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Eye injuries in Australia 2010–11 to 2014–15

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Abbreviations

AFHSB	Armed Forces Health Surveillance Branch
AIHW	Australian Institute of Health and Welfare
ED	emergency department
ERP	estimated resident population
ICD	International classification of disease
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
METeOR	Metadata Online Registry
NHMD	National Hospital Morbidity Database
NISU	National Injury Surveillance Unit
NMDS	national minimum data set
NNAPEDCD	National Non-admitted Patient Emergency Department Care Database
USEIR	United States Eye Injury Registry
WHO	World Health Organization

Summary

This report provides an overview of eye injury cases identified in hospital admission records over the 5-year period from 1 July 2010 to 30 June 2015. A brief analysis of eye injury presentations to emergency departments (EDs) for a 2-year period from 1 July 2013 to 30 June 2015 is also included.

Eye injury cases admitted to hospital, 2010–11 to 2014–15

Close to 52,000 people required an admission to hospital for treatment for eye injury between 2010–11 and 2014–15. An *Open wound of the eyelid and periocular area* (27%) was the most common principal diagnosis for eye injury cases, followed by a *Fracture of orbital floor* (18%). *Falls* were the most common cause of eye injury, being responsible for just over one-third (35%) of cases. A fall-related eye injury most commonly occurred in those aged over 65 and was more frequently reported in women of this age group (72%) than in men (46%). A further 23% of eye injuries were due to an *Assault*, with this being the most common external cause reported for males (26%). *Exposure to inanimate mechanical forces* (20%) rounded out the top 3 external causes. This latter category includes, for example, injuries due to a foreign body entering the eye, or being struck in the orbital region by an object. A total of 3,720 Aboriginal and Torres Strait Islander people were hospitalised for an eye injury. During this 5-year period, assault-related eye injuries were more frequent for Indigenous Australians (61% or 2,270 cases) than for non-Indigenous Australians (20%, or 9,317 cases).

Sports-related eye injuries

In the 5-year period 2010–11 to 2014–15, 3,291 injuries in males and 595 injuries in females were sustained while the person was participating in a sporting activity. This is likely to be an underestimation because information on activity while injured was not reported for 69% of cases. Sports-related eye injuries occurred most frequently among people aged 25–44 (34% of males and 26% of females). More than one-third (37%) of males were participating in a form of football, including rugby or soccer, when they sustained an eye injury. Trail or general horseback riding (12%) was the most common sport reported for females. Over half (55%) of the sports-related cases resulted in an *Orbital bone fracture* of some type.

Eye injuries while working for income

Approximately 3,000 eye injury cases (6%) occurred while the person was working for income. This is likely to be an underestimate because information on activity while injured was not reported for 69% of cases. The most common type of eye injury was *Injury of eye and orbit* (35%), followed by *Orbital bone fracture* (22%). *Construction* (14%; 400 cases) was the most frequently specified employment sector where eye injuries occurred *While working for income*. A further 9% of cases occurred in the *Agriculture, forestry and fishing* sector (268 cases).

Eye injuries presenting to an emergency department, 2013–14 to 2014–15

A total of 86,602 cases presented to an ED with an eye injury between 1 July 2013 and 30 July 2015. More than 2 in 5 (44%) of all ED presentations for eye injury were for a *Foreign body in the eye*. Less than 1% of this type of eye injury resulted in a hospital admission.

1 Introduction

This report examines eye injuries in Australia that resulted in an admission to hospital over a 5-year period from 1 July 2010 to 30 June 2015. A brief analysis of eye injury cases presenting to a public hospital emergency department (ED) over a 2-year period, 1 July 2013 to 30 June 2015, is also included. The last AIHW publication on eye injuries in Australia was published in 2009. In that report, just over 100,000 cases of hospitalised eye-related injury were identified over a 6-year period from 1999 to 2006 in Australia, representing 4.4% of all hospitalised injury cases (AIHW 2009).

Traumatic injury to the eye is known to be a leading cause of visual impairment and of blindness most often affecting people under the age of 46 (Adelman & Raducu 2016). While most eye injuries are likely to be minor and non-threatening (for example, a foreign body in the cornea or contusion (bruising) to the eyelid), some have serious and lasting consequences that result in reduced vision or blindness, for example, where there is a penetrating wound or the traumatic removal of an eye (avulsion of eye).

The World Health Organization (WHO) estimated that in 2010, 285 million people were affected by visual impairment globally; 39 million of these were blind and 246 million had low vision (WHO 2012). In the Australian context, a national eye health survey was conducted between 11 March 2015 and 18 April 2016 to estimate the prevalence of older Australians living with vision impairment or blindness (Foreman et al. 2016). This survey was conducted in the context of the *National framework for action to promote eye health and prevent avoidable blindness and vision loss* (Commonwealth of Australia 2005). Based on the results of this national survey and using age-adjusted population data, it was estimated that more than 453,000 older Australians were living with vision impairment or blindness. This includes approximately 18,000 Indigenous Australians aged 40 or over and 143,000 non-Indigenous Australians aged 50 or over.

While no current epidemiological data is available specifically for visual impairments due to traumatic eye injuries, approximately 1.6 million people globally were estimated to be living with blindness due to eye injures (Adelman & Raducu 2016). A further 2.3 million people were estimated to have bilateral visual impairment (that is, reduced vision in both eyes) and 19 million, unilateral vision loss (reduced vision in one eye).

Analysis of 11,320 eye records from the United States Eye Injury Registry (USEIR) database concluded that eye injuries sustained during a fall had a poor prognosis, with every second person with an eye injury remaining blind (Kuhn et al. 2006). Similarly, 41% of assault-related eye injuries in the USEIR resulted in blindness. Some eye diseases usually attributable to injury, such as vitreous haemorrhage or retinal detachment, were also found to increase the risk of blindness. From a public health perspective, therefore, it is important to understand the current incidence of eye injuries in Australia and who in the population might benefit from eye injury prevention programs.

Causes of eye injury

Eye injury generally refers to an injury that might have been due to mechanical trauma (blunt or penetrating), or chemical agents or radiation (Adelman & Raducu 2016). However, some eye injury surveillance programs, such as the USEIR, and the United States of America Armed Forces Health Surveillance Branch (AFHSB) also recognise that an eye injury may be due to an eye disease usually attributable to injury, such as traumatic cataracts, retinal detachments and corneal disorders (AFHSB 2016; Kuhn et al. 2006).

The main foci of this report are eye injury cases admitted to hospital or presentations to EDs due to a blunt or penetrating trauma, chemical agents or radiation; the selection criteria for these eye injury cases is detailed in the following 'Methods' section. However, to enable broader comparison with other eye injury surveillance data, a separate Appendix has been included to provide a brief analysis of separation records that include an 'eye injury or eye disease usually attributable to injury' (see 'Appendix B: Other eye-related injury data').

Methods and data sources

Two data sources have been used to prepare this report: the National Hospital Morbidity Database (NHMD) for eye injury cases resulting in a hospital admission, and the National Non-admitted Patient Emergency Department Care Database (NNAPEDCD) for presentations to an ED for an eye injury.

