Virtual fracture clinic delivers British Orthopaedic Association compliance

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ABSTRACT

INTRODUCTION The British Orthopaedic Association recommends that patients referred to fracture clinic are thereafter reviewed within 72 hours. With the aim of improving care by seeking to meet this target, waiting times for fracture clinic appointments in a district general hospital were audited prospectively against this national guideline, with the intervening implementation of a virtual fracture clinic.

MATERIALS AND METHODS The study was conducted as a prospective closed-loop audit in which the second cycle took place several months after a change in the clinical pathway for all referrals from the emergency department to fracture clinic. Data were gathered in real-time via a pro forma during fracture clinic consultations.

RESULTS The first cycle demonstrated a non-compliant mean waiting time of 10.7 days, with 6% of patients being seen within the 72-hour target. Following the implementation of the virtual fracture clinic, the second cycle found that all patients were reviewed within the 72-hour target (mean 1.3 days).

DISCUSSION The improvement in performance was delivered with no increase in clinic capacity. The cost of implementation was negligible.

CONCLUSION A simple virtual fracture clinic model delivered a significant reduction in waiting times and achieved compliance with the British Orthopaedic Association guideline. Similar results could be achieved in subsequent deployment elsewhere in the NHS.

KEYWORDS

Orthopaedic surgery – Hospital outpatient clinics – Bone fractures – Quality improvement

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Introduction

In August 2013, the British Orthopaedic Association (BOA) Standards for Trauma published guidelines for fracture clinic services (BOAST 7 Guidelines).¹ Specifically, the first point addressed by these guidelines reads as follows:

Following acute traumatic orthopaedic injury, patients should be seen in a new fracture clinic within 72 hours of presentation with the injury. This includes referrals from emergency departments, minor injury units and general practice.

Owing to increasing demand and resource constraints throughout the NHS,^{2,3} fracture clinics face an ongoing need to match capacity to demand.

At a typical urban district general hospital, it was observed that there were often delays from first presentation to the emergency department to a patient's first appointment within the fracture clinic. Such delays increase the risk of suboptimal

patient outcome, such as extended duration of immobilisation in inadequate splints,⁴ patient anxiety and concerns while awaiting a specialist opinion⁵ and, in particular, prolonged delays to trauma surgery potentially increase the technical difficulties of the surgery itself, as well as increasing morbidity, mortality, length of stay and overall cost in certain cases.⁶

In response to feedback from clinicians that patients were often presenting later than recommended to fracture clinic, a closed-loop audit was undertaken to measure the actual time delay and, should the anecdotal reports prove correct, to implement a change to remedy the situation.

The aims of the study were threefold: i) to evaluate the compliance of the clinic with the BOAST 7 standard by establishing the proportion of new patient referrals seen within 72 hours in a fracture clinic, as well as the mean time in days from first presentation to a patient's first fracture clinic appointment; ii) to implement a change to address any compliance shortcoming; iii) to assess the outcome of the intervention.

Materials and Methods

The study was prospective, taking the format of a closed-loop audit against a recognised standard. It was conducted in an urban district general hospital.

Inclusion criteria were all new referrals from the emergency department and the minor injuries unit. Direct, acute referrals from GPs to the fracture clinic are only 5% of the cases in our hospital, which is consistent with other published assessments of referral sources.^{7,8} As GP referrals make up only a small proportion of acute referrals and arise through a completely different pathway, they were excluded from the study.

A pro forma was produced for data collection and performance metrics were recorded during new patient consultations in the fracture clinic over the course of a number of sessions. For each new patient attending the fracture clinic, by reviewing imaging from the emergency department and/or the minor injuries unit, we established when they first presented and, hence, the time in days until they attended the fracture clinic.

Our primary outcome measure was the proportion of new referrals that were seen within the recommended 72-hour period. As a secondary outcome measure, we established the mean averages in days for the time delay from first emergency department presentation to their first presentation to a fracture clinic.

The implementation of a virtual fracture clinic was considered. This clinic was introduced in the following manner. Each day, the fracture clinic staff were provided with the clinical notes and imaging for referrals in the preceding 24 hours from the emergency department and minor injuries unit fracture clinic. Following a weekend, the notes and imaging regarding all emergency referrals for the preceding 48 hours were provided to the fracture clinic on the Monday morning. An orthopaedic registrar reviewed each referral. The clinician then scheduled an appointment for the patient to be seen, while any inappropriate referrals were returned to the emergency department. Several months after implementing the virtual fracture clinic, the same pro forma was then completed to close the audit loop and the outcomes compared.

The virtual clinic can be considered to be equivalent to a formal clinic appointment, in that each new patient's notes

and imaging were reviewed by a trauma and orthopaedic specialist. However, for the sake of completion, in the second cycle of the audit, the elapsed time in days from their first emergency department presentation to the patient's first physical appearance in a fracture clinic was also recorded, to determine whether the 'triaging' effect of the virtual clinic showed any improvement here.

