The surgical management of patients who deliberately self-harm

BA ROGERS, F PEASE, DM RICKETTS

Department of Orthopaedics, The Royal Sussex County Hospital, Brighton, UK

ABSTRACT

INTRODUCTION Deliberate self-harm is a common problem that often requires orthopaedic treatment. Patients with injuries due to deliberate self-harm are often referred to our unit. This study assessed the type of treatment required and the cost of treatment.

PATIENTS AND METHODS We undertook a retrospective survey of deliberate self-harm patients with known ICD-10 psychiatric disorders admitted for orthopaedic care from a medium-secure, female-only, psychiatric unit. Data were collected on admission rate, duration of stay, surgical interventions and complications.

RESULTS Over a 36-month period there were 73 admissions for 15 patients (mean age, 25.1 years) requiring 65 operative interventions, a mean of 4.3 (range, 0–9) per patient. Over 50% of patients were admitted more than 3 times, totalling 416 hospital bed-days and 80% had methicillin-resistant *Staphylococcus aureus* (MRSA) isolated. The orthopaedic treatment costs for these patients was £453,000 during the period studied.

DISCUSSION The significant resources required to manage this patient cohort demonstrates the need for a co-ordinated management policy. We recommend day-case surgery for infected wounds only. Postoperatively, wounds should be protected with plaster of Paris. All patients with deliberate self-harm should be regarded as being infected with MRSA.

KEYWORDS

Deliberate self-harm – Surgical management – Cost

CORRESPONDENCE TO

Benedict A Rogers, Department of Orthopaedics, The Royal Sussex County Hospital, Brighton BN2 5BE, UK
E: benedictrogers@hotmail.com

Deliberate self-harm is defined as an act with a non-fatal outcome in which an individual deliberately acts with the intention to cause harm to themselves.¹ The incidence is up to 5% in the young adult population.^{2,3} Patients who suffer from deliberate self-harm are typically young with long-standing psychiatric morbidity.^{1,4} The orthopaedic injuries sustained by these patients vary in severity from soft tissue wounds and lacerations to long bone and pelvic fractures. Despite an array of case reports documenting the surgical treatment of individual cases,^{5,6} no studies in the literature have assessed the overall surgical caseload and resource implication of patients who repetitively self-harm.

We have gained experience in treating psychiatric patients who presented on many occasions following episodes of deliberate self-harm. The aim of this study was to evaluate the type and cost of orthopaedic treatment required.

Patients and Methods

Patients

We included all patients admitted for orthopaedic care from a local, medium-secure psychiatric unit. From hospital records, 15 patients were identified (mean age, 25 years;

Table 1 Diagnoses of admitted patients

Diagnosis	Number of patients
Borderline personality disorder	12/15
Schizophrenia	4/15
Substance misuse	7/15
Post-traumatic stress disorder	1/15
Eating disorder	4/15

range, 22–37 years). All patients were female and known to have an ICD-10 psychiatric disorder (see Table 1),⁷ with many patients having multiple psychiatric co-morbidities. We did not include episodes of orthopaedic care unrelated to deliberate self-harm.

Data collection

Data were obtained from hospital records regarding a 3-year period (May 2004 to May 2007). For each patient, a

proforma was completed to collate all the relevant information (Appendix 1)

Circumstances of treatment

This study was undertaken after 7 years of treating patients who repeatedly self harmed. During this time, we developed a protocol for treating patients with deliberate self-harm:

1. Staff from the referring psychiatric unit were encouraged to contact the on-call orthopaedic team following the discovery of deliberate self-harm wounds. Accident and emergency department attendances were kept to a minimum. Wounds without signs of infection were assessed and treated without hospital admission or surgical procedures if possible. This was because patients often used surgical wounds to attempt further deliberate self-harm, usually by insertion of foreign bodies.
2. Evidence of uncontrolled infection (*i.e.* spreading cellulitis, pus, offensive smell, systemically unwell, rising inflammatory markers) prompted commencement of antibiotics and consultant review within 24 h if possible.
3. Surgical management entailed the following: (i) wound swab and appropriate broad-spectrum antibiotics; (ii) surgical wound debridement under general anaesthetic; (iii) plaster cast protection of wounds following surgery to prevent further deliberate self-harm; and (iv) day-case surgery if possible.
4. At all times during hospital treatment, patients were supervised by at least two trained psychiatric staff.
5. Out-patient follow-up limited to one appointment, with further reviews only instigated following liaison between psychiatric and orthopaedic teams.