National Hospital Morbidity Database

The NHMD is an Australian Institute of Health and Welfare (AIHW) data set that contains information on episodes of admitted patient care in public and private hospitals in Australia. In addition to administrative data, this data set contains diagnoses, procedural and external causes of morbidity and mortality codes using international standard classification systems. For the first 3-year period of this report, 2010–11 to 2012–13, episodes of admitted patient care are coded according to the seventh edition of the *International statistical classification of diseases and related health problems, tenth revision, Australian modification* (ICD-10-AM) (NCCH 2010). For 2013–14 and 2014–15, episodes of admitted patient care are coded according to the eighth edition of the ICD-10-AM (NCCC 2012).

Selection criteria for hospitalised eye injury cases

Records in the NHMD that met the following criteria were included as hospitalised eye injury cases:

- episode of admitted patient care was between 1 July 2010 and 30 June 2015
- had 1 of the following ICD-10-AM *Chapter 19 Injury, poisoning and certain other consequences of external causes* codes recorded as the principal diagnosis:
  - *Superficial injury of eyelid and periocular area* (S00.1 & S00.2)
  - *Open wound of eyelid and periocular area* (S01.1)
  - *Orbital bone fracture* (S02.1, S02.3 & S02.8)
  - *Injury to optic, oculomotor, trochlear, and abducent nerves and pathways* (S04.0–S04.2 & S04.4)
  - *Injury of eye and orbit* (any S05 code)
  - *Foreign body in eye* (T15.0, T15.1, T15.8 & T15.9)
  - *Burns to the eye area* (T26.0–T26.4)
- mode of admission was not a transfer from another acute hospital. (Inward transfers were omitted to reduce multiple counting of cases.) (See 'Appendix A: Data issues' for details.)

In tables and charts, unless stated otherwise:

- the patient's age is calculated at the date of admission
- in tables by age group and sex, cases for which age and sex were not reported were included in totals

- rates were age-standardised as detailed in ‘Appendix A: Data issues’.

Non-admitted Patient Emergency Department Care Database

The NNAPEDCD is also an AIHW data set, and contains information on the care provided (including waiting times for care) for non-admitted patients registered for care in emergency departments in selected public hospitals. (See ‘Appendix A: Data issues’ for more details on the NNAPEDCD.) These data are hereafter referred to as emergency department data or ED data.

Comparable ED data were not available for 2010–11 to 2012–13. In ED data, the principal diagnosis refers to the diagnosis established at the conclusion of the patient's attendance at an ED to be mainly responsible for occasioning the attendance following consideration of clinical assessment. ED data were included only for records with presentations coded according to ICD-10-AM using the principal diagnosis field. Presentations to New South Wales hospitals were excluded as over 70% of cases in this jurisdiction were coded using a system known as Systematised Nomenclature of Medicine or SNOMED. Presentations to hospitals in Western Australia were also excluded due to the significant number of cases where the principal diagnosis field was blank or contained non ICD-10-AM codes. Presentations to one Victorian hospital were also excluded because their data were coded to ICD-9-AM.

Selection criteria for eye injury presentations to ED

Records in the NNAPEDCD that met the following criteria were included as eye injury presentations:

- presentation date to an ED was between 1 July 2013 and 30 June 2015
- had 1 of the following ICD-10-AM *Chapter 19 Injury, poisoning and certain other consequences of external causes* codes recorded as the principal diagnosis:
  - *Superficial injury of eyelid and periocular area* (S00.1 & S00.2)
  - *Open wound of eyelid and periocular area* (S01.1)
  - *Orbital bone fracture* (S02.1, S02.3 & S02.8)
  - *Injury to optic, oculomotor, trochlear, and abducent nerves and pathways* (S04.0–S04.2 & S04.4)
  - *Injury of eye and orbit* (any S05 code)
  - *Foreign body in eye* (T15.0, T15.1, T15.8 & T15.9)
  - *Burns to the eye area* (T26.0–T26.4).

Underestimation of cases

In addition to the known exclusions for ED data, the number of eye injuries identified in this report is an underestimate of the total number of cases in Australia, as not all of the ways that a person with an eye injury may present for assessment and management have been included. People who present to a general practice, private consulting rooms of an ophthalmologist, or optometrists, or who present directly to outpatients have also not been included. Minor cases may not be the subject of any professional health care.

A further contributing factor may be that an eye injury can occur in conjunction with other more serious injuries, for instance a traumatic brain injury or fracture of a limb. These more serious injuries would be considered as chiefly responsible for occasioning an episode of admitted patient care and would be recorded at the principal diagnosis.

Additionally, a person might have sustained an injury to both eyes, but only 1 type of injury to 1 eye can be recorded as the primary diagnosis and counted. In particular, 4 eye injury case records identified in this report contained up to 7 different eye injury codes. This type of underestimation is not necessarily negligible, as close to 7,000 eye injury cases had a second eye injury code recorded in an additional diagnosis field; just over 1,300 cases had 2 additional eye injury diagnoses recorded, and 264 cases had 3 additional eye injury diagnoses recorded. Overall, 16% of eye injury cases identified in this report had 2 or more eye injury codes appearing in the record.

Further information about the terminology and methodological issues used in this report can be found in Boxes 1.1–1.4 and in 'Appendix A: Data issues'.

Structure of this report

The primary focus of this report is eye injuries that resulted in a hospital admission between 1 July 2010 and 30 June 2015 (this period is abbreviated as 2010–11 to 2014–15). The report is arranged as follows:

Chapter 2 provides an analysis of cases where the principal diagnosis and primary reason for being admitted to hospital was an eye injury. Included in the analysis are age and sex, type of eye injury, external cause of injury, activity at time of injury and place where the injury occurred. A brief analysis of eye injuries in Aboriginal and Torres Strait Islander people is also included.

Chapter 3 presents a brief overview of ED presentations for eye injury in a 2-year period from 1 July 2013 to 30 June 2015.

Appendix A: Data issues provides summary information on the NHMD and NNAPEDCD, notes on the presentation of data, the population estimates used to calculate population rates, analysis methods, and information on data quality.

Appendix B: Other eye-related injury data expands the analysis of the NHMD and NNAPEDCD to include, for broader comparison, records with either an eye injury diagnosis code or 1 of 3 diseases of the eye usually attributable to injury. The NHMD unit of counting in this section is a 'separation' rather than a 'case', and is expanded to include separations due to any principal diagnosis.

Appendix C: Additional tables provides the data that underpin the figures reported in Chapter 2.

Box 1.1: ICD-10-AM codes for an eye injury diagnosis

ICD-10-AM *Chapter 19: Injury, poisoning and certain other consequences of external causes (S00–T98*) eye injury codes include:

- *Superficial injury of eyelid and periocular area* (S00.1 & S00.2)
- *Open wound of eyelid and periocular area* (S01.1)
- *Orbital bone fracture* (S02.1, S02.3 & S02.8)
- *Injury to optic, oculomotor, trochlear, and abducent nerves and pathways* (S04.0–S04.2 & S04.4)
- *Injury of eye and orbit* (any S05 code)
- *Foreign body in eye* (T15.0, T15.1, T15.8 & T15.9)
- *Burns to the eye area* (T26.0–T26.4).