The chi-squared test was used to analyse categorical differences between the pre- and post-implementation populations. The Mann-Whitney U test was used to analyse the difference between sets of continuous data for the two populations. In both cases, a *P*-value of less than 0.05 was deemed to be statistically significant.

Results

In the first cycle of the audit, completed in May 2014, the consultations of 123 patients attending several clinics on different days of the week were audited. The virtual fracture clinic went live in October 2014. In the second cycle of the audit, completed in June 2015, 58 clinic consultations were audited, of which 51 had received prior review in the virtual clinic. Data collection ceased once the effectiveness of the clinic had become clear.

The rate of BOA compliance before and after implementation of the virtual clinic is shown in Table 1. Initially compliance was only 6% but post-implementation it rose to 100% for patients reviewed in the virtual clinic ($P < 0.05$). There was also a large improvement in the compliance rate for face-to-face consultations in clinic, which, post-implementation, rose to 53% ($P < 0.05$).

Considering the elapsed time before patients were reviewed in fracture clinic, the mean time in which patients initially waited for a consultation after presenting was initially 10.5 days, as shown in Figure 1. Following implementation, the mean waiting time for a virtual clinic review was 1.3 days ($P < 0.05$), as shown in Figure 2. The mean waiting time for a face-to-face consultation fell to 4.2 days ($P < 0.05$), as shown in Figure 3.

Discussion

The most important recommendation following this audit is that a virtual fracture clinic should be considered for

Table 1 Impact of virtual clinic intervention

Time of consultation	Patients (n)	Patients seen			
		Within 72 hours		After 72 hours	
		(n)	(%)	(n)	(%)
Pre-intervention	123	7	6	116	94
Post-intervention:					
Virtual clinic reviews	51	51	100	0	0
Physical clinic consultations	58	30	53	28	47

Figure 1 Distribution of waiting times for appointment pre-intervention

Figure 3 Distribution of waiting times for appointment post-intervention

Figure 2 Distribution of waiting times for virtual clinic post-intervention

implementation at other institutions where there is a known shortcoming with BOA compliance and/or with waiting times. The simplicity of the solution adopted in this study means that this recommendation is especially applicable in institutions where resources and/or finances are scarce.

Virtual fracture clinics are a relatively new phenomenon within the UK. The idea was first trialled in Glasgow in 2011 and was found to be successful in significantly reducing attendance at fracture clinics by avoiding unnecessary visits, thereby increasing the time available for improving standards of patient care, teaching and training without the need for additional resources.⁹ This approach was soon introduced into other hospitals within the UK, with their own processes developed from the Glasgow experience.^{10,11}

This study also sought to quantify the impact made in terms of compliance with the BOA guideline and on excess waiting times. The virtual clinic introduced during this study has seen a statistically significant increase in the proportion of patients being reviewed within the BOA target time. It has also led to a statistically significant fall in the mean time that patients wait for a face-to-face consultation. There was no

known instance of any patient being deprived of a necessary consultation as a result of the implementation of the virtual clinic.

The virtual clinic improved the effectiveness of existing capacity by:

- > sending inappropriate referrals back to the emergency department or minor injuries unit for their continued care, thereby freeing up appointment slots for the accepted appropriate referrals;
- > ensuring that patients' first attendance at the clinic took place at the most appropriate interval following injury, rather than the first available appointment. A reduction in the mean number of attendances per injury may have occurred. For example, a patient with an uncomplicated paediatric clavicle fracture, rather than being seen the day after the injury in the fracture clinic and again some time later for consideration of discharge, would not be seen in the following day's fracture clinic but would instead be seen later and perhaps discharged at that time. In this way, two appointment slots are reduced to one (albeit one which might have prolonged the wait for a consultation). It is in this arena that further improvements could be made. There are cases considered safe to be managed conservatively with very little specialist orthopaedic input. In the Glasgow model, these safe types of injuries are discharged directly from the virtual clinic and a telephone conversation with the patient ensures that they are provided with appropriate advice, that any concerns are addressed and that they are satisfied.

While it is acknowledged that larger sample sizes may have been desirable, it can also be reasoned that the statistical significance of its findings makes the recommendations of this study persuasive. Further work to investigate the effect of a virtual clinic on the average number of consultations required per injury, on patient satisfaction or on clinical outcome measures, particularly since the BOA guidelines are consensus-based, rather than evidence based, would be of interest.

Conclusion

We have shown how the implementation of a virtual fracture clinic in our hospital effected a significant improvement in waiting times and compliance with BOA guidelines. The model has been adopted permanently. We suggest that this model should be considered for implementation at similar institutions elsewhere.

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