



## TELERADIOLOGY IN NSW

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This article reports on work establishing, and planning the evaluation of, a teleradiology network centred around Wagga Wagga Base Hospital (WWBH) in the Riverina region of NSW. A basic network between WWBH and Sydney's St Vincent's Hospital (SVH) was set up in November 1991. A review of cases transmitted to Sydney during the first 19 months of operation suggested teleradiology had performed well and was worthy of extension. Supported by funds from the Commonwealth's Health Communication Network program, teleradiology facilities are being added to two hospitals in the Riverina to form a local regional network which will be examined in a formal evaluation of its costs and benefits.

**L**arge distances between hospitals, particularly in country areas, and the difficulties of access to expert advice from larger hospitals have motivated the development of methods to improve communication in Australia. One of these methods is teleradiology — transmitting x-rays over large distances for management and diagnostic advice. These systems have potential benefits to medical care in Australia, such as improved patient management and reduced hospital costs<sup>1,2</sup>. In order to make decisions about the efficient use of this resource, these benefits and costs must be evaluated.

Several pilot teleradiology systems have already been installed in Australia. In November 1991 clinicians at WWBH, motivated by a desire to improve the management and outcome of patients with head injuries, established a teleradiology link between Wagga Wagga Base Hospital and St Vincent's Hospital with the principal objective to transmit brain CT scans of head-injured patients from WWBH to SVH for diagnostic and management advice.

### PILOT STUDY REVIEW

We reviewed the records of 43 patients who had teleradiology consultations transmitted between WWBH and SVH in the first 19 months of the system. The aim of this review was to describe the use of teleradiology and identify potential benefits of the new system.

Twenty-four of these patient consultations involved head-injured cases and the transmission of head CT scans — accounting for just under one in five head-injured patients (17 per cent) admitted to WWBH during the review period. The remaining 19 consultations were for patients with a range of clinical conditions and included the transmission of images such as angiograms, chest x-rays and spinal x-rays.

### Head-injured patients

Many of the head-injured patients for whom a teleradiology consultation was organised were aged between 15 and 24 years (33 per cent) and most were male (71 per cent), reflecting the demographics of serious head injury in NSW. Advice was sought predominantly on patients with intracranial haemorrhages (79 per cent). In all these cases teleradiology provided management rather than diagnostic advice.

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Initial and follow-up scans were transmitted from two hours up to 16 days after the injury incident. Patients with more severe injuries, i.e. those presenting in coma, were more likely to have scans transmitted within 24 hours of admission. However, in some cases the transmission of scans was delayed, due to the natural history of the injury, for example subdural haematomas that present with a slow deterioration, or to delays in finding the patient where the injury occurred in a remote area. These patients all had less severe injuries on admission to hospital.

Nine patients required craniotomies; three of these were done at WWBH. Eleven head-injured patients (48 per cent of consultation cases) were transferred to a tertiary referral centre in Sydney or Melbourne for further treatment. An additional six head-injured patients were transferred urgently before their x-rays were transmitted. This represents an overall transfer rate of 12 cases per 100 head-injured patients admitted to WWBH.

The length of hospital stay at WWBH (excluding rehabilitation) for the 24 patients ranged from one day to 47 days, with a median stay of three days. Those patients who were in a coma on admission stayed at WWBH for shorter periods due to earlier and more frequent transfer to a tertiary referral centre. Overall, two patients died — one at WWBH and one after transfer.

### Non-head injured patients

A brief review of the 19 other patients indicated that 10 (53 per cent) were males and half were aged 65 years and over.

Nine consultations reported on cerebral CT scans for patients with intracranial pathology, two reported on carotid and cerebral angiograms, three on cervical CT scans of patients with secondary deposits, and the others included chest x-rays and CT scans, a cystogram and a post-colectomy sinogram. Fourteen (74 per cent) of these cases were transferred to Sydney.

Overall, the clinicians using the system reported that teleradiology had performed well and improved patient management and reduced the need for transfer in individual cases.

### HEALTH COMMUNICATIONS NETWORK PROJECT

Following the success of this initial pilot, WWBH has recently obtained funds through the Commonwealth Department of Health, Housing and Local Government and Community Services' Health Communication Network (HCN) program to extend the teleradiology network to include Prince of Wales Children's Hospital and to develop and formally evaluate a regional service linking WWBH with Griffith and Tumut hospitals.

HCN is part of the Australian Health Ministers' Conference national health information management and technology strategy which aims to enhance health care delivery in Australia through forms of technology such as facsimiles, videos and medical images.

### Proposed evaluation

The system was installed at Griffith Base Hospital in May 1993 and at Tumut in July 1993. For the HCN project, these links will focus on improving the management of orthopaedic trauma in the region.

The evaluation will be managed by staff of the Epidemiology and Health Services Evaluation Branch, working in collaboration with clinicians from Wagga Wagga Base Hospital and the HCN project team. The aim is to determine changes in patient management and associated costs that result from teleradiology use.

All orthopaedic cases diagnosed by x-ray at Griffith Base and Tumut hospitals for six months before and after the introduction of the teleradiology system and three months during the establishment of the system will be included in the study. Based on a review of one month's data we estimate that around 750 patients will be included — 300 in each of the before and after categories and 150 in the establishment phase.

The study comparing orthopaedic cases before and after the introduction of teleradiology will determine the impact of this technology on:

- hospitalisation and inter-hospital transfer rates;
- timeliness of inter-hospital transfer;
- appropriateness of inter-hospital transfer;
- type and timing of treatment — for example, operations;
- length of hospital stay;
- appropriateness and adequacy of treatment; and
- costs of treatment.

A review will also be conducted of all teleradiology consultations using information recorded on a standardised request form completed by the referring doctor and report form filled out by the orthopaedic specialist.

From this review we will report on the degree of urgency of the request, the purpose of the consultation and clinical details of the patient, the adequacy of the images in terms of quality, views and magnification, the diagnosis and treatment advice given to the referring doctor and the orthopaedic specialist's perception of the usefulness of the technology for individual cases.

The referring doctor will be sent a short consumer survey questionnaire after each consultation to assess attitudes about the perceived impact of teleradiology on the doctor's diagnosis and management of the patient, the referring doctor's satisfaction with the conduct of the consultation and satisfaction with its outcome.

In summary, teleradiology has the potential to provide benefits to medical care in Australia — particularly in a rural setting — such as improved patient management and reduced hospital costs. The HCN teleradiology project is a collaborative effort that will provide a description of the costs and benefits of the teleradiology system for orthopaedic patients in the Riverina district of NSW and, more important, contribute valuable information to decisions about the role of teleradiology in Australia.

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