Box 1.2: Indigenous reporting

In this report, the terms 'Aboriginal and Torres Strait Islander people' and 'Indigenous Australians' are used to refer to people identified as such in Australian hospital separations data and population data collections. Separations for which Indigenous status was 'not stated' (873 cases) have been excluded from the analyses of non-Indigenous Australians. (See 'Appendix A: Data issues' for more information on Indigenous status.)

Injury rates were age-standardised to age 65 and over by the direct method.

Analysis of ED presentations by Indigenous status was not undertaken in this report.

Box 1.3: Summary of terms relating to hospitalised eye injury cases

Statistics on admitted patients are compiled when an **admitted patient** (a patient who undergoes a hospital's formal admission process) completes an episode of admitted patient care and 'separates' from the hospital. This is because most of the data on the use of hospitals by admitted patients are based on information available at the end of the patients' episodes of care, rather than at the beginning. The length of stay and the procedures carried out are then known and the diagnostic information is more accurate.

Separation is the term used to refer to the episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute care to rehabilitation). 'Separation' also means the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing type of care.

The **principal diagnosis** is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care.

(continued)

Box 1.3 (continued): Summary of terms relating to hospitalised eye injury cases

An **additional diagnosis** is a condition or complaint either coexisting with the principal diagnosis or arising during the patient‘s episode of admitted patient care.

An **external cause** is defined as the environmental event, circumstance or condition that was the cause of injury or poisoning. Whenever a patient has a principal or additional diagnosis of an injury, an external cause code should be recorded. External cause codes include information on whether the injury was accidental or intentional.

Injury cases are estimated as the number of injury separations, less those records where the mode of admission was ‘inward transfer’. Inward transfers are omitted to reduce over-counting.

Box 1.4: Summary of terms relating to eye injury presentations to an emergency department

The **presentation** of a patient at an emergency department occurs following the arrival of the patient at the emergency department and is the earliest occasion of being registered clerically or triaged.

The **principal diagnosis** is the diagnosis established at the conclusion of the patient’s attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment.

2 Hospitalised eye injury cases, 2010–11 to 2014–15

This chapter analyses NMHD data for episodes of admitted patient care over a 5-year period from 1 July 2010 to 30 June 2015.

Analysis in this section is restricted to cases where the principal diagnosis was one of the eye injury codes from *Chapter 19 Injury, poisoning and certain other consequences of external causes* of the ICD-10-AM (see Box 1.1). Between 2010–11 and 2014–15, close to 52,000 eye injury cases required an admission to hospital (Table 2.1). The age-standardised rate was 11.9 cases per 100,000 population.

Table 2.1: Key indicators for eye injury cases, by sex, Australia, 2010–11 to 2014–15

Key indicators	Males	Females	Persons
Number of hospital separations due to eye injury	36,218	18,679	54,897
Estimated number of eye injury cases	34,094	17,684	51,778
Age-standardised rate of cases per 100,000 population	11.3	12.0	11.9

Source: AIHW National Hospital Morbidity Database.

Age and sex

More males (34,094 cases) than females (17,684 cases) were hospitalised as a result of an eye injury (Table 2.2). The age category with the highest number of cases was 25–44 (28%) and fewer cases occurred among children. Differences between males and females by age were evident. A much greater proportion of eye injuries occurred in males 25–44 (32%), while just under half of the identified eye injury cases for females occurred in those aged 65 or older (42%).

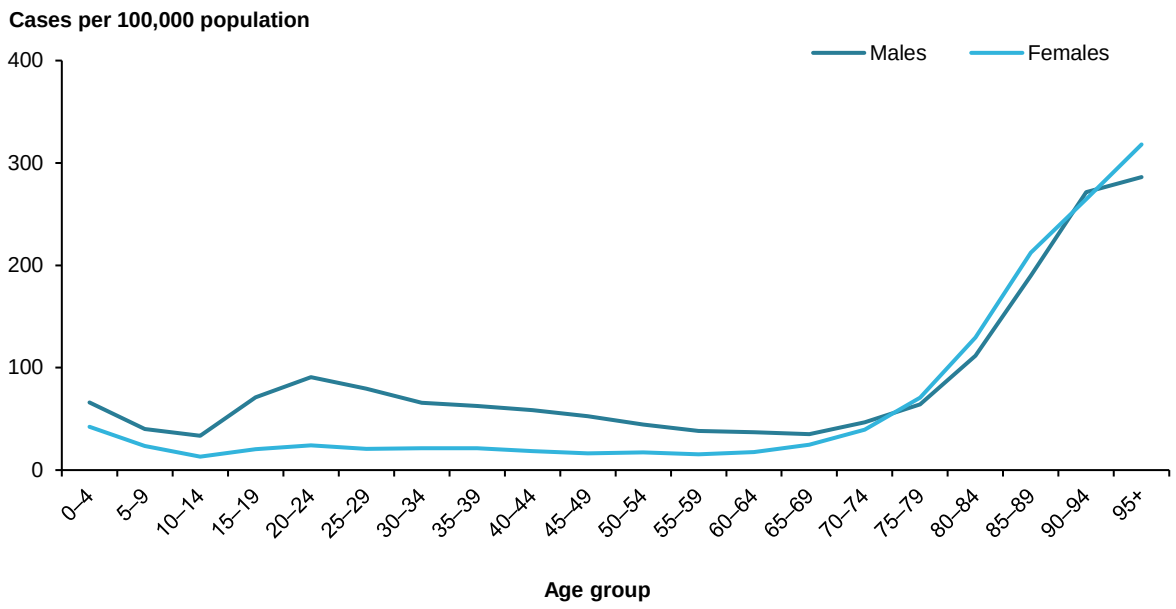
Table 2.2: Eye injury cases, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	Number	%	Number	%	Number	%
0–4	2,543	7.5	1,538	8.7	4,081	7.9
5–14	2,679	7.9	1,269	7.2	3,948	7.6
15–24	6,467	19.0	1,691	9.6	8,158	15.8
25–44	10,907	32.0	3,348	18.9	14,255	27.5
45–64	6,124	18.0	2,397	13.6	8,521	16.5
65+	5,373	15.8	7,441	42.1	12,814	24.7
Total[(a)]	**34,094**	**100**	**17,684**	**100**	**51,778**	**100**

(a) Total includes 1 male case with no specified age.

Source: AIHW National Hospital Morbidity Database.

The pattern of age-specific rates of eye injury was generally similar for males and females, with low rates until about 75–79 years, after which higher rates were seen in successive age groups (Figure 2.1). The greatest disparity between males and females can be seen among those aged 20–24. The age-specific rate for men aged 20–24 was 90.9 cases per 100,000 population, compared with 24.2 cases per 100,000 per population for women of the same age.



