Letter to the Editor

A review of the experience of the Princess Alexandra Hospital teleconference fracture clinics over six years

1. Introduction

Telemedicine is not a widely used method of delivery for orthopaedic care in Australia. There are, however, a small number of services around the country that have been successfully providing orthopaedic care through telemedicine for many years.^{1,2} Teleconference fracture clinics have been held between the rural Mt Isa Hospital (MIH) and the Princess Alexandra Hospital (PAH), a tertiary referral centre, since January 2011. An analysis of the cost effectiveness of the first 18 months has previously been published.³ A number of other studies have examined the cost and patient benefits of telemedicine, and these have shown benefits consistent with our institution's initial experience, with reduced patient transfers and travel time, and earlier access to consultant led care.^{5–7} In the following six years, the teleconference fracture clinics have evolved and expanded. This article reviews our institution's experience of holding these clinics over the past 6 years. We retrospectively reviewed the prospectively collected data assessing the number of clinics held, the number of patients seen, and the estimated cost saved by reduced patient transfers during the six years. From our experience holding these fracture clinics, we re-evaluate the role telemedicine can play in clinical orthopaedic surgery, including its strengths, weaknesses, and areas for potential improvement and expansion.

2. Background

Fracture clinics at MIH are usually held by a local medical officer or nurse practitioner twice each week. Without the teleconference fracture clinics between the PAH and MIH, if consultant assessment or management is required, a patient from the fracture clinic and any accompanying person needs to be transferred to Townsville Hospital, at an estimated cost of \$1269 per adult, a significant cost that is shared by the patient and the health system. This cost was calculated in our pilot study and is based on airfares, food, accommodation, ground transport and time off work for the patient.⁴

The trial teleconference fracture clinics were held most Fridays in place of the usual fracture clinic, at an approximate cost of \$1285 per clinic. The cost of holding the teleconference fracture clinic was calculated from the time spent by clinical staff in organising and holding the clinic, and the cost of duplicate patient charts. Since 2012, the fracture clinics have been held in the PAH Telehealth Centre with its more advanced technological and audio-visual support. A radiographer and surgeon participate in the clinic in the PAH Telehealth centre, and can communicate with the local health practitioner and patient, and review radiographic imaging. The same orthopaedic surgeon has been conducting the telehealth fracture clinics since they commenced in 2011, and an additional orthopaedic surgeon began doing a weekly fracture clinic in 2015.

3. Results

Graph 1 shows the number of clinics held each year. There was an increase in 2015 when an additional surgeon joined and the teleconference clinics began being held twice per week. The value for 2017 only includes data from the start of the year. A total of 304 clinics have been held. With an average of 8 patients seen in each clinic, this means approximately 2410 patients have been reviewed in the teleconference fracture clinics.

Since 2011, over 300 clinics have been held by two orthopaedic surgeons, and approximately 2 400 patients have been seen in the teleconference fracture clinics. By applying the costs estimated in our original research, the estimated cost of holding the clinics is \$390 000. The initial study modelled the cost of transfer and estimated each patient transfer to cost \$1269–\$2134 for adult and paediatric patients respectively. Therefore, it is estimated that the teleconference clinics have saved approximately \$2 400 000 over 6 years, which equates to \$400 000 per year per hospital health service.

4. Discussion

Over the six years, many advantages of the teleconference fracture clinics have been identified. The most important has been the ability to bring consultant directed orthopaedic care in a timely manner to remote centres. When patients do not have access to consultant led specialist care, the options for treatment are to attend the emergency department of the local hospital and be transferred with the Royal Flying Doctor's Service, or incur the cost of private travel to another hospital.

The advantages of access to a consultant surgeon include earlier diagnosis of sinister pathology, the ability to discuss treatment options and to coordinate treatment plans with other hospitals, all of which were associated with reducing patient transfers. Other benefits to patients are reduced cost and distance of travel and less time off work. In addition to patients, parents and carers were also saved the time and expense of a transfer to Townsville Hospital.

