Day Surgery for Trauma Patients

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Abstract:

Utilisation of day surgery units for orthopaedic trauma is an uncommon concept, but limited reports of its use in specific patients have been encouraging. There is currently no formal provision for day surgery for orthopaedic trauma patients in our trust. With a view to establishing a more formalised service, our three main objectives were to identify the proportion of trauma patients that would be suitable for day surgery, to identify the proportion of these that currently undergo these procedures as a day case and to establish if day surgery has potential to improve quality of service and be a more cost effective solution for trauma patients.

We undertook prospective data collection on all orthopaedic referrals in our institution over a one month period. All patients requiring surgery were assessed on their suitability for day surgery as defined by predetermined patient-related and surgery-related criteria.

Of 230 patients referred during the audit period, 129 required surgery. Of these, 57 (44%) patients met all criteria for day surgery, but only 15 (26%) had their procedures performed this way. The remaining 42 day surgery-eligible patients spent a total of 81 additional days in hospital; 34 days were due to preoperative delay and 47 were due to postoperative delay. The two main causes of preoperative delay were limited dedicated operating theatre capacity for day surgery-eligible procedures and limitations on dedicated bed availability. The causes of postoperative delay were more variable, but on the whole could have been avoided with appropriate protocols.

This audit has identified a significant proportion of the orthopaedic trauma workload which would be appropriate for day surgery. Without an appropriate day surgery setup, current delays result in 81 unnecessary bed days per month in our institution. These are caused by a lack of synchronisation between timing of admission and surgery and the lack of appropriate discharge protocols. We are in the process of developing a business plan for implementation of a dedicated day surgery trauma service at our institution and suggest that this may be an appropriate use of day surgery facilities in other trusts.

Introduction

The NHS has long identified the potential benefits of day surgery, dating back to the Audit Commission in 1990[1] and more recently highlighted by the NHS Modernisation Agency[2]. However, these initiatives have focussed on elective care and a relatively narrow basket of procedures. However, the principles of day surgery include process redesign and optimisation of list scheduling and can be applied to a very wide range of procedures, including some elements of emergency care[3].

Trauma surgery is one area where the well recognised benefits of day surgery, both to the patients and the hospital, may be realised. Other units have already found very favourable results from expanding the potential content of day surgery lists in trauma care. Schonauer and colleagues observed benefits from a day case list dedicated to hand trauma requiring plastic surgery in their unit[4], while another group trialled a dedicated knee trauma list with similar success[5]. Their experience was that removing these groups of patients from their general list not only reduced unnecessary admissions, reduced cost and improved patient satisfaction, but had other benefits too. For example, more knee operations were being performed by dedicated knee specialists on the day case lists[5], whilst a reduction in complication rates followed the introduction of a dedicated hand day case list[4].

The Bristol Royal Infirmary (BRI) is a large, approximately 700 bed, teaching hospital serving South Bristol and North Somerset, as well as receiving tertiary referrals from the Southwest. The trust's overall day surgery rate is currently 75%, while that in trauma and orthopaedics is 66.7% (although the majority of inpatient elective orthopaedic work is performed in the Avon Orthopaedic Centre, somewhat skewing the BRI figures). Despite an established day surgery unit and some elective orthopaedic day surgery provision,

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there is no dedicated day surgery trauma list. We do have one inpatient theatre exclusively dedicated to orthopaedic trauma for all sessions during the week, but as a regional referral centre for limb reconstruction, some of this time is taken up by specialist work, so trauma can overflow into the evenings. With no current provision for any day surgery trauma work, we wanted to find out if our hospital would benefit from the introduction of a day surgery list for appropriate trauma. The recent NCEPOD report, ''Trauma – Who Cares?' has highlighted the need for best possible trauma care provision, albeit in a more severely injured patient population than under discussion here[6]. In line with this, we hoped this study would provide an opportunity to introduce set standard protocols outlining best practice and also identify areas for improvement in this group of patients.

Table 1 Surgical and patient inclusion and exclusion factors for trauma day surgery (These guidelines are currently under review)

Surgical inclusion criteria:
able to mobilise within 12 hours of surgery
do not require extended postoperative monitoring
do not require postoperative imaging
Surgical exclusion criteria
any open fractures
high energy or multiple trauma
any femoral shaft, hip or tibial shaft fractures
need for further surgery
need for postoperative review over the following day by a doctor
requirement for ongoing medical care
Patient inclusion criteria
ASA grade 1 or 2
patients that had someone to take them home and help out for at least 24 hours
patients with controlled chronic medical conditions
BMI of under 35, or maximum 40 if they were otherwise very well.

Patients and Methods

We undertook prospective data collection from all trauma referrals in our institution over a one month period. Information was recorded about the date and time of referral, admission, operation and discharge. The nature of injury, type of procedure performed, grades of surgeon involved and length, nature and reason for any pre- or postoperative delay were also recorded.

All patients requiring intervention were assessed for their suitability for day surgery as defined by predetermined surgical and patient factors (Table 1). Surgical factors were based on the type of injury sustained, while patient factors were based on the current day surgery policy in our institution. Patients who met both surgical and patient factors were classified as being day surgery-eligible.