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.1: Age-specific rates for hospitalised eye injury cases, by sex, Australia, 2010–11 to 2014–15

Types of eye injuries

Types of eye injuries reported as the principal diagnosis are presented in Table 2.3. *Open wound of the eyelid and periocular area* was the singular principal diagnosis recorded for hospital admissions due to eye injury for 2010–11 to 2014–15, accounting for 27% of cases overall. A *Fracture of orbital floor* was the next most common specific injury at 18%, followed by a *Contusion of the eyelid and periocular area* (10%) (this type of injury commonly results in a 'black eye'). A *Contusion of the eyelid and periocular area* and an *Injury to the abducent nerve* were the only specific eye injuries where female cases outnumbered males.

An *Injury to the optic nerve and pathways* was the most frequent type of injury to a nerve reported (45 of 92 nerve injury cases). A total of 1,648 cases involved a foreign body becoming lodged in the cornea; these cases accounted for 3% of eye injuries overall and 52% of cases involving a foreign body in the eye. A *Burn to the cornea and conjunctival sac* was the most frequent type of burn involving the eye (45% of burns).

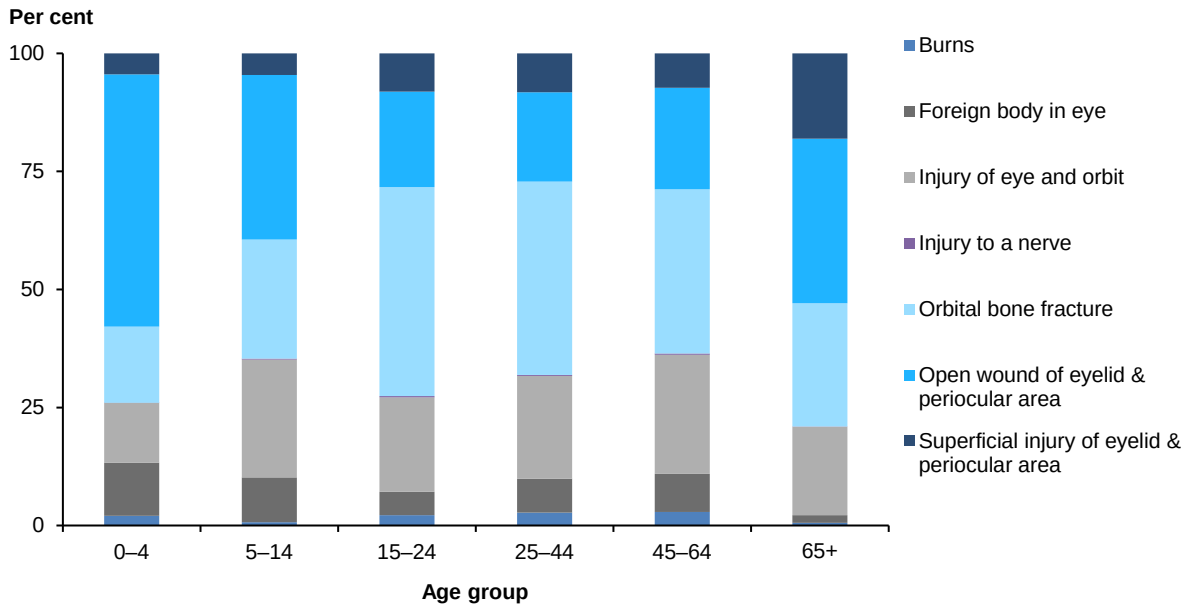
Table 2.3: Principal diagnoses for eye injury cases, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Principal diagnoses	**Number**	**%**	**Number**	**%**	**Number**	**%**
Superficial injury of eyelid & periocular area	2,005	5.9	3,127	17.7	5,132	9.9
Contusion of eyelid & periocular area	*1,983*	*5.8*	*3,111*	*17.6*	*5,094*	*9.8*
Other superficial injuries of eyelid & periocular area	*22*	*0.1*	*16*	*0.1*	*38*	*0.1*
Open wound of eyelid & periocular area	8,996	26.4	5,203	29.4	14,199	27.4
Orbital bone fracture	12,518	36.7	4,896	27.7	17,414	33.6
Fracture of base of skull including orbital roof	*3,522*	*10.3*	*1,339*	*7.6*	*4,861*	*9.4*
Fracture of orbital floor	*6,706*	*19.7*	*2,548*	*14.4*	*9,254*	*17.9*
Fracture of other skull & facial bones including orbit, n.e.c.[(a)]	*2,290*	*6.7*	*1,009*	*5.7*	*3,299*	*6.4*
Injury to a nerve	64	0.2	28	0.2	92	0.2
Injury of optic nerve & pathways	*36*	*0.1*	*9*	*0.1*	*45*	*0.1*
Injury of oculomotor nerve	*9*	*0.0*	*5*	*0.0*	*14*	*0.0*
Injury of trochlear nerve	*16*	*0.0*	*9*	*0.1*	*25*	*0.0*
Injury of abducent nerve	*3*	*0.0*	*5*	*0.0*	*8*	*0.0*
Injury of eye and orbit	7,247	21.3	3,545	20.0	10,792	20.8
Injury of conjunctiva & corneal abrasion, no mention foreign body	*920*	*2.7*	*511*	*2.9*	*1,431*	*2.8*
Contusion of eyeball & orbital tissues	*1,451*	*4.3*	*1,052*	*5.9*	*2,503*	*4.8*
Ocular laceration & rupture with prolapse or loss of intraocular tissue	*631*	*1.9*	*242*	*1.4*	*873*	*1.7*
Ocular laceration without prolapse or loss of intraocular tissue	*767*	*2.2*	*312*	*1.8*	*1,079*	*2.1*
Penetrating wound of orbit with or without foreign body	*195*	*0.6*	*87*	*0.5*	*282*	*0.5*
Penetrating wound of eyeball with foreign body	*860*	*2.5*	*140*	*0.8*	*1,000*	*1.9*
Penetrating wound of eyeball without foreign body	*623*	*1.8*	*149*	*0.8*	*772*	*1.5*
Avulsion of eye	*31*	*0.1*	*12*	*0.1*	*43*	*0.1*
Other injuries of eye & orbit	*1,030*	*3.0*	*676*	*3.8*	*1,706*	*3.3*
Injury of eye & orbit part unspecified	*739*	*2.2*	*364*	*2.1*	*1,103*	*2.1*
Foreign body in eye	2,495	7.3	652	3.7	3,147	6.1
Foreign body in cornea	*1,267*	*3.7*	*381*	*2.2*	*1,648*	*3.2*
Foreign body in conjunctival sac	*222*	*0.7*	*85*	*0.5*	*307*	*0.6*
Foreign body in other & multiple parts of external eye	*211*	*0.6*	*49*	*0.3*	*260*	*0.5*
Foreign body on external eye part unspecified	*795*	*2.3*	*137*	*0.8*	*932*	*1.8*
Burns	769	2.3	233	1.3	1,002	1.9
Burn of eyelid & periocular area	*61*	*0.2*	*32*	*0.2*	*93*	*0.2*
Burn of cornea & conjunctival sac	*360*	*1.1*	*92*	*0.5*	*452*	*0.9*
Burn with resulting rupture & destruction of eyeball	*2*	*0.0*	*0*	*0.0*	*2*	*0.0*
Burn of other parts of eye & adnexa	*73*	*0.2*	*24*	*0.1*	*97*	*0.2*
Burn of eye & adnexa part unspecified	*273*	*0.8*	*85*	*0.5*	*358*	*0.7*
Total	**34,094**	**100**	**17,684**	**100**	**51,778**	**100**

(a) n.e.c. is the abbreviation for 'not elsewhere classified'.

