliver specialist services to this rural population and to share specialist knowledge.

**Introducing telestroke**

The telestroke system includes 15 consultant stroke physicians from seven trusts at eight hospital sites across the region, who all participate in an on-call rota covering nights, weekends and public holidays.

The system uses a two-way videolink comprising of a “telecart” based in each hospital and a dedicated laptop computer at home for each on-call stroke physician. This enables the physician to assess the patient remotely, with the support of a practitioner caring for the patient in the admitting hospital. CT head scan images can be sent to the physician from the hospital via a secure link. The physician is able to confirm the diagnosis of stroke, assess its severity and exclude signs of haemorrhagic stroke or other contraindications to thrombolysis on the CT head scan. They can discuss the diagnosis and treatment plan with the local team and the patient and family via the videolink. The main aims of the system are outlined in Box 1.

In the year after Lancashire and Cumbria launched telestroke in August 2011, 343 advice calls took place using the system, 319 patients received telestroke video assessments and 131 received thrombolysis. The case study in Box 2 outlines a patient’s experience.

Some staff were initially wary of using the new system, thinking it would prove to be too time consuming and cumbersome, but they were generally reassured when they saw it in use. A series of “mock-up” runs before the system went live were useful in demonstrating its practical use and identifying potential problems. If there is a technical problem, practitioners can call a 24-hour technical support helpline.

**BOX 1. TELESTROKE AIMS**

- To provide an out-of-hours stroke assessment and thrombolysis service
- To ensure all people who present with symptoms suggesting acute stroke can access expert assessment, regardless of the time
- To share the resource of specialist stroke knowledge, regardless of location
- To reduce disability and death due to acute stroke via timely specialist assessment

**BOX 2. CASE STUDY**

Maria Nelson, a 48-year-old mother of two children, had a stroke that resulted in loss of speech and function in her left arm and leg. She was admitted to hospital and assessed by a consultant via videolink as part of the telestroke collaborative.

Forty-eight hours after her stroke, Ms Nelson returned home with full use of her arm and only slight weakness in her leg.

“When I got to the hospital, I was surrounded by people and it wasn’t long before thrombolysis was mentioned. I was asked whether I’d like to try it. I was taken away for a CT scan and, by the time I got back, they were setting up the TV screen.”

“The doctor appeared on the screen, introduced himself and talked about my CT results with the doctor who was in the room with me. He talked to me from the screen, asking me to try different movements, then the doctors talked about the treatment I’d need. "I had an injection first then most of the dose was put in through a drip. Within half an hour, my speech started to come back. I’d been able to work my left arm at all but then the feeling started to return in my hand and I could wiggle my fingers. By the next morning, my leg had started to work again too.”

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**BOX 3. NURSE ROLES**

- Contribute to setting up of service
- Lead staff training (initial and ongoing)
- Manage and streamline the service
- Act as “telestroke champion”
- Provide bedside assessment via telecart (some sites)
- Facilitate telestroke assessment process and subsequent treatment
- Arrange transfer to acute stroke unit care
- Communication and support of patient and family

**Nurses’ roles in telestroke**

Nurses have played a key role in the development of the telestroke service, including taking responsibility for staff training.

Due to high staff turnover in emergency departments, a rolling “train the trainer” programme has been implemented. This ensures staff are aware of changing service models, innovation and new technologies. It also aims to improve services and reduce variability and poor practice.

Some trusts use emergency department doctors or other on-call medical staff to act as “bedside assessors”. Nurses in these departments contribute to the process by facilitating quick assessment, undertaking procedures such as recording base-line observations, ensuring prompt communication of information, and setting up, delivering and monitoring if thrombolysis is administered.

They are also an important source of advice and support for patients and their families involved in this form of assessment, particularly as the remote assessor is not physically present.

Nursing staff are also responsible for ensuring patients are transferred as soon as possible to an acute stroke unit for specialist nursing and medical management. This is known to reduce short- and long-term death and disability from stroke regardless of whether the patient is receiving thrombolysis (Stroke Unit Trialists Collaboration, 2007). Box 3 outlines the key nursing roles in the service.

Other trusts use nurse clinicians, who have additional experience and training in acute stroke and in the telestroke system, to act as the bedside assessor. This ensures continuity of service provision, and gives the nurse clinicians opportunities to develop high-level skills. They need considerable knowledge of stroke and clinical examination skills, and to be familiar with
assessment using the National Institutes for Health Stroke Scale (NIH, 2008) (Box 4). This standardised 15-item stroke-specific assessment is used to evaluate and document neurological status, contribute to decision making about treatment, and provide a baseline measure of stroke severity. It also ensures accurate communication between the bedside and remote assessors about the patient’s neurological status.

Standardised telemedicine toolkit
As part of a project funded by the National Institute for Health Research – Acute Stroke Telemedicine: Utility, Training and Evaluation – we have constructed a standardised toolkit for the implementation of telemedicine in the UK (www.astute-telestroke.org.uk). This contains information on all aspects of setting up and running a telestroke service and includes downloadable resources such as protocols and care plans. Data collection is continuing to identify how the use of telestroke systems can be optimised. The findings will inform the development of the online standardised telemedicine toolkit.

Conclusion
Telemedicine can benefit patients by improving access to specialist stroke assessment and enabling the safe delivery of thrombolytic therapy if appropriate.

Patients appear to welcome this new way of working. There are, however, challenges for nurses working in stroke care and in emergency departments in developing the technical, clinical and interpersonal skills needed to deliver this system safely and effectively.

NT references

BOX 4. NIH STROKE SCALE
Points are given for each impairment found during a focused neurological examination. A maximum score of 42 represents the most severe and devastating stroke. Guidelines allow patients with scores over 4 to be treated with thrombolysis.

The level of stroke severity as measured by the scale:
- 0 = stroke unlikely
- 1-4 = minor stroke
- 5-15 = moderate stroke
- 16-20 = moderate/severe stroke
- 21-42 = severe stroke

Source: NIH (2008)