Results

Admissions

QUANTITY

Over the 36-month period studied, there were 73 admissions for the 15 patients, an average of one admission every 2 weeks, with 9 patients being admitted four or more times. The average length of stay for an orthopaedic admission was 5.7 days (range, 1–32 days). Overall, this patient cohort required 416 hospital bed-days.

DIAGNOSIS

All admissions were for the management of lacerations, wounds or foreign bodies inserted into wounds on the extremities or a combination of both. The most common site was the left forearm. In most patients, the same wound was repeatedly re-opened or foreign bodies were inserted

into chronic wound sinuses. Methicillin-resistant *Staphylococcus aureus* (MRSA) was isolated from 13 out of the 15 patients.

Treatment

NUMBER OF OPERATIONS

During the 73 admissions, 65 operative procedures were performed, a mean of 4.3 per patient (range, 0–9). Of these, 63 were under general anaesthetic. All patients were consented using a standard adult consent form.

TYPE OF OPERATIONS

All procedures related to soft tissue management (*i.e.* washout and debridement of wounds, removal of foreign body and primary or delayed wound closure). One patient underwent nine operative procedures to remove foreign bodies from the same wound.

A vacuum dressing was applied in one case following extensive wound debridement; the plastic surgery team subsequently managed this patient, requiring a local flap for soft tissue closure.

Plaster casts were used in 18 operations in an attempt to prevent repeated episodes of foreign body insertion into the same wound or re-opening of wounds. The 18 patients who had plaster casts applied subsequently underwent fewer operative interventions (2.2 compared to the overall mean of 4.3).

WOUND INFECTION

Infection was present in each of the treated wounds. MRSA was isolated from 13 of the 15 patients (86%). In addition, all patients had Gram-positive cocci cultured, principally *Staphylococcus aureus* and *Staphylococcus epidermidis*, with one case of *Peptostreptococcus* spp., a common anaerobic commensal of the human vagina.

ORTHOPAEDIC OUT-PATIENT FOLLOW-UP

Of the 15 patients, 13 had orthopaedic out-patient follow-up; 67 out-patient appointments in total, a mean of 5.1 per patient (range 1–11). During the period studied, several patients underwent out-patient review by other specialities (*i.e.* gynaecology and general surgery). These data were not included in this study.

Cost analysis

IN-PATIENT COSTS

The standard daily cost for an orthopaedic ward bed in our trust is £250. Each patient in this study had an escort of two trained psychiatric nurses 24 h a day, staffed in 8-h shifts. Thus, each day in hospital cost £600 in nurse escort costs (6 × 8-h shifts at £100 per shift).

Table 2 Cost analysis of patient care

In-patient cost		
	Orthopaedic ward bed	£250 per day
	24-h psychiatric nurse escort (×2)	£600 per day
	Mean cost per day	£850
	Average admission length (days)	5.7
	Total nursing and ward cost per admission	£4845
	Theatre/operation cost	£700
	Total mean admission cost per patient	£5545
Out-patient cost		
	Out-patient appointment (×1)	£40
	Psychiatric nurse escort (×1)	£100
	Transport	£20
	Total cost per appointment	£160
	Mean number of out-patient appointments per patient	5.1
	Mean out-patient appointment cost per patient	£816
Overall cost		
	Cost of 73 admissions	£353,685
	Cost of 65 operations	£45,500
	Cost of 67 out-patient appointments	£54,672
	Total cost	£453,857

OUT-PATIENT COSTS PER APPOINTMENT

Each patient was accompanied by a psychiatric nurse escort whose entire shift was devoted to the out-patient appointment. The mean cost of the out-patient appointment estimates the combined staffing and material costs.

OVERALL COST OF ORTHOPAEDIC MANAGEMENT

The total costs of in-patient and out-patient management for these patients, incorporating 73 admissions, 65 operations and 67 out-patient appointments over a 36-month period are shown in Table 2.

Illustrative case

A 29-year-old woman was admitted from a local, medium-secure unit having re-opened a self-inflicted wound on her anterior tibia and inserted cigarette ash, soil and a battery. This wound was infected and the patient was systemically unwell.

This patient had a psychiatric diagnosis of borderline personality disorder and deliberate self-harm. She had been admitted previously after inserting batteries into her vagina (on two separate occasions) and for inserting faeces-coated staples around her orbit. Her medical history included diabetes, asthma, obesity and cigarette smoking.

