Penetrating ocular injuries in the home

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ABSTRACT

Background We studied the prevalence and aetiology of penetrating ocular injuries, in particular ones that were sustained whilst undertaking Do It Yourself (DIY) or gardening in the domestic environment. We also examined the extent of eye safety promotion in DIY stores and garden centres and on their websites.

Methods We conducted a case note review of patients who underwent surgery for penetrating ocular trauma between January 2000 and June 2004. Eight DIY stores and garden centres and 10 websites were visited and evaluated using standardized questions.

Results Of the 85 patients identified, 35 (41.2%) patients had injuries that occurred in the home with 10 patients having visual acuities of <6/60 at final follow up. Accidents from DIY or gardening were the cause in 17 of 33 (51.5%) patients, with a failure to wear eye protection in all cases. Overall, DIY stores and garden centres were poor at promoting eye safety both in their stores and on their websites.

Conclusion The home is a frequent place for severe penetrating ocular injury, with highly popular pastimes such as DIY and gardening as common causes. As many of these injuries are preventable, additional safety information is essential to educate the public on the potential dangers of these pastimes.

Keywords health promotion, ocular trauma, surgery

Introduction

Trauma is an important cause of serious ocular morbidity. Each year, there are 55 million eye injuries globally that ‘restrict activities for more than 1 day’, 19 million have at least unilateral permanent reduction in vision and 1.6 million people are blinded by their injury.1

A retrospective study of all injuries in Scotland over a 1-year period found the incidence of ocular trauma requiring admission to be 8.14 per 100 000 of the population annually with 10% losing useful vision in the injured eye.2 The incidence of penetrating eye injury in Australia is 3.7 per 100 000 of the population3 and 3.1 per 100 000 in the United States,4–6 with 78–80% of penetrating eye injuries occurring in males.7–9

About 30% of all eye injuries occur in the domestic setting,2 and ‘Do it yourself’ (DIY), car repairs and gardening have been shown to be a common cause of eye injury especially amongst males.10 As there has been a recent increase in these pastimes,11 perhaps due to a plethora of DIY and gardening shows on television, we wished to identify severe penetrating eye injuries that occurred in the home, in particular ones that were sustained whilst undertaking DIY or gardening. We also wanted to examine whether retail DIY stores and garden centres promote the use of eye-protection and whether approved safety goggles (at least to the British Standard of 2092) are sold to the public.

Methods

We identified cases of penetrating eye trauma that presented to the Birmingham and Midland Eye Centre, a large teaching hospital in an urban environment, between 1 January 2000 and 4 June 2004. Cases were identified by searching operating theatre registers for repair of penetrating eye injury, repair of ruptured globe, repair of perforation, scleral laceration and intra-ocular foreign body. Patient records were then reviewed to determine age, gender, place of injury, cause of injury, operation performed and best final visual acuity recorded.

DIY and gardening websites, in the Birmingham area, were searched for using the search engine google.co.uk and
the website www.Yell.com. The first 10 websites selling products, five for DIY stores and five for garden centres, were examined. To assess the safety content of the websites, we asked the following questions: (i) Is there a ‘safety’ link on the homepage? (ii) Is there a ‘safety’ link on the web pages of high-risk equipment, such as hammers and lawnmowers? (iii) Do they sell safety goggles? (iv) If so, are they approved to the British Standard?

Then four DIY stores and four garden centres in the Birmingham area were visited. All eight stores were reviewed using the following questions to analyse their ‘safety content’: (i) Are approved safety goggles located adjacent to the aisles containing high-risk equipment, such as hammers and lawnmowers? (ii) Are posters and leaflets advocating the need for eye protections in a prominent position, such as near pay counters? (iii) Are there warnings on/in the packaging of hammers and lawnmowers?

### Results

A total of 85 patients were operated upon during the study period. Of these, 76 (89.4%) were male and nine (10.6%) were female with a mean age of 36.6 years (range 4–90 years). Penetrating trauma occurred most frequently at home (n = 35, 41.2%). The next most common locations were the workplace (n = 21), public houses (n = 13), sporting areas (n = 7), road traffic accidents (n = 4), the street (n = 4) and school (n = 1).

