

# Surfboard-related eye injuries in New South Wales: a 1-year prospective study

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Surfing carries a well documented risk of head and facial injuries<sup>1-8</sup> and these injuries may have become more frequent in recent times with overcrowding at beaches and the streamlining of surfboard design. Ocular trauma caused by surfboards can be severe, with long-term effects on the work prospects and lifestyles of otherwise fit, young people.<sup>1</sup> There is an increasing number of case reports of severe surfboard-related eye injuries (SREIs)<sup>5-7</sup> and active discussion in the medical literature about the need for protective eyewear while surfing. Studies have found that protective headgear is seldom worn by surfers.<sup>8,9</sup>

No studies have examined the incidence of SREIs among surfers of all levels of experience in New South Wales or Australia. We need data on these injuries to establish the extent of the problem so that recommendations for the use of protective eyewear and headgear while surfing and guidelines for surfboard design can be developed for the Australian context, if required.

In this prospective study, we aimed to determine the incidence, nature and severity of SREIs in NSW over 1 year, between 30 December 2010 and 30 December 2011.

## Methods

For the purposes of this study, an SREI was defined as any eye, orbit or eyelid injury caused by a surfboard.

We sought to involve all NSW ophthalmologists in reporting SREIs by including a one-page description of our study and an accompanying doctor questionnaire in two of the Royal Australian and New Zealand College of Ophthalmologists' (RANZCO) quarterly newsletters. There are 308 Fellows of RANZCO registered in NSW. Ophthalmology trainees in NSW, of whom there are 61, were informed about the study at regular meetings which are attended by an overwhelming majority. We also made the questionnaire for doctors

## Abstract

**Objective:** To determine the incidence of surfboard-related eye injuries (SREIs) in New South Wales in 1 year.

**Design, setting and participants:** Prospective questionnaire-based study of SREIs through reporting on injuries, treatment and outcomes by ophthalmologists and ophthalmology trainees in NSW and by patients of all ages with any SREIs on risk factors for SREIs that occurred between 30 December 2010 and 30 December 2011.

**Main outcome measures:** Incidence, nature and severity of SREIs, defined as any injury to the eye, orbit or eyelid caused by a surfboard.

**Results:** 10 cases of SREIs were reported. Eight patients were male. The mean age of injured patients was 35.4 years. Two of the patients were children. Patients often had a combination of ophthalmic injuries. There were two globe ruptures, four fractured orbits, one case of fibreglass foreign bodies in the orbit and six eyelid lacerations. SREIs were caused by all sharp projections of the surfboard including the nose, fins and tail.

**Conclusions:** This study confirms that surfing carries a small risk of eye trauma and helps to describe and quantify SREIs. A fifth of the SREIs we report were severe. Surfboard modification and protective eyewear may help reduce the risk of SREIs.

available via a link on the Save Sight Institute website. Patients with SREIs were given a study information card by their doctor with the contact details of the researchers, and when they contacted us, they were given a patient questionnaire to complete and return by email.

Sixteen coastal and teaching hospitals in NSW were involved in the study and human research and ethics committee (HREC) approval was obtained from them and from the University of Sydney. The lead HREC for this study was that of the Northern Sydney Central Coast Area Health Service (NSCCAHS). The NSCCAHS emergency departments' data were monitored via their electronic database for patients presenting with SREIs during the study period. An article about this study appeared in *The Sydney Morning Herald* (SMH) near the conclusion of the study to capture any SREIs not reported to us via doctor questionnaires.

The de-identified doctor questionnaire included a description of the injury, date of injury, visual outcome, sex and age of the patient and place the injury occurred.

The de-identified patient questionnaire sought demographic information, details of the injury and its

severity, details of the event during which the SREI occurred and information on the surfer's level of experience. The questionnaire is shown in full in the Appendix (online at [mja.com.au](http://mja.com.au)).

## Results

Nine SREIs were reported by five ophthalmologists and two trainees (Box) and one SREI was self-reported by a patient. Doctor questionnaires were completed for all but one patient who did not seek medical attention. This patient self-reported the injury to us (with an accompanying photo) in response to the article in the SMH. Eight of the 10 patients were male. They ranged in age from 9 to 71 years, with a mean age of 35.4 years. Most patients had a combination of eye injuries. There was one periorbital contusion and six patients had eyelid lacerations. There were four orbital fractures and two penetrating eye injuries resulting in loss of vision and loss of the eye in one case. There was one case of retained fibreglass foreign bodies in the orbit. We are aware of an additional case of globe rupture sustained while surfing, but the data are incomplete as a doctor questionnaire