Source: AIHW National Hospital Morbidity Database.

The types of eye injuries varied greatly across age groups (Figure 2.2). *Open wound of the eyelid and periocular area* was the most common type of injury among younger age groups (0–4 and 5–14 years) and among those aged 65 or older (53%, 35% and 35% of cases, respectively). This was followed by *Orbital bone fracture,* 16%, 25% and 26% of cases in the same age group, respectively. For the middle age groups (15–24, 25–44 and 45–64 years), the most common type of eye injury was *Orbital bone fracture*, ranging between 35% and 44% of cases among these age groups.



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.2: Proportion of type of eye injuries, by age group, Australia, 2010–11 to 2014–15

External causes of eye injuries

Just over one-third (35%) of eye injury cases were due to a *Fall* (Table 2.4). *Falls* accounted for 53% of female eye injury cases compared with 25% for males. A further 23% of eye injuries were due to an assault (11,818 cases), with this being the most common external cause reported for males (26%), and second most common for females (16%). *Exposure to inanimate mechanical forces* rounded out the top 3 external causes overall (20%), and for both males (24%) and females (12%). Just under 10% of eye injuries were due to transport crashes. Circumstances related to these 4 leading causes of eye injury are discussed in more detail below.

Table 2.4: External causes of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
External cause	**Number**	**%**	**Number**	**%**	**Number**	**%**
Transport crash	3,239	9.5	1,350	7.6	4,589	8.9
Accidental drowning and submersion	8	0.0	2	0.0	10	0.0
Accidental poisoning	669	2.0	249	1.4	918	1.8
Falls	8,603	25.2	9,293	52.6	17,896	34.6
Thermal causes	190	0.6	62	0.4	252	0.5
Exposure to inanimate mechanical forces	8,305	24.4	2,198	12.4	10,503	20.3
Exposure to animate mechanical forces	1,897	5.6	676	3.8	2,573	5.0
Intentional self-harm	62	0.2	33	0.2	95	0.2
Assault	8,954	26.3	2,864	16.2	11,818	22.8
Other external causes of accidental injury	1,856	5.4	786	4.4	2,642	5.1
Undetermined intent	197	0.6	82	0.5	279	0.5
Other[(a)]	114	0.4	89	0.6	203	0.4
Total	**34,094**	**100**	**17,684**	**100**	**51,778**	**100**

(a) External causes in this residual category includes cases due to complications of medical and surgical care, sequelae and supplementary factors related to causes of morbidity and mortality classified elsewhere.

Source: AIHW National Hospital Morbidity Database.

Fall-related eye injuries

People in the 65 and over age group made up the highest proportion (59%) of all fall-related eye injury cases (Table 2.5). The proportion of women aged 65 and over was considerably higher than for men in the same age group: 72% for women compared with 46% for men. Cases in the 45–64 age group were the next most numerous (13% overall), and then children aged 0–4 (10%).

Table 2.5: Fall-related eye injury cases, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–4	1,125	13.1	648	7.0	1,773	9.9
5–14	676	7.9	301	3.2	977	5.5
15–24	575	6.7	194	2.1	769	4.3
25–44	933	10.8	494	5.3	1,427	8.0
45–64	1,341	15.6	992	10.7	2,333	13.0
65+	3,953	45.9	6,664	71.7	10,617	59.3
Total	**8,603**	**100**	**9,293**	**100**	**17,896**	**100**

Source: AIHW National Hospital Morbidity Database.

An *Open wound of the eyelid and periocular area* (41%) was the most commonly reported eye injury following a *Fall* (Table 2.6). A further third (33%) resulted in a fracture to one of the orbital bones, such as the orbital roof or floor. *Foreign body in eye* was the least commonly reported eye injury resulting from a fall. The distribution of injury type was similar for males and females, but a significantly larger proportion of females (21%) than males (9%) sustained a superficial injury of the eyelid.

Table 2.6: Fall-related eye injury cases, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Open wound of eyelid & periocular area	4,132	48.0	3,272	35.2	7,404	41.4
Orbital bone fracture	3,003	34.9	2,824	30.4	5,827	32.6
Superficial injury of eyelid & periocular area	800	9.3	1,939	20.9	2,739	15.3
Injury of eye and orbit	652	7.6	1,247	13.4	1,899	10.6
Injury to a nerve	13	0.2	10	0.1	23	0.1
Foreign body in eye	3	0.0	1	0.0	4	0.0
Total	**8,603**	**100**	**9,293**	**100**	**17,896**	**100**

Source: AIHW National Hospital Morbidity Database.

Just over a quarter (28%) of fall-related eye injuries were due to a *Fall on the same level from slipping, tripping or stumbling* (Table 2.7). This was followed by some other type of fall on the same level (22%), a fall on and from stairs and steps (7%), from a bed (5%) or chair (3%). The top 5 types of fall-related eye injuries made up just under two-thirds (65%) of all fall-related eye injuries. The distribution of the types of falls causing eye injury was similar for males and females, although a larger proportion of females (32%) than males (24%) sustained an eye injury as a result of slipping, tripping or stumbling.

Table 2.7: Top 5 types of fall-related eye injury cases, by sex, Australia, 2010–11 to 2014–15

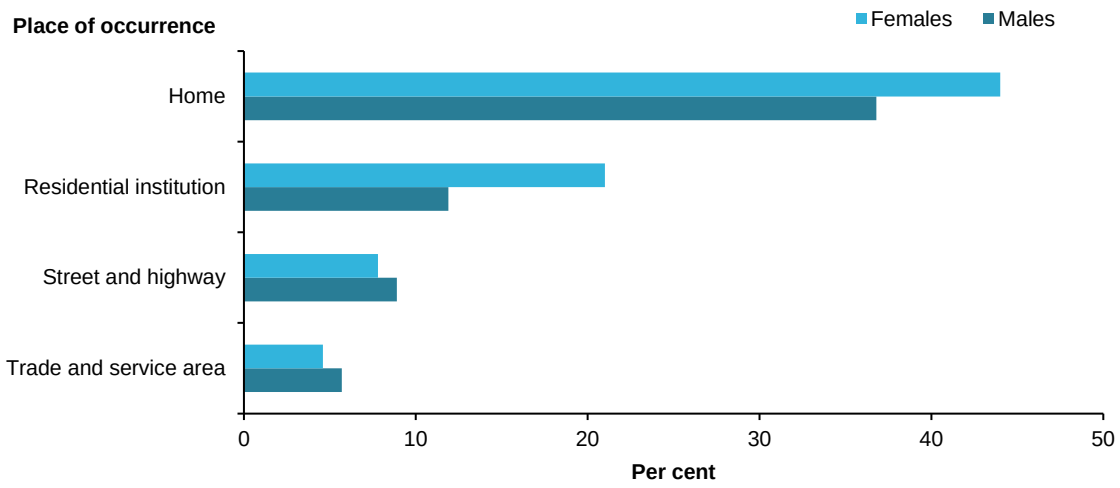
	Males		Females		Persons	
Type of fall	**Number**	**%**	**Number**	**%**	**Number**	**%**
Fall on same level from slipping, tripping or stumbling	2,092	24.3	2,974	32.0	5,066	28.3
Other fall on same level	1,779	20.7	2,144	23.1	3,923	21.9
Fall on and from stairs and steps	592	6.9	594	6.4	1,186	6.6
Fall involving bed	377	4.4	540	5.8	917	5.1
Fall involving chair	284	3.3	273	2.9	557	3.1
Subtotal of fall-related eye injuries	*5,124*	*59.6*	*6,525*	*70.2*	*11,649*	*65.0*

Source: AIHW National Hospital Morbidity Database.