Of those identified as day surgery-eligible, our next step was to identify which of these patients were treated by day surgery despite the current lack of dedicated day surgery lists. More importantly, we identified the reasons preventing day surgery-eligible patients from achieving day surgery admission, classifying causes into both pre- and postoperative delay.

Our data were collected prospectively. We piloted our method in December 2007 and then undertook data collection from January to February 2008. We looked at all referrals made to trauma and orthopaedics.

Table 2 Trauma procedures in the 57 patients who met both the surgical and medical eligibility criteria for day surgery

Trauma procedures	Number of patients (%)
Open reduction and internal fixation:	
wrist	9 (15.8%)
ankle	5 (8.8%)
forearm	4 (7.0%)
elbow	3 (5.3%)
finger	3 (5.3%)
patella	2 (3.5%)
humerus	1 (1.8%)
clavicle	1 (1.8%)
K-wiring	
finger	8 (14.0%)
wrist	3 (5.3%)
Other procedures	
incision and drainage	6 (10.5%)
incision and drainage & removal of metalwork	1 (1.8%)
manipulation under anaesthesia	4 (7.0%)
washout & debridement	4 (7.0%)
knee arthroscopy	2 (3.5%)
tendon repair	1 (1.8%)

Results

There were 230 referrals over the one month period, of whom 129 patients required an operation. Of these 129 patients, 80 had procedures that met the surgical inclusion criteria and 57 of these also met the patient inclusion criteria. These 57 patients were therefore deemed day surgery-eligible.

Of the 57 day surgery-eligible patients, 15 (26%) were treated as day cases in our existing system. Those patients either left the accident and emergency department with a plan to return for day surgery at a later date, or they were admitted, operated on and discharged on the day of their injury. The remaining 42 day surgery-eligible patients (74%) were unnecessarily admitted for inpatient surgery.

There were a wide spectrum of trauma procedures which met inclusion criteria for day surgery eligibility (Table 2). The majority of procedures were upper limb (42%) and hand (21%), with the lower limb and soft tissue injuries making up 18% and 19%, respectively. The single most common procedure (16%) being open reduction and internal fixation of the wrist.

In the day surgery-eligible patients, the procedure was

performed by a consultant in five instances and other specialists in another five patients. Much of the day surgery-eligible work load (82%) was clearly undertaken by trainee grade surgeons, specifically clinical fellows or ST3 grade trainees performed 28 of the procedures and specialist registrars operated on the remaining 19 patients.

Of the 42 day surgery-eligible patients who were admitted following a traumatic injury, 17 still underwent their operation on the day of surgery. The remaining 25 patients experienced a preoperative delay; in 18 patients this was of one day, but five patients waited two days and two waited three days, making a total of 34 preoperative days delay. The majority of preoperative delay was either due to an overly busy theatre (13 patients) or to poor coordination and planning of admission, with patients either brought in the night before surgery (seven patients) to secure a bed or admitted late (two patients) minimising potential for same day discharge. A further two patients were delayed because of excessive swelling in one case and the need for a specialist surgeon in the other.

Eight of the day surgery-eligible patients were discharged on the day of their operation (six having been admitted for one day and two for three days before surgery), but 27 stayed in overnight and six patients had a two day postoperative stay. One further patient was unavoidably delayed for eight days by postoperative cardiovascular complications. The total postoperative delay was therefore 47 days.

The most significant cause of postoperative delay was the routine administration of intravenous antibiotics, which occurred in 17 patients and all of the patients with more than one reason for postoperative delay. This is related to the current hospital protocol, which involves three doses of intravenous cefuroxime given at the time of, and at six and 12 hours after, insertion of metal work. Other causes are shown in Table 3 and include the use of the evening theatre list for trauma cases, preventing reasonable same day discharge. The two complications included one patient with a recurrence of an abscess and one who developed fast atrial fibrillation and stayed in for rate control and medical review.

Table 3 The reasons for a postoperative delay in discharge in 34 of the 57 patients who met both the surgical and medical eligibility criteria for trauma day surgery

Reason for delayed discharge	Number of patients
Required intravenous antibiotics 12 hours after surgery	17
Use of evening operating list	11
Required medical review prior to discharge	5
Postoperative pain	4
Required neurological observations of a limb	3
Patient experienced complications	2
Required occupational therapy	1
Postoperative nausea	1
Patient anxiety	1

The discharge of nine patients was delayed for two reasons and of one patient for three reasons

Discussion

The results of our audit clearly identify a significant number of wasted bed days that could potentially be avoided by establishing an appropriate day surgery service for trauma patients in our institution. During the one month audit period, the total preoperative and postoperative delay amounted to 81 bed days, which equates to more than 900 bed days a year. The number of patients who could be deemed day surgery-eligible could be expanded if we were to implement a policy whereby local anaesthesia and blocks could be undertaken for appropriate procedures on ASA 3 patients. Including these patients would further increase the potential bed days saved within our department. However, of the patients deemed day surgery-eligible in this study, the two main limiting factors at present appear to be theatre provision and bed availability.

