Rural health care: problems and solutions

Living in rural areas has many attractions, but the availability of health care is not necessarily one of them. The provision of care is likely to become increasingly problematic with the population skewed towards a growing proportion of the elderly – with disproportionate increases predicted in the remote and rural Highlands of Scotland (Philip et al, 2012) – who are likely to have multiple chronic conditions. Increases in the expected burden of diabetes, heart disease, cancer, dementia and stroke have also been forecast and will put demands on an already stressed health-care service (Holman et al, 2010; NHS Lothian, 2014).

Anecdotally, the authors have heard of people moving away from their homes in the Highlands and islands as they get older so that they can be nearer to their doctors and hospital. This is also in part the result of changes in the care profile of some rural areas (e.g. the local GP or community nurse retiring and not being replaced on a like-for-like basis). It is clear that a robust model of community care is essential to support the 'extitution' agenda, whereby patients are cared for at home rather than in hospital as far as possible (Milligan et al, 2011). The implementation of technology may be part of the future solution to support rural resilience, if it is appropriately designed, implemented and supported (Mort and Philip, 2014).

The role of technology

The development and implementation of technology could mean that people living remote from larger centres of care may be able to get care equal to those living closer, with access to specialists and faster diagnosis. It is certain that even relatively simple technology such as videoconferencing can be useful. Many care providers already have the equipment required to connect their institution to others, but have not been using it, or have only considered it for business facilitation purposes rather than for use with patients. The authors' experience is that once the initial fright and bluster has passed, clinicians and patients readily take to videoconferencing, gaining confidence rapidly as they gain experience. Some clinicians the authors have worked with have become evangelists for the technology, linking their Highland clinics with many others, including London-based specialists, to offer the best possible care and expertise to their patients.

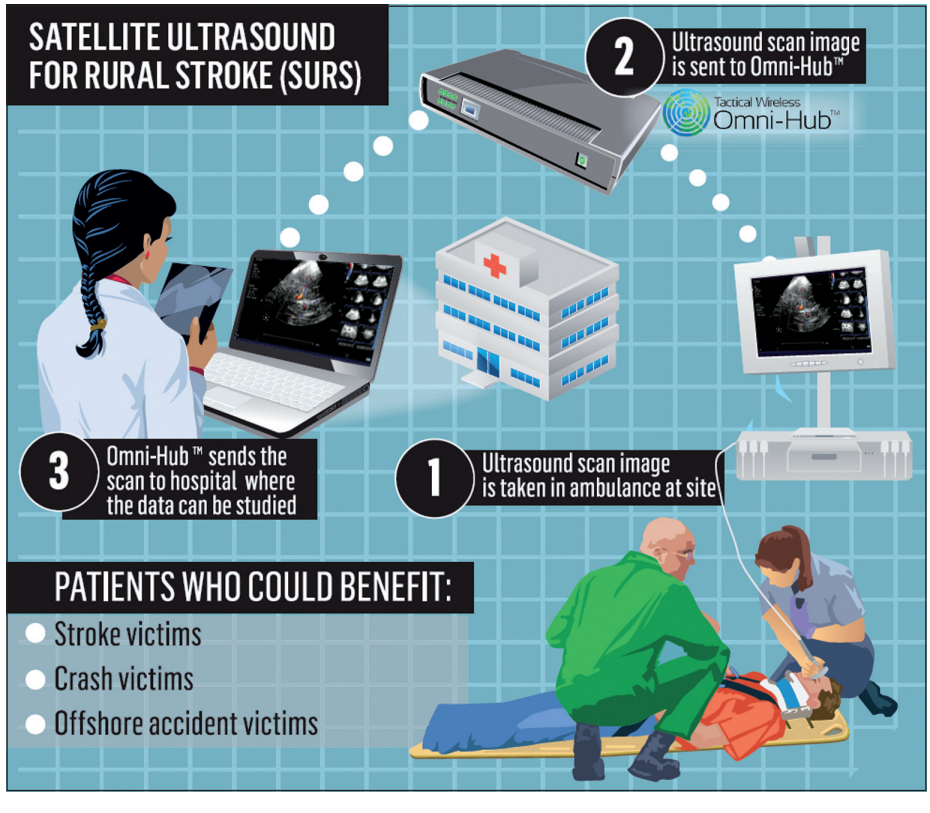
These type of applications have been successful perhaps because the technology is simple and the benefits can be readily appreciated, unlike examples such as the Whole Systems Demonstrator cluster randomized controlled trial of telehealth technology, in which the new care system did not confer improvements in quality-adjusted life years when compared with usual care, also proving to be more expensive (Henderson et al, 2013).