## Surfboard-related eye injuries: questionnaire results

Doctor questionnaire results*			Patient questionnaire results						
Case	Description of injury and surgery	Severity and visual outcome	Swell	Manoeuvre	Surgery	Board type	Part of board causing injury	Leg rope	Surfing experience
1	<b>Injury:</b> brow, UL, LL and canaliculus lacerations <b>Surgery:</b> lacerations sutured, Mini Monoka stent inserted	Mild No change from previous vision	na	Standing	Yes, once	Short, own board	Fin	No	Twice/week
2	<b>Injury:</b> corneal and scleral laceration, vitreous haemorrhage <b>Surgery:</b> primary closure of corneal/scleral laceration	Severe 6/24 – blindness	1–2m	Not standing	Yes, 3 times	Short, own board	Nose	Yes	Once/week
3	<b>Injury:</b> orbital floor fracture <b>Surgery:</b> no surgery	Mild No impairment	1–2m	Not standing	No	Long, own board	Fin	Yes	Learning to surf
4	<b>Injury (from photo; no doctor questionnaire completed):</b> periorbital contusion	nd	1–2m	Standing	No	Short, own board	Side of board near nose	Yes	Daily
5	<b>Injury:</b> conjunctival, LL, lateral canthus and nose lacerations <b>Surgery:</b> lacerations sutured	Mild No impairment	No patient questionnaire received						
6	<b>Injury:</b> UL laceration, orbital fracture, orbital fibreglass FBs, nose fracture <b>Surgery:</b> laceration sutured, removal of fibreglass FBs, nose fracture repaired	Mild No impairment	< 1m	Standing	Yes, once	Short, own board	Nose	Yes	Daily
7	<b>Injury:</b> medial wall orbital fracture, posterior globe rupture and eyelid lacerations <b>Surgery:</b> evisceration, eyelid lacerations sutured	Severe Loss of eye	No patient questionnaire received						
8	<b>Injury:</b> LL laceration <b>Surgery:</b> no surgery	Mild Normal vision	1–2m	Body boarding	No	Long, not own board	Bottom edge	na	Once/week
9	<b>Injury:</b> UL laceration <b>Surgery:</b> no surgery	Mild Normal vision	> 2m	Standing	No	Long, not own board	Back side of board	nd	Daily
10	<b>Injury:</b> orbital floor fracture <b>Surgery:</b> open reduction and internal fixation of fractured orbit	Mild Normal vision	No patient questionnaire received						

FB = foreign body. UL = upper lid. LL = lower lid. na = not applicable. nd = no data. \* Reported by five ophthalmologists and two ophthalmology trainees.

was not received; it has not been included in our data analysis.

Seven of the 10 patients completed patient questionnaires. SREIs occurred in seven separate locations and, interestingly, one of the eye injuries was sustained while using the surfboard in a backyard swimming pool. The other injuries occurred at Queens Head on the north coast, two different beaches in Shellharbour, Forster, Maroubra and Bondi. The injuries occurred throughout the year. Five of the seven patients were hit by their own boards and two were hit by someone else's board. In all four cases of SREIs caused by a patient's own board when surfing (the fifth SREI occurred in a backyard pool), the patient was wearing a leg rope. One patient was learning to surf while six others all surfed at least once per week.

In a 2011–2012 Australian Bureau of Statistics report on participation in sport and physical recreation, the number of people aged 15 years and over estimated to be participating in surf sports in NSW was 120 200,<sup>10</sup> among a NSW population at the time of 5 853 800. Based on our study and using the mid *P* method, the

incidence of SREIs in NSW is 8.3 per 100 000 person-years (95% CI, 4.2–14.8 per 100 000 person-years).

## Discussion

Our study confirms that surfing does carry a small risk of severe ocular injury.

At present there are no government regulations or recommendations about surfboard design or wearing protective eyewear or headgear while surfing. It would be possible to attach soft rubber tips to the nose or tail of short boards and to make fins from flexible material such as rubber. Protective eyewear and helmets especially designed for water sports are available.<sup>5</sup> Further research would be needed to assess the efficacy of surfboard modification and protective eyewear for preventing SREIs.

This is the first prospective longitudinal study of SREIs in Australia or NSW, and it has helped to describe and quantify the risk of SREIs. A limitation of the study is that we may not have captured all cases of SREI by our study method. It is possible that not all NSW ophthalmologists

were reached through our communications in the RANZCO journal, or that they chose not to participate because, despite our best efforts to simplify the reporting, they found it too cumbersome or time-consuming. We are aware of one such unreported SREI. Also, we may have missed minor injuries for which patients presented to optometrists or general practitioners or to no health professional at all. Further, we cannot be sure that the emergency department data we used captured all SREIs. Finally, not all patients responded to the patient questionnaire, so our data are incomplete with regard to specific risk factors for SREIs. Despite possibly underestimating the incidence of SREIs, our study has documented that SREIs do occur and that they are predominantly associated with the hard projections of the surfboard.

We report 10 SREIs occurring over a year in NSW in a range of circumstances, ages and levels of experience. One fifth of the SREIs we report were severe. One fifth of the injuries were in children. All parts of surfboards may be responsible for SREIs, consistent with the findings in other

studies.<sup>5</sup> Most of the severe ocular injuries in the literature and one of the two severe injuries we report were caused by the nose of the surfboard. It may be most important to modify this part of the surfboard to reduce the incidence of SREIs.

**Competing interests:** No relevant disclosures.

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