Limited dedicated operating theatre capacity for day surgery-eligible procedures resulted in their regular de-prioritisation for the sake of more urgent surgery. This can result in patients fasting for long periods of time, and being given false hope of being operated on, only to be later cancelled at short notice causing unacceptable levels of distress. Limitations on dedicated bed availability have led to the emergence of inappropriate coping strategies, with patients being brought in early to guarantee a bed. As a result there is currently no synchronisation between the admission and the planned time and date of surgery.

A large proportion of potential day surgeries were being performed on the evening trauma list, thereby precluding same day discharge. It is possible that these procedures are considered more minor and, as such, are left for evening lists, prioritising more complex surgery for daytime sessions when more supervision and guidance are available. This is supported by the high proportion of procedures performed by trainee grade surgeons. Regardless of simplicity, independent operating by trainee grade surgeons out of hours without adequate supervision is increasingly deemed inappropriate[7,8]. A planned day surgery trauma list with consultant supervision could, in addition to service benefits, become an excellent training opportunity.

In general, the vast majority of postoperative delay was for one day or less and was mostly for reasons that could be easily addressed. The problem causing the greatest postoperative delay was the routine prescription of intravenous antibiotics. This has been discussed with our microbiology colleagues and our current policy was deemed unnecessary. This is supported by recent evidence[9] and we now administer only a single dose of antibiotics on induction of anaesthesia.

Additional issues were patients waiting for a postoperative review by a doctor and inadequate symptom control. A doctor's review was often unnecessary and was requested by ward staff when there were no clear discharge plans in the operation notes. This led to the further problem that waiting for the review often took longer when there was a

poor handover between doctors and during weekend periods. This can be easily addressed with simple protocols, which have now been implemented.

Postoperative pain accounted for 11% of delayed discharges. Although of course valid, a mindset towards more aggressive management and a proactive rather than reactive attitude towards postoperative pain, may help to prevent pain delaying discharge. It has been shown that protocols implemented in a day surgery setting often provide more appropriate anaesthetic and postoperative analgesic management [10,11]. It has also been suggested that, if patients are appropriately informed preoperatively that their procedure is planned as day surgery, then this can have a positive effect on postoperative expectation of pain.

In order to move forward from this survey in our department, we have identified requirements for service provision, such as staffing, equipment and theatre time, and also requirements for changes to clinical protocols, such as admission criteria, fast-track discharging of appropriate patients and our antibiotic guidance. Some of these problems are addressed in the NHS Institution for Innovation and Improvement's to recent development work on the creation of a productive operative theatre.* Research shows that the way theatres function, both in a day surgery and inpatient settings, are causes for major bottlenecks in the care pathway of many patients, a concept supported by our audit. Improving theatre turnaround is one of the keys tasks that will streamline our service provision. Our audit has shown that taking appropriate patients out of the general surgery list and implementing a dedicated trauma day surgery list, with specific protocols for pain and antibiotic use, having appropriately trained surgeons, anaesthetists and nursing staff available specifically to run these lists has the potential to vastly improve the level of service offered in our department. Having a dedicated list will also make it much simpler to ensure that requirements specific to trauma are available for all patients; such as appropriate equipment, sterilisation techniques and laminar flow.

We will also address problems which have developed in our institution in order to try and guarantee our patients a bed – such as admission the day prior to surgery. As our patients have been selected according to certain criteria, they are, by their nature, of lesser severity and therefore more subject to losing their place to more urgent procedures. With a dedicated elective trauma list, our patients will no longer be competing with all other urgent surgery patients in the hospital. Our data have provided sufficient evidence to allow worthwhile discussions with appropriate management at our institution and they are in the process of implementing necessary changes to allow us to establish a day surgery trauma service.

Other centres have limited experience of providing some capacity for day surgery trauma and recent studies suggest generally favourable results in terms of cost analysis and of patient satisfaction[12,13]. Early problems have included a relatively high rate of unplanned overnight stays, but measures have been put in place to address the reasons behind this. Of particular interest will be a repeat audit following establishment of a day case trauma service in our institution to allow for comparative analysis with this study. We have already implemented change to the antibiotic policy and instituted a protocol to facilitate nurse led discharge where appropriate. Early indications are that these changes are having a beneficial effect, however, we are yet to re-audit. We have subsequently introduced a screening proforma for all trauma patients to facilitate future studies and to aid in the rapid identification of day case eligible patients. We would recommend other institutions adopt similar measures prior to planning potential day case trauma services.

In conclusion, we have identified that a significant proportion of orthopaedic trauma workload would be appropriate to be carried out as day surgery. Without an appropriate day surgery setup, current delays are causing approximately 80 unnecessary bed days per month in our institution. We are in the process of implementing changes required in order to establish a dedicated day surgery trauma service and suggest that this may be an appropriate use of day surgery facilities in other trusts.

* Conference presentation, 2008

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