Prehospital use of technology

The authors' team is taking the use of videoconferencing a step further by trialling the equipment in an ambulance where it allows hospital-based experts to interpret ultrasound imaging and advise on patient care. This is done using a communications device (Omni-Hub; Tactical Wireless, UK) that accesses multiple cellular networks plus satellite bandwidth to stream live ultrasound images in addition to the usual audio–video videoconferencing channels (*Figure 1*).

This could be beneficial in time-critical emergency and trauma situations where focussed assessment using sonography for trauma (FAST scanning) is used to look for internal bleeding and pneumothorax. These scans, well known to 'flying doctor' teams around the world, can be performed following simple, brief training, and paramedics can either receive further

Figure 1. The process being evaluated in the Satellite Ultrasound for Rural Stroke project.



training in interpretation or, using this new technology, stream the images to their nearest emergency department for assessment.

A relatively new application for ultrasound has also been proposed in a stroke diagnosis research project (Satellite Ultrasound for Rural Stroke): patients suspected of having suffered a stroke can be assessed in the field using clinical checklists and transcranial Doppler looking for ischaemic stroke and/or with b-mode imaging looking for haemorrhage, with these currently non-routine images being reviewed by hospital-based experts. In addition, if the type of stroke can be diagnosed in the ambulance, then thrombolysis could potentially be given pre-hospital, much as it is recommended that patients who have had a ST-segment elevation myocardial infarction are treated as soon as a diagnosis is reached (Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology, 2012).

Even without pre-hospital treatment, an accelerated diagnostic time could be of significant benefit to patients living in remote and rural areas, where the time delays associated with initially calling for help, total transport time and assessment on arrival at the emergency department can be in excess of the recommended time limit applicable to treatment with thrombolysis.

Simply knowing the precise diagnosis could help smooth the patient's pathway, with hospitals being warned and prepared, having a team ready to provide confirmatory scanning and/or treatment as soon as the ambulance arrives. With only 29% of eligible patients across Scotland currently receiving thrombolysis within an hour of arriving at hospital (Scottish Stroke Care Audit, 2013), this type of care streamlining could help make a real difference to treatment plans and, hopefully, outcomes.

Ambulance services in the UK are currently making plans for the next generation of emergency vehicles and it is likely that they will consider fitting both videoconferencing and portable imaging equipment, such as ultrasound, as standard. But there is also a wider applicability to these systems: why not install them in offshore locations, such as oil rigs and cruise ships? And if there was an ultrasound machine plus dedicated communications technology in every GP surgery, or in community-based ambulances, then it need not only be used for emergencies, but for everyday diagnostic purposes such as screening and prenatal checks, keeping care local and at the best standard available.

This idea will support rural and remote communities facing the challenge of recruiting and retaining health staff, offering access to expertise and training, and also provides a solution to the provision and preservation of skills such as ultrasound interpretation which are unlikely to be required by paramedics on a regular basis in the field.

With the confluence of these various technologies, old and new, it seems only sensible that patients in need should be able to get a diagnosis as fast as possible, accessing quality care wherever they are. BJHM

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Figure 1 *is used with permission from The Press and Journal, Aberdeen Journals Ltd. The Satellite Ultrasound for Rural Stroke project is funded by: Highlands & Islands Enterprise, the University of Aberdeen's dot.rural Digital Economy Hub, TAQA Bratani and the Satellite Applications Catapult.*

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KEY POINTS

- People living in rural areas could be at a disadvantage compared to those living in urban areas when considering health care, and emergency health care in particular.
- e-health can offer some solutions to help, such as videoconferencing to bring specialist knowledge to community hospitals or even to ambulances.
- One research project is investigating the potential for satellite and mobile communications networks to support and guide paramedics in emergency situations and also to make a diagnosis of stroke using clinical checklists and ultrasound imaging.
- Future ambulances could be fitted with communications systems to facilitate earlier diagnosis and smooth patient pathways.
- This technology could also be used in GP surgeries and offshore locations, such as oil rigs and cruise ships.