### Injuries in the home

Of the 35 injuries occurring in the home, 33 (94.3%) were due to accidents and two from injuries sustained during assaults. Males were affected more often than females (30 versus 5), and the mean age was 48.7 years. These injuries most commonly affected the 20- to 39-year-old range (n = 12, 34.3%). Of the 33 accidents, 17 (51.5%) occurred directly due to DIY or gardening (Table 1), and in none of these injuries was eye protection worn. Of the injuries not sustained from DIY or gardening, falls were the most common cause (Table 2) and these occurred predominantly in the elderly. In 21 of 35 (60%) patients, the final visual acuity was 6/12 or better. However, four (11.4%) cases had a final visual acuity in the ‘visually impaired’ range (6/18–6/60), and the remaining 10 (28.6%) cases had a final visual acuity of 6/60 or worse with one eye requiring removal.

### Health promotion

We visited four DIY centres and four garden centres in the area. Safety goggles were located adjacent to the aisles containing hammers in two of the four DIY stores. There were no safety goggles adjacent to the aisles containing lawnmowers in any of the four garden centres. Posters and leaflets promoting eye safety and eye protection were found in only one DIY store and in one of the garden centres. However, all product packaging had ocular safety mentioned on them. Interestingly, in a local hire shop, which is part of a large national chain, it was mandatory to rent out eye goggles when hiring out equipment.

The websites of five DIY and five garden centres were examined. ‘Safety’ as a link from the homepage was found in 60% (five links on DIY sites and one on a garden centre site). However, the safety links on the homepages generally offered safety clothing rather than eye protection. On the pages for high-risk equipment (hammers and lawnmowers), only one web page had a safety link and even this did not contain approved eye protection. Only three websites, all of which were for DIY stores, sold British-Standard-approved eye protection. No garden centre websites offered eye protection of any description.

### Discussion

#### Main findings of this study

Of the 35 penetrating eye injuries that occurred in the home, 17 were directly due to DIY or gardening. The commonest
mechanism of injury was projectiles, usually from particles thrown off after hammering. A crucial factor to all these potentially blinding injuries was that the eye protection was not worn in any of these cases. Such injuries can cause significant loss of vision, and 14 of the penetrating eye injuries sustained in the home in our series resulted in a final visual acuity of 6/18 or worse.

Increased awareness of the risk of serious eye injury and how to prevent such injuries is crucial in reducing their incidence. Such health promotion has been shown to improve uptake of protective eye equipment in Australian squash players.12 However, we found the promotion of eye safety to be lacking both in store and online. More visual information or greater availability of goggles near ‘high-risk’ products in stores may encourage their use. The importance of such health promotion is especially poignant as none of the patients in our study who sustained serious ocular injury was wearing eye protection.

What is already known on this topic
A recent study7 from Manchester found that over half of the open-globe injuries resulted in a visual acuity of <6/15 and 12% required removal of the eye. Of the 107 open-globe injuries examined over a 5-year period, 23 (21%) took place in the home.

A large study looking at all hospital admissions for ocular trauma in Scotland2 found the home was the single most frequent place of injury (30.2%) for the 0–15 and 65-year and over-age groups. There were 428 admissions over a 1-year period, and tools or machinery, either at home (13.9%) or at work (10.3%), were collectively (24.2%) the most frequent cause of injury. This study included serious blunt trauma, but these cases were excluded from our study.

A 1-year retrospective study in Ireland by Mulvihill and Eustace showed 32.4% of all perforating injuries to be DIY-related,13 and severe ocular trauma relating to lawnmowers is well described.14

Limitations of this study
Our study is likely to have underestimated the number of DIY and gardening accidents caused by these pastimes as we only studied penetrating ocular injuries that, by their nature, are the most severe. We had excluded blunt trauma that could also cause severe visual impairment and did not include minor ocular trauma, such as corneal abrasions, corneal foreign bodies and eyelid lacerations that are also frequent consequences of DIY and gardening. We have no reason to think that those suffering these types of injuries would have worn eye protection.

We have shown that severe penetrating eye injuries commonly occur in the home, with DIY and gardening the most frequent causes. Prevention must remain the priority to reduce morbidity and the resulting socio-economic and psychological costs. Unfortunately, we found that preventative safety equipment was inadequately promoted in DIY stores, garden centres and online.

References