

Sports-related Eye Trauma Study (SETS): Five-year audit of sports-related eye injuries at a tertiary eye hospital in Australia (2015-2020)



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Aim

To examine outcomes of sports-related ocular injuries in an Australian tertiary eye hospital setting.

Method

Patients presenting with sports-related ocular injuries to The Royal Victorian Eye and Ear Hospital (RVEEH) Emergency Department (ED) over a 5-year period between 1/6/2015 and 31/5/2020 were included, if this was the first presentation for the injury.

Data were collected from initial presentation and most recent follow-up. Data examined included patient demographics (age, sex, date of presentation), injury mechanism (sport, mechanism, bilateral or unilateral involvement), injury characteristics (visual acuity [VA], intraocular pressure [IOP], pupil reactions, diagnosis) and investigation and management performed (orbital imaging and medical/surgical management). Multivariate logistic regression was used to determine the sports which had an increased risk of leading to an ocular injury. The study was approved by the Human Research Ethics Committee of the RVEEH (HREC reference: 09/886H/14) and all patient data was de-identified.

Results

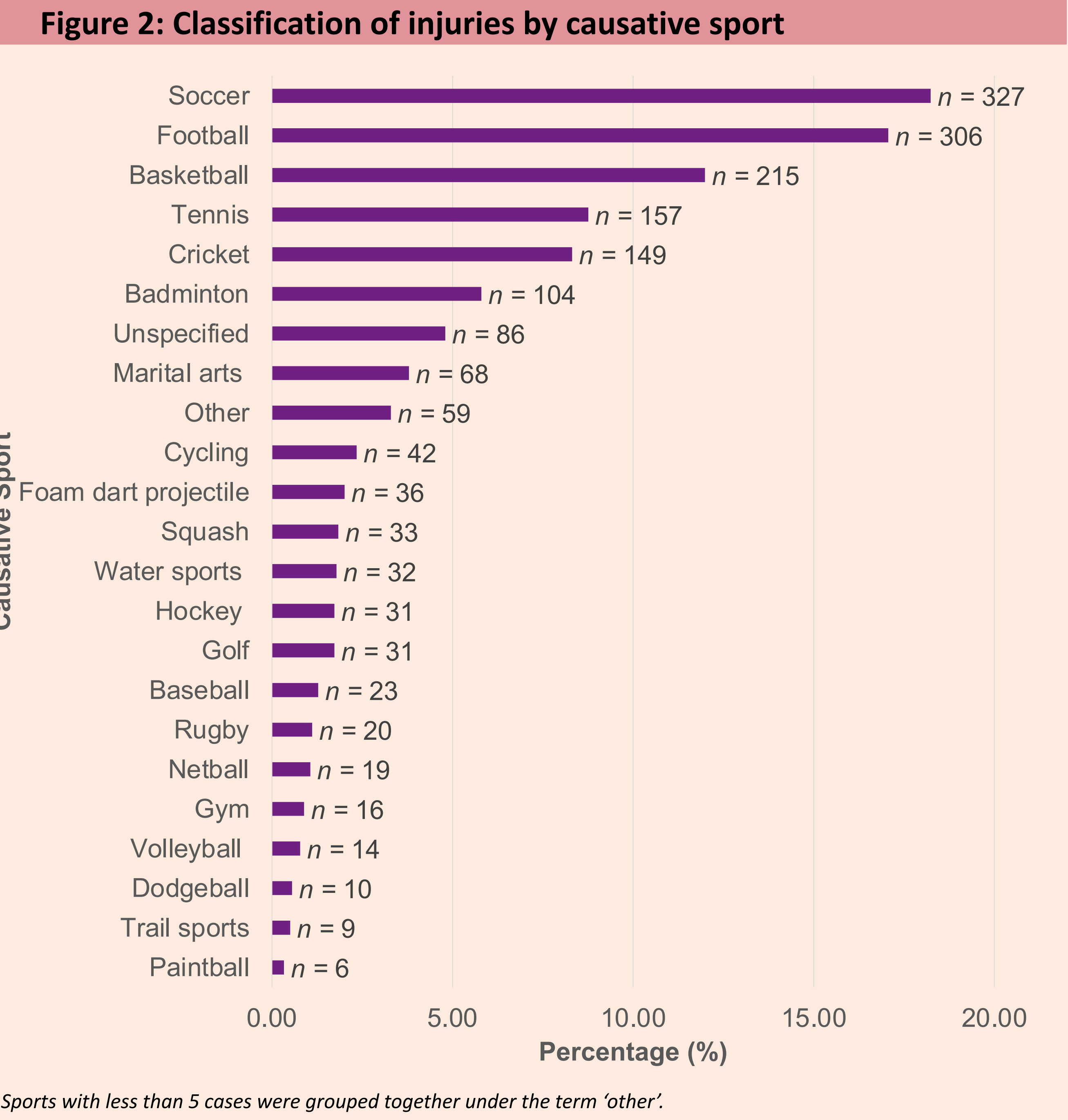
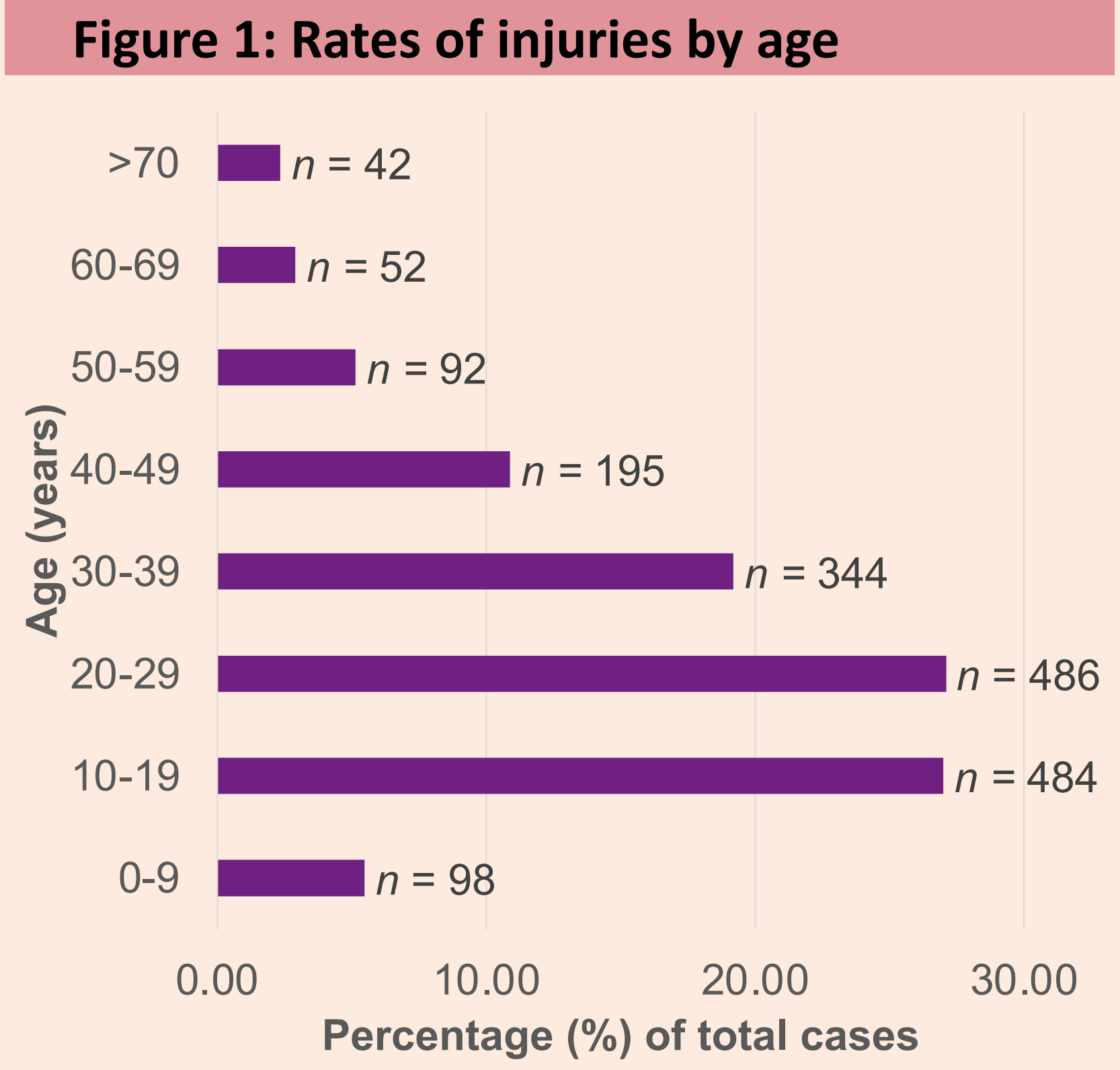
1793 individuals (mean age 28.67 years; 80.42% males and 19.58% females) presented with sports-related ocular trauma (see Figure 1). Most injuries (99.22%) were unilateral. The top three injury-causing sports were soccer (n=327, 18.24%), Australian Rules Football (AFL) (n=306, 17.07%) and basketball (n=215, 11.99%) (see Figure 2). The top three injury mechanisms were projectile (n=976, 54.43%), incidental body contact (n=506, 28.22%), and sporting equipment (n=104, 5.80%) (see Table 1). The most frequent diagnosis was traumatic hyphaema/ traumatic anterior uveitis (n=725) (see Figure 3).