Over the 6 years of the clinic, it was also noticed that a subgroup of patients was travelling hundreds of kilometres to attend the teleconference fracture clinic, sometimes with painful injuries, for things such as medical and compensation certificates. These simple injuries could be managed appropriately by a local, rural hospital if a teleconference service existed there to provide support and advice regarding management, prognosis and work limitations. The teleconference fracture clinics have been held between the PAH and some smaller hospitals on request, but many smaller hospitals could benefit from a regular telehealth service.

A significant group of patients were seen for post-operative reviews, and this was found to be a main example for saved patient transfers. There were a number of patients who had been referred to Townsville Hospital for surgery, and were able to have their post-operative follow-

Graph 1. Number of fracture clinics held each year from 2011 to 2017.

up appointments at MIH with the teleconference fracture clinics, and were therefore saved the time and cost of having to return to Townsville.

The teleconference fracture clinics also provide a unique opportunity for support and education of rural doctors.

One example of the benefits of early access to consultant led care through the teleconference fracture clinic is the case of a 50-year-old woman who attended the clinic having been placed in a short leg cast five weeks previously at her local hospital for a left distal fibula fracture. She presented in a wheelchair and complained of severe, constant pain in her left leg, which was unusual, given the length of time since her injury. The surgeon conducting the teleconference fracture clinic discovered her history of breast cancer, and diagnosed the pathological nature of the fracture as well as identify a suspicious lesion in her left distal tibia. The consultant was then able to refer her to an oncologist and coordinate clinic and imaging appointments so that they could occur in the one trip to Townsville. Had the teleconference fracture clinics not been held, this woman would have had to travel to Townsville Hospital for a consultant surgeon assessment and may have had a delayed diagnosis.

The challenges of the clinics include natural limitations of telehealth with reliance on a medical, nursing or allied health practitioner at the other end to assist in evaluating the patient. The surgeon needs to be able to direct a colleague at another location in how to perform specific examinations, and the local health practitioner needs to have some knowledge of clinical orthopaedic examination to accurately elicit clinical signs. In addition to this, the view of the patient on the screen is not perfect, although this has improved over the life of the clinics with newer and larger screens. Generally, our surgeons have found that through the telehealth medium, the practitioner at the other end is able to perform an adequate orthopaedic assessment.

Other challenges encountered included an initial high failure to attend rate of approximately 29%. In order to improve attendance, it was advertised to patients that they would be attending the teleconference fracture clinic which included a consultant orthopaedic surgeon. This successfully improved attendance to rates similar to those seen in regular outpatient clinics.

In order to improve the quality of plaster cast application in remote centres, the PAH runs a training seminar once each year, where plaster technicians from the PAH travel to MIH to educate and update local staff on plaster application. Our surgeons have found this to be an important qualifier in being able to deliver orthopaedic care via telehealth.

The first phase of the study identified difficulties with transfer of radiographic images due to the variety of radiological imaging systems used in Queensland hospitals, which prevent images from being automatically available on other systems. Previously, image transfer took a day, so patients needed to have an x-ray the day before their clinic

appointment. Since then, by changing radiology provider and moving to a web based radiology system, radiographic images are now more easily accessible, streamlining the consultation process and saving patients' time.

Some other areas of potential improvements have also been identified. Electronic medical records would allow multiple centres to allocate appointments for the clinics, and could also provide a location for patient notes, saving the cost of expensive duplicate charts. There is also the potential to expand the telehealth service to smaller, remote hospitals, provided they have access to radiology services. Training of the local health practitioners in assessment and management of common, uncomplicated orthopaedic pathology would assist with this, both in the telehealth consultation process, and also in ongoing local management of the patient. In addition, more surgeons would be needed to engage with the telehealth clinics to expand the service to multiple rural locations.

5. Conclusion

Our review of six years of teleconference fracture clinics shows a significant number of rural and remote patients have been able to be assessed in their local health service by an orthopaedic surgeon, with a significant patient benefits and cost saving by reducing patient transfers.

Conflict of interest

Both authors of this paper have no conflict of interest to declare, nor has any support been provided by a third party.

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