Place of occurrence for fall-related eye injuries

About 20% (3,622 cases) of fall-related eye injury cases had an unspecified place of occurrence. Four specific locations accounted for 71% of all places in which fall-related eye injuries occurred: home, residential institution, street and highway, and trade and service area (Figure 2.3). Home (7,252 cases) was the most commonly reported place of occurrence, accounting for roughly 2 in 5 (41%) cases. This was followed by falls in a residential institution (2,983 cases; 17%). Greater proportions of females sustained

fall-related eye injuries in the home (44%) or a residential institution (21%) than males (37% and 12%, respectively).



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.3: Selected place of occurrence for fall-related eye injury cases, by proportion, by sex, Australia, 2010–11 to 2014–15

Assault-related eye injuries

Hospitalisation for an eye injury due to assault was more common among males than females during 2010–11 to 2014–15, with a 3:1 male to female ratio (Table 2.8). Just over half (52%) of assault-related eye injury cases were sustained by people aged 25–44. Both males and females aged 25–44 had the greatest proportion of assault-related eye injury cases (51% and 57%, respectively).

Table 2.8: Assault-related eye injury cases, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–4	21	0.2	12	0.4	33	0.3
5–14	84	0.9	51	1.8	135	1.1
15–24	2,538	28.3	688	24	3,226	27.3
25–44	4,524	50.5	1,628	56.8	6,152	52.1
45–64	1,595	17.8	438	15.3	2,033	17.2
65+	191	2.1	47	1.6	238	2.0
Total[(a)]	**8,954**	**100**	**2,864**	**100**	**11,818**	**100**

(a) Total includes 1 male case with no specified age.

Source: AIHW National Hospital Morbidity Database.

Over half of all reported assault-related eye injuries resulted in an *Orbital bone fracture* (51%) and four-fifths of these cases involved males (86%) (Table 2.9). This was followed by injuries resulting in an *Open wound of the eyelid and periocular area* (19%) and an *Injury to the eye and orbit* (15%). The distribution of types of eye injuries was similar across males and females.

Table 2.9: Assault-related eye injury cases, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Orbital bone fracture	5,183	57.9	825	28.8	6,008	50.8
Open wound of eyelid & periocular area	1,612	18	569	19.9	2,181	18.5
Injury of eye and orbit	1,266	14.1	581	20.3	1,847	15.6
Superficial injury of eyelid & periocular area	854	9.5	881	30.8	1,735	14.7
Injury to a nerve	14	0.2	4	0.1	18	0.2
Burns	19	0.2	3	0.1	22	0.2
Foreign body in eye	6	0.1	1	0	7	0.1
Total	**8,954**	**100**	**2,864**	**100**	**11,818**	**100**

Source: AIHW National Hospital Morbidity Database.

Almost three-quarters (74%) of assault-related cases involved an *Assault by bodily force* (Table 2.10). A further 12% of cases were due to *Assault by a blunt object*. The distribution of type of assault cases resulting in an eye injury was similar for males and females.

Table 2.10: Assault-related eye injury cases, by type of assault, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of assault	**Number**	**%**	**Number**	**%**	**Number**	**%**
Assault by bodily force	6,554	73.2	2,150	75.1	8,704	73.7
Assault by blunt object	1,020	11.4	334	11.7	1,354	11.5
Assault by sharp object	373	4.2	114	4.0	487	4.1
All other assault types	1,007	11.1	266	9.2	1,273	10.8
Total	**8,954**	**100**	**2,864**	**100**	**11,818**	**100**

Source: AIHW National Hospital Morbidity Database.

Just over half (51%) of all assault-related eye injury cases had an unspecified perpetrator in the record (Table 2.11). In cases where a perpetrator was specified, the person's spouse or domestic partner was the most common perpetrator recorded (13% or 1,511 cases). A spouse or domestic partner was the most common specified perpetrator among females (47%). Among males, the most commonly specified perpetrator involved multiple persons unknown to the victim (11%).

Table 2.11: Assault-related eye injury cases, by perpetrator, by sex, Australia, 2010–11 to 2014–15

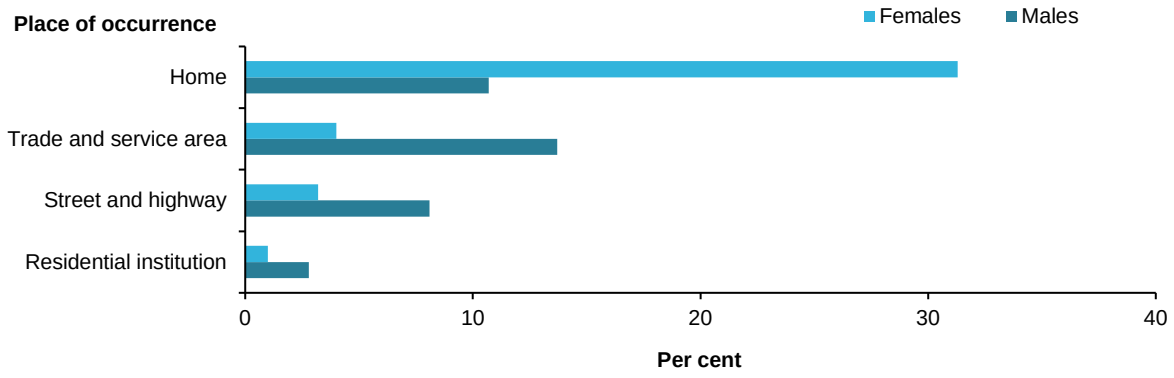
	Males		Females		Persons	
Perpetrator	**Number**	**%**	**Number**	**%**	**Number**	**%**
Spouse or domestic partner	164	1.8	1,347	47.0	1,511	12.8
Parent	56	0.6	63	2.2	119	1.0
Other family member	471	5.3	253	8.8	724	6.1
Carer	2	0.0	2	0.1	4	0.0
Acquaintance or friend	693	7.7	204	7.1	897	7.6
Official authorities	72	0.8	2	0.1	74	0.6
Person unknown to the victim	684	7.6	90	3.1	774	6.5
Multiple persons unknown to the victim	1,022	11.4	82	2.9	1,104	9.3
Other specified person	419	4.7	110	3.8	529	4.5
Unspecified person	5,343	59.7	710	24.8	6,053	51.2
Total[(a)]	**8,954**	**100**	**2,864**	**100**	**11,818**	**100**

(a) Total includes 29 cases of legal intervention or operations of war which do not require a perpetrator to be recorded.