Best documented baseline VA was ≥ 20/40 in 84.78%, 20/100-20/50 in 7.53% and < 20/100 in 7.69% of cases (see Table 2a). Follow-up VA was ≥ 20/40 in 95.01%, 20/100-20/50 in 2.31% and < 20/100 in 2.68% of cases (see Table 2b).

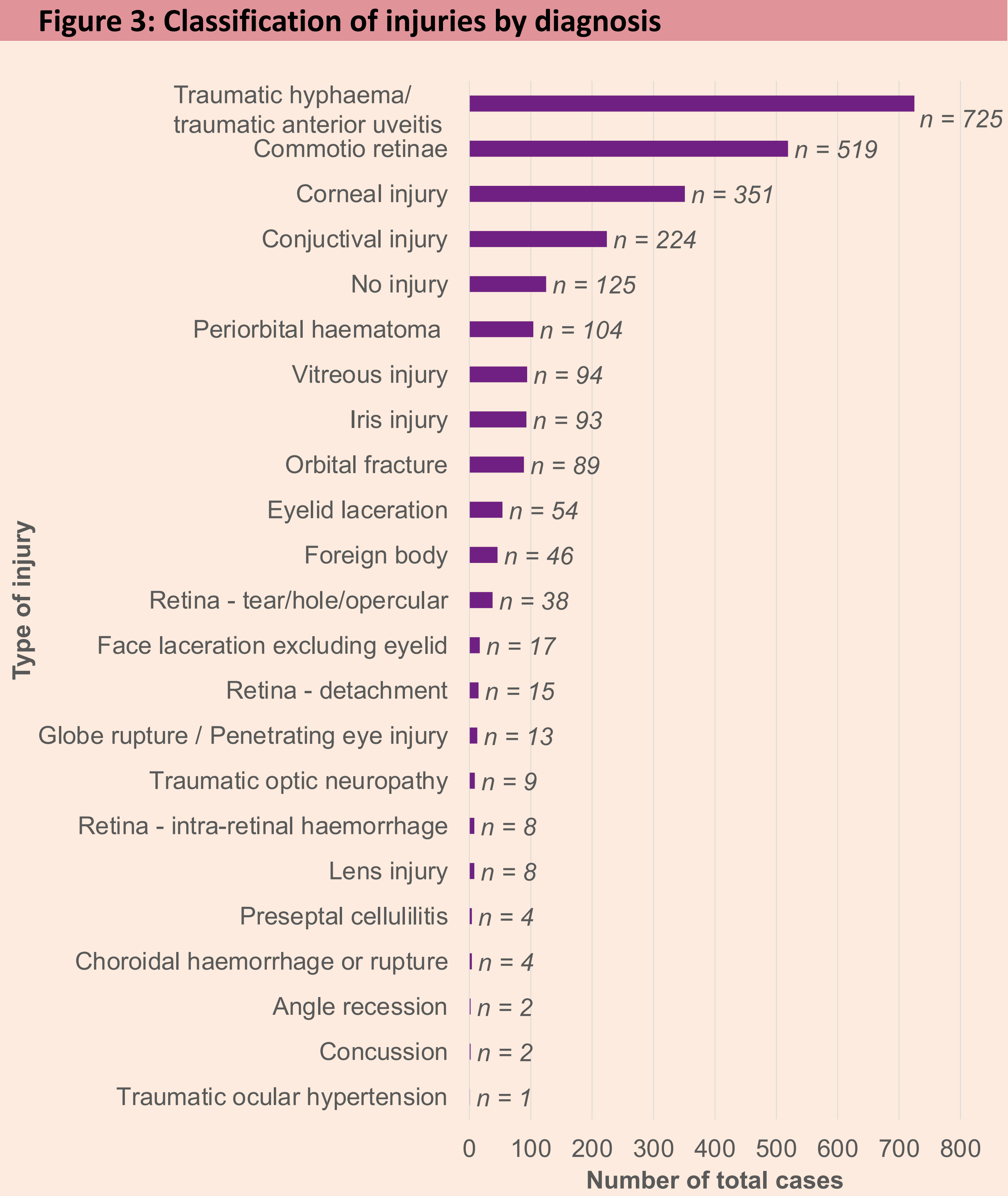
Using AFL as the base reference, multivariate logistic regression showed that the greatest risks of globe rupture or penetration were associated with martial arts (OR 16.22) and golf (OR 10.43); orbital blow-out fracture with skiing (OR 14.42), hockey (OR 4.39) and cricket (OR 2.35); hyphaema with squash (OR 4.18), badminton (OR 3.87) and cricket (OR 2.39); and retinal tears with foam dart projectiles (OR 5.59). All associations were statistically significant (p < 0.05).