An initial debridement and washout failed to treat the infection adequately. The wound was managed with a further extensive debridement and the application of a vacu-

um dressing to manage the significant soft tissue defect. The anterior, lateral and superficial compartments of the lower leg were all exposed with a section of the tibia visible at the wound base. Following seven general anaesthetics and operative procedures by the orthopaedic team, the wound was closed by the plastic surgery team. This patient's admission lasted 28 days and she was monitored by two specialist psychiatric nurses 24 h a day throughout her admission.

Following return to the psychiatric unit, she has continued to self-harm and has required a further general anaesthetic to remove a twig, soil and cigarette butts from a further deep wound on her left arm. Currently, she remains under out-patient follow-up, having been reviewed 7 times in 9 weeks.

Discussion**Costs of treatment**

We had tried to reduce the costs of treating these difficult patients by the protocol outlined above. Despite this, the 15 patients studied incurred orthopaedic costs in excess of £450,000 over the 36-month period studied (£1000 a month each). These patients are young and likely to incur such costs over a long period of time.

The actual costs of treatment are likely to be far higher. We did not include in our calculation the costs of: (i) any

surgical treatment following initial debridement; (ii) treatment from other specialties for the same patients; (iii) treatment in the emergency department; or (iv) the continued residential costs at the secure psychiatric unit.

The current study demonstrates that the diagnosis of deliberate self-harm is associated with high, long-term costs to treat the complicated surgical problems that ensue. Hospital billing practise may need to be altered to reflect this.

Type of treatment

All patients were admitted for the treatment of infected soft tissue wounds. Of the 15 patients, 13 had MRSA isolated. We recommend that all deliberate self-harm wounds are assumed to be infected with MRSA and appropriately treated.

These cases frequently require multiple operative procedures, necessitating general anaesthesia for patients with significant medical co-morbidities including diabetes, epilepsy and obesity. For these patients, the use of a plaster cast is associated with a lower re-operation rate and avoidance of operative risk.

Conclusions

Patients who deliberately self-harm are young with numerous co-morbidities and are driven to repeated self-harm over a prolonged periods. This study highlights the problems

involved that lead to high costs over long periods of time. We recommend a policy that avoids hospital admission unless there is overt infection. Of infected wounds, 100% involve Gram-positive cocci and 80% involve MRSA. The use of plaster casts following surgery reduces the rate of re-operation.

References

1. Hawton K, Rodham K, Evans E, Weatherall R. Deliberate self harm in adolescents: self report survey in schools in England. *BMJ* 2002; **325**: 1207–11.
2. Gunnell D, Shepherd M, Evans M. Are recent increases in deliberate self-harm associated with changes in socio-economic conditions? An ecological analysis of patterns of deliberate self-harm in Bristol 1972–3 and 1995–6. *Psychol Med* 2000; **30**: 1197–203.
3. Gelder M, Gath D, Mayou R. (eds) Suicide and deliberate self harm. In: *Oxford Textbook of Psychiatry*. Oxford: Oxford Medical, 1989; 478–506.
4. Gunnell D, Bennewith O, Peters TJ, House A, Hawton K. The epidemiology and management of self-harm amongst adults in England. *J Public Health (Oxf)* 2005; **27**: 67–73.
5. Brown JN, Redden JF, Fagg PS. Deliberate self-harm as a cause of persistent discharge from arthroscopic portals. *J R Coll Surg Edinb* 1997; **42**: 252–3.
6. Sharma S, Rampurada A, Rees AJ. A glass foreign body in the knee joint mistaken for ACL avulsion: an unusual case. *Knee Surg Sports Traumatol Arthrosc* 2007; **15**: 766–8.
7. World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*. Geneva: WHO, 1992.

APPENDIX 1

Patient proforma

Age _____	Length of admission _____
Sex _____	Number of operations _____
Date of admission _____	Date of surgery _____
Psychiatric diagnosis (if known) _____	Operation _____
_____	Consent obtained _____
Diagnosis (FB/lac/other) and site _____	Vacuum dressing used _____
_____	Plaster of Paris used _____
Date of injury (or approximate) _____	Plastic surgery required _____
Psychiatric review during admission Yes/No _____	_____
Plastics referral Yes/No _____	_____
Discharge date _____	