Source: AIHW National Hospital Morbidity Database.

Place of occurrence for assault-related eye injuries

About 58% of assault-related eye injury cases had an unspecified place of occurrence (6,878 cases). As with fall-related eye injuries, the most frequently specified locations were home, trade and service area, street and highway, and residential institution, although in a different order (Figure 2.4). Overall, these 4 places accounted for 36% of those specified. Differences in place of occurrence were apparent by sex, with a much greater proportion of eye injuries in females (31%) occurring in the home, compared with males (11%).



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.4: Selected place of occurrence for assault-related eye injury cases, by proportion, by sex, Australia, 2010–11 to 2014–15

Eye injury due to inanimate mechanical forces

A large number of eye injuries during 2010–11 to 2014–15 were attributable to *Exposure to inanimate mechanical forces* (20% or 10,503 cases) (Table 2.12). The pattern of injury distribution for male and female cases due to *Exposure to inanimate mechanical forces*

differed considerably across the age groups examined. Girls under the age of 15 made up nearly half of all female cases (47%), while men aged 25–44 and 45–64 accounted for more than half (54%) of all male cases.

Box 2.1: External causes contained within *Exposure to inanimate mechanical forces*

The *Exposure to inanimate mechanical forces (W20–X49)* section of ICD-10-AM *Chapter 20 External causes of morbidity and mortality* contains the following groups:

- *Struck by thrown, projected or falling object* (W20)
- *Striking against or struck by sports equipment* (W21)
- *Striking against or struck by other objects* (W22)
- *Caught, crushed, jammed or pinched in or between objects* (W23)
- *Contact with lifting and transmission devices, not elsewhere classified* (W24)
- *Contact with sharp glass* (W25)
- *Contact with knife, sword or dagger* (W26)
- *Contact with non-powered hand tool* (W27)
- *Contact with powered lawnmower* (W28)
- *Contact with other powered hand tools and household machinery* (W29)
- *Contact with agricultural machinery* (W30)
- *Contact with other and unspecified machinery* (W31)
- *Handgun discharge* (W32)
- *Discharge from other and unspecified firearms* (W34)
- *Explosion and rupture of boiler* (W35)
- *Explosion and rupture of gas cylinder* (W36)
- *Explosion and rupture of pressurised tyre, pipe or hose* (W37)
- *Explosion and rupture of other specified pressurised devices* (W38)
- *Discharge of firework* (W39)
- *Explosion of other materials* (W40)
- *Exposure to high-pressure jet* (W41)
- *Exposure to noise* (W42)
- *Exposure to vibration* (W43)
- *Foreign body entering into or through eye or natural orifice* (W44)
- *Foreign body or object entering through skin* (W45)
- *Contact with hypodermic needle* (W46)
- *Exposure to other and unspecified inanimate mechanical forces* (W49).

Table 2.12: Eye injury cases due to exposure to inanimate mechanical forces, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–4	817	9.8	511	23.2	1,328	12.6
5–14	1,109	13.4	517	23.5	1,626	15.5
15–24	1,316	15.8	211	9.6	1,527	14.5
25–44	2,653	31.9	389	17.7	3,042	29
45–64	1,838	22.1	333	15.2	2,171	20.7
65+	572	6.9	237	10.8	809	7.7
Total	**8,305**	**100**	**2,198**	**100**	**10,503**	**100**

Source: AIHW National Hospital Morbidity Database.

Forty-four per cent of all cases in this external cause category sustained an *Injury to the eye and orbit* (4,626 cases) (Table 2.13), while 26% resulted in a diagnosis of *Foreign body in the eye* (2,711 cases). A further 18% were diagnosed with an *Open wound of the eyelid and periocular area* (1,921 cases). The types of eye injuries did not differ greatly between males and females.

Table 2.13: Eye injury cases due to exposure to inanimate mechanical forces, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Injury of eye and orbit	3,753	45.2	873	39.7	4,626	44
Foreign body in eye	2,194	26.4	517	23.5	2,711	25.8
Open wound of eyelid & periocular area	1,366	16.4	555	25.3	1,921	18.3
Orbital bone fracture	861	10.4	172	7.8	1,033	9.8
Superficial injury of eyelid & periocular area	80	1.0	69	3.1	149	1.4
Burns	37	0.4	8	0.4	45	0.4
Injury to a nerve	14	0.2	4	0.2	18	0.2
Total	**8,305**	**100**	**2,198**	**100**	**10,503**	**100**

Source: AIHW National Hospital Morbidity Database.

Close to 2 out of 5 (38%) eye injury cases due to *Exposure to inanimate mechanical forces* were caused by a foreign body entering into or through the eye (Table 2.14). This was followed by striking against or being struck by other objects (20%) and being *Struck by a thrown, projected or falling object* (16%). Among females, after foreign body injuries (34%), the second highest proportion of eye injuries due to inanimate mechanical forces were due to *Striking against or struck by other objects* (30%). In comparison, males had a lower proportion of eye injuries due to striking against or being struck by other objects (18%).

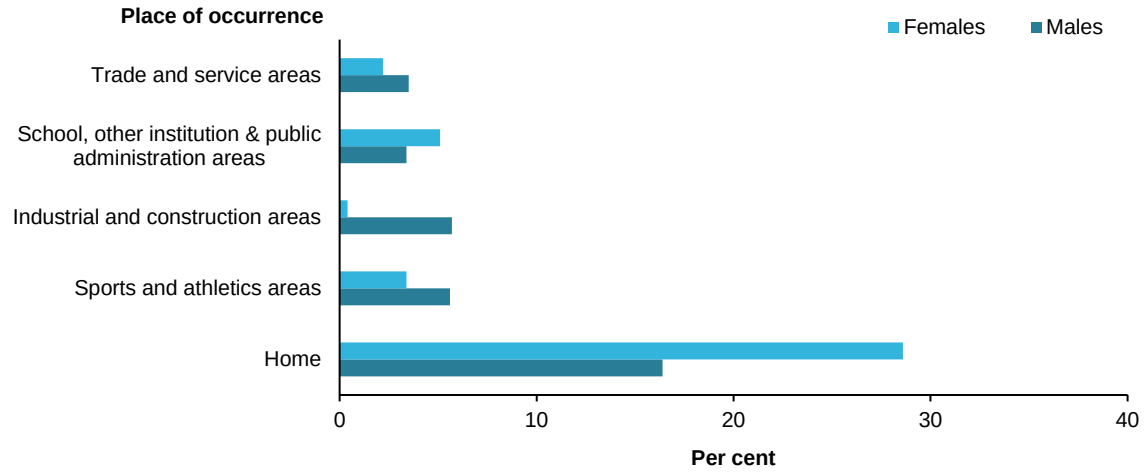
Table 2.14: Eye injury cases due to exposure to inanimate mechanical forces, by type of force, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of inanimate mechanical force	**Number**	**%**	**Number**	**%**	**Number**	**%**
Foreign body entering into or through eye or natural orifice	3,190	38.4	745	33.9	3,935	37.5
Striking against or struck by other objects	1,477	17.8	658	29.9	2,135	20.3
Struck by a thrown, projected or falling object	1,364	16.4	291	13.2	1,655	15.8
Striking against or struck by sports equipment	927	11.2	187	8.5	1,114	10.6
Exposure to other and unspecified inanimate mechanical forces	220	2.6	84	3.8	304	2.9
All other types of inanimate mechanical force	1,127	13.5	233	10.6	1,360	12.9
Total	**8,305**	**100**	**2,198**	**100**	**10,503**	**100**

Source: AIHW National Hospital Morbidity Database.