Topical steroids were the most common non-surgical treatment (n=693, 38.65%). CT orbits and facial bones were the most common investigation (n=184, 10.26%). The mean baseline IOP in the injured eye was 16.05mmHg; 103 (5.74%) cases required topical ocular anti-hypertensive medication.

Of the presenting cases, 27 (1.51%) were recorded as being admitted from the ED to hospital and 26 (1.45%) cases required surgery. The most common sport contributing to surgical cases was AFL with 5 (19.23% of surgical cases) cases followed by basketball, cricket, golf and hockey all with 3 (11.54% of surgical cases) each. The most common mechanism of injury contributing to surgical cases was projectile with 12 (46.15%) cases. The most common injury requiring surgery was globe rupture/penetration with 10 (25.64%) cases.



| Table 1: Classification of injuries by causative mechanism | | |
|--|---------------|-------------------------------|
| Mechanism of injury | Frequency (n) | Percentage (%) of total cases |
| Projectile | 976 | 54.43 |
| Incidental body contact | 506 | 28.22 |
| Sporting equipment | 104 | 5.80 |
| Foreign body | 78 | 4.35 |
| Unspecified | 71 | 3.96 |
| Natural element | 33 | 1.84 |
| Fall | 14 | 0.78 |
| Other | 7 | 0.40 |
| Protective clothing | 4 | 0.22 |
| Total | 1793 | 100.00 |



Discussion

Ocular injuries and their sequelae can predispose patients to long-term physical, psychosocial and health-economic impacts, which is particularly concerning as studies have demonstrated that sports-related ocular trauma disproportionately affects the young. [1] Mean patient age was 28.67 years and 30.56% of patients were paediatric. Importantly, this higher impact on the younger age groups highlights the risk for long-term loss of quality-adjusted life years. Further research is required to explore the nature of this observation and may target interventions for higher-risk school and community level sports.

Soccer, AFL and basketball were the leading sports to cause injuries, accounting for 47.30% of all cases. The use of protective eyewear is not mandatory in any of these sports, likely contributing to the high number of presentations. In contrast, paintball, where the use of a face shield in Australia is mandatory, was the sport to cause the least number of injuries, contributing only 0.33% of cases. The frequency of the use of protective eyewear was not calculated in study participants as this information was not documented in the majority of presentations. It has previously been demonstrated that appropriate protective eyewear can reduce the incidence of sports-related ocular injury. [2]

The strength of the study is that data was obtained from the ED of the largest tertiary eye referral center in Australia and New Zealand. However, it is important to acknowledge that the study does not encompass all patients with sports-related eye trauma in Victoria. Secondly, follow-up data was only included for patients with follow-up at RVEEH.

The findings of this study suggest that we should aim to minimise sports-related ocular trauma through various methods including advocacy for the use of protective eyewear particularly amongst individuals and sports that pose the greatest risk for serious ocular injury. [3]

Conclusion

Sports related eye trauma has a predilection for young males. The top three sports associated with any eye injury were soccer, Australian Rules Football, and basketball. The most frequent injury was traumatic hyphaema. Projectiles posed the greatest risk for injury and short-term visual impairment.

| Table 2: Visual acuity | | |
|---|---------------|-------------------------------|
| (a) Best documented visual acuity in affected eye at initial presentation | | |
| Visual acuity | Frequency (n) | Percentage (%) of total cases |
| ≥ 20/40 | 1487 | 84.78 |
| 20/50 to 20/100 | 132 | 7.53 |
| 19/100 to 5/200 | 70 | 3.99 |
| 4/200 to light perception | 65 | 3.70 |
| No light perception | 0 | 0.00 |
| Total | 1754 | 100.00 |

| (b) Best documented visual acuity in affected eye at latest follow-up | | |
|---|---------------|-------------------------------|
| Visual acuity | Frequency (n) | Percentage (%) of total cases |
| ≥ 20/40 | 781 | 95.01 |
| 20/50 to 20/100 | 19 | 2.31 |
| 19/100 to 5/200 | 16 | 1.95 |
| 4/200 to light perception | 5 | 0.61 |
| No light perception | 1 | 0.12 |
| Total | 822 | 100.00 |

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