Orthopaedic Admissions Due to Sports and Recreation Injuries

Abstract:
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Abstract
The health benefits of exercise may be attenuated by sports and recreation related injury (SRI). Though the majority of SRI are mild and self-limiting, a significant minority are serious and require orthopaedic intervention. The aims of this study were to assess the burden of these serious injuries on the orthopaedic inpatient service, and to investigate potential targeted areas for injury prevention. All 1,590 SRI seen in the ED over a 3-month period were attended using the Patient Information Management System to determine which patients received inpatient orthopaedic care. The medical records of those 63 patients who required inpatient care were reviewed and data collected on demographic features, history, operative procedure and theatre resources, and length of hospital stay. The mechanism of injury was defined using the ICD-9 classification. Mechanism of injury was classified asfall, over exertion which included injuries resulting from the patients own actions or excessive exertion e.g. forced inversion of the ankle, and external forces resulting from accidental or deliberate contact with a ball, piece of equipment or other player. Site of injury was classified as head and neck, upper limb or lower limb. SPSS (version 13.0; SPSS, Chicago, Illinois, USA) was used to analyse the data.

Methods
This was a three-month retrospective study, performed in conjunction with a larger study on all sports and recreation injuries (SRI) at the Emergency Department (ED) of a level one trauma centre. A new, upgraded ED opened on April 27, 2005. Data were collected on all patients aged four years or older presenting to the ED from that date to July 30, 2005 with an injury relating to sports and recreational activity. In total there were 1,590 patients. The Patient Information Management System (PIMS) was used to identify which of these 1,590 patients were seen by the orthopaedic trauma service. This in turn enabled us to quantify the burden placed on orthopaedic fracture clinics, inpatient care and operating theatre by SRI. This study addresses the latter two aspects of the orthopaedic trauma service. Patients under 4 years of age were included in the study. This age range was chosen because this is the age at which children are most likely to need medical attention or restrict activity. The resulting medical costs, costs of lost future work, and value of lost quality of life were calculated by multiplying the number of injuries attended to on many other wards. This study focuses on the burden imposed by sports and recreation injuries (SRI) on orthopaedic admissions and on the orthopaedic operating theatre. Injuries sustained during sports are common and the majority require some medical attention. Most of these injuries are dealt with in the ED, with the rest being cared for by first aid staff, physiotherapists and primary care practitioners. Of those patients who sustained severe injuries the majority require orthopaedic attention. Many of these operations were performed on an outpatient basis, but a proportion of them require admission and operative management. We also examine the activity resulting in injury and the mechanism of injury, in order to identify potential areas for injury prevention.

Results
16 females and 47 males were admitted to the orthopaedic unit during the 3-month period as a result of SRI. This represented 12.3% of all injuries requiring orthopaedic admission. The age range of these patients was 4-73 years, with a mean of 19 years. The most frequent activity resulting in orthopaedic admission was cycling, followed by soccer, playground apparatus, monkey bars, hurling and trampoline (Table 1).

The mechanism of injury was fall in 43 of the 63 (68.4%) patients admitted. Overexertion accounted for 12 injuries and external force was the mechanism of injury in 8 cases. The external force was struck by playing equipment in 3 cases, collision in 2 cases, struck by ball in 2 cases, and struck by another player in 1 case. The site of injury was lower limb in 36.5% (23 patients), upper limb in 61.9% (39) and head and neck in 1.6% (1). Injuries included tendon and ligamentous injuries e.g. ruptured Achilles tendon, patellar tendon, quadriceps tendon, ulnar collateral ligament of the thumb; meniscal tears in the knee; supracondylar fractures of the humerus; distal radius and ulna fractures; hand fractures; foot and ankle fractures; femoral shaft fractures; one stable lumbar spinous process fracture; and one ligamentous injury e.g. ruptured Achilles tendon, patellar tendon, quadriceps tendon, ulnar collateral ligament of the thumb.

Site of injury was classified as head and neck, upper limb or lower limb. SPSS (version 13.0; SPSS, Chicago, Illinois, USA) was used to analyse the data.