Place of occurrence for eye injury due to inanimate mechanical forces

More than half (57%) of exposure to inanimate mechanical force-related eye injury cases had an unspecified place of occurrence (5,975 cases). Five specific locations accounted for 36% of all places of occurrence for such injuries (Figure 2.5). These locations were the home (1,991 cases), sports and athletics areas (544 cases), industrial and construction areas (480 cases), schools, other institution and public administration areas (391 cases) and trade and service areas such as restaurants and bars (335 cases). A much greater proportion of females (29%) than males (16%) sustained an eye injury due to inanimate mechanical forces in the home, while industrial and construction areas accounted for a greater proportion of place of occurrence for such injuries among males than females (6% of male cases and less than 1% of female cases).



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.5: Selected place of occurrence for eye injuries due to exposure to inanimate mechanical forces cases, by proportion, by sex, Australia, 2010–11 to 2014–15

Transport crash-related eye injuries

Just under 4,500 eye injury cases during 2010–11 to 2014–15 were the result of a transport crash (Table 2.15). This amounted to roughly 1 in 10 eye injury cases overall. Just over one-third (34%) of these cases were aged 25–44. The pattern of injury distribution for male and female cases was similar across the age groups.

Table 2.15: Transport crash-related eye injury cases, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–4	109	3.5	47	3.5	156	3.5
5–14	287	9.2	131	9.9	418	9.4
15–24	853	27.2	359	27.1	1,212	27.2
25–44	1,112	35.5	386	29.1	1,498	33.6
45–64	529	16.9	229	17.3	758	17.0
65+	244	7.8	173	13.1	417	9.4
Total	**3,134**	**100**	**1,325**	**100**	**4,459**	**100**

Source: AIHW National Hospital Morbidity Database.

An *Orbital bone fracture* was the most common type of eye injury due to a transport crash, accounting for over half of all transport eye injury cases (55%) (Table 2.16). An *Open wound of the eyelid and periocular area* was the next most common injury accounting for 27% of injuries overall in this external cause category. Males and females had a similar distribution of injury types.

Table 2.16: Transport crash-related eye injury cases, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Orbital bone fracture	1,774	56.6	692	52.2	2,466	55.3
Open wound of eyelid & periocular area	895	28.6	305	23.0	1,200	26.9
Injury of eye and orbit	269	8.6	171	12.9	440	9.9
Superficial injury of eyelid & periocular area	162	5.2	140	10.6	302	6.8
Injury to a nerve	19	0.6	8	0.6	27	0.6
Foreign body in eye	15	0.5	9	0.7	24	0.5
Total	**3,134**	**100**	**1,325**	**100**	**4,459**	**100**

Source: AIHW National Hospital Morbidity Database.

Motor vehicles were the most common mode of transport for transport crash-related eye injuries (1,843 cases or 41%) (Table 2.17). Pedal cycles accounted for 23% of transport crash-related eye injuries, followed by motor cycles (14%). Eye injuries due to crashes in traffic outnumbered eye injuries due to crashes in non-traffic at a ratio of 3 to 1.

Table 2.17: Mode of transport for transport crash-related eye injury cases, Australia, 2010–11 to 2014–15

Injured person's mode of transport	Non-traffic	Traffic	Unspecified	Total
Motor vehicle	122	1,663	58	1,843
Pedal cycle	366	643	16	1,025
Motor cycle	246	349	6	601
Pedestrian	52	354	32	438
Animal or animal-drawn vehicle	0	0	151	151
Heavy transport vehicle	7	57	4	68
Bus	4	24	26	54
Unknown	7	46	0	53
Pick-up truck or van	7	35	4	46
Three-wheeled motor vehicle	3	2	0	5
Total	**964**	**3,176**	**319**	**4,459**

Source: AIHW National Hospital Morbidity Database.

Types of activities undertaken when eye injury occurred

Activity at the time of injury was unspecified in roughly two-thirds (69%) of eye injury cases for 2010–11 to 2014–15 (Table 2.18). Overall, *While engaged in sports* was the most frequent specific activity reported (8%), followed by *While working for income* (6%). Males sustained higher proportions of eye injuries while playing sports (10%) or working for income (8%) compared with females (3% and 2%, respectively).

Table 2.18: Type of activity being undertaken when eye injury occurred, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of activity	**Number**	**%**	**Number**	**%**	**Number**	**%**
While engaged in sports	3,291	9.7	595	3.4	3,886	7.5
While engaged in leisure	1,574	4.6	695	3.9	2,269	4.4
While working for income	2,656	7.8	283	1.6	2,939	5.7
While engaged in other types of work	1,702	5.0	736	4.2	2,438	4.7
While resting, sleeping, eating or other vital activity	1,031	3.0	1,436	8.1	2,467	4.8
Other specified activity	1,467	4.3	727	4.1	2,194	4.2
Unspecified activity or not reported	22,373	66.0	13,212	75.0	35,585	69.0
Total	**34,094**	**100**	**17,684**	**100**	**51,778**	**100**

Source: AIHW National Hospital Morbidity Database.

Sports-related eye injuries

A total of 3,886 cases (8%) reported being engaged in a sporting activity at the time of eye injury. As already mentioned, considerably more males sustained an eye injury while participating in sports than did females, with a male to female ratio of 6:1. The highest number of eye injuries for both male and female cases occurred among people aged 25–44 (34% of males and 26% of females) (Table 2.19). Combined with people aged 15–24, these 2 age categories made up nearly two-thirds (65%) of all the hospitalised sports-related eye injury cases in the 5-year period, 2010–11 to 2014–15.

Table 2.19: Sports-related eye injury cases, by age group, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–4	57	1.7	28	4.7	85	2.2
5–14	592	18	144	24.2	736	18.9
15–24	1,092	33.2	145	24.4	1,237	31.8
25–44	1,133	34.4	152	25.5	1,285	33.1
45–64	322	9.8	78	13.1	400	10.3
65+	95	2.9	48	8.1	143	3.7
Total	**3,291**	**100**	**595**	**100**	**3,886**	**100**

Source: AIHW National Hospital Morbidity Database.

The types of sport-related eye injuries reported were similar for males and females (Table 2.20). Over half (56%) of such eye injuries among males resulted in an *Orbital bone fracture;* this was followed by injuries involving *Open wound of eyelid and periocular area* (22%). The most common type of sports-related eye injury for females was also *Orbital bone fracture* (48%), followed by *Open wound of eyelid and periocular area* (26%).

Table 