Figure 1
cLateral tibial plateau fracture sustained while skiing, treated with buttress plate.

Figure 2
Medial malleolus fracture sustained in a fall from a bicycle.

Just 4 patients were managed conservatively. Sixteen patients required only manipulation under anaesthesia (MUA), however 11 required MUA and Kirschner wires and 12 required open reduction and internal fixation. Other procedures performed were calcaneal pinning and scarf technique with Achilles tendon lengthening. 87.3% of operations were performed under general anaesthesia. Two surgeons were scrubbed in for 47.6% of the operations, 1 surgeon for 30.2% of cases, and 3 surgeons for 11.1% of cases. A radiographer was required in the operating theatre in 63% of cases. SRI resulted in a total of 59 operations, which was 9.7% of all orthopaedic operations, 20% of the operations for SRI were performed outside of routine hours by the on-call service. The duration of the operation was recorded in 49.2% of cases. The average duration of surgery was 28.33 minutes. No operation for which duration was recorded took longer than one hour. This is in keeping with the overall trend of surgery duration in the orthopaedic trauma theatre, where 43.8% of all cases took less than 30 minutes and 79% of cases were categorized as of minor or intermediate complexity. The length of hospital stay as a result of SRI ranged from 1 to 28 days, with a mean of 3.7 days.

Figure 3
The same patient post-operatively.

Discussion
This study is the first of its kind to document the direct impact of all sports and recreation injury on orthopaedic trauma services in Ireland. Other studies examined the effect of different individual activities or events, for example ice-skating, hurling, Gaelic football. We have demonstrated that overall sports and recreation injuries account for 12.3% of all orthopaedic admissions over a 3 month period and for nearly 10% of all operations performed by the service in that period. 20% of the operations for SRI were performed outside of routine hospital working hours. The function of the orthopaedic trauma service is to provide timely intervention in the management of emergency musculoskeletal injury. In a busy public service setting, motor vehicle collisions and occupational trauma are of a sufficient number to stretch resources. Sports and recreation-related injury further over-extend services.

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The retrospective nature of this study, combined with incomplete data entry in-patient and operating theatre records, means that a number of data sets are incomplete. This limits the conclusions that may be drawn, for example duration of operation was recorded in only approximately half the cases. We limited our study to cases involving orthopaedic admission, to the exclusion of other services. We do not therefore report on all hospital admissions resulting from SRI. We have seen from this study that many of the injuries requiring admission occurred in a recreational setting and may have been preventable. Irish and international studies have focused on trampoline-related injury. As far back as 1977 the American Association of Paediatrics has stated that trampolines should not be used in a residential setting. Their use and resultant injury from this use continues to rise. Linakis et al report a rise in US ED presentations from trampoline-related injury of 113% in the 10 years from 1995 to 2005. The use of bouncy castles is widespread in Ireland for celebrations and birthday parties. This equipment is provided without advice or instruction and injury arising from this use has also been reported. In this series, both these equipment resulted in a significant percentage of admissions due to SRI. Rising levels of paediatric and adult obesity has focused public health initiatives toward increasing activity levels in the general population. We must encourage our public to exercise and be active, but to do so in an informed and safe manner. Public health programmes aimed at promoting safe play and recreation may not only decrease the burden which SRI places on health care services but ultimately help the general public be more active and healthy. Fall was the mechanism of injury in 37% of all SRI referred to orthopaedics, but falls accounted for 68.4% of the SRI cases that required operative management, the implication being that injuries sustained in falls tend to be more severe. SRI had a significant impact on orthopaedic trauma services at our centre. We have identified falls in sport as a major cause of severe injury, and therefore as a target area for public education and injury prevention. This has been addressed in the US by the American Academy of Pediatrics and the National Program for Playground Safety (NIPPS), attention being paid to equipment standards, age-appropriate playgrounds impact dissipation measures such as 'fall-zones' and raising public awareness about active rather than passive supervision. The cost of sport and recreation in terms of injury and its impact on trauma services must not be ignored as we encourage the public to exercise. References

18. The National Program for Playground Safety (NIPPS): http://www.uni.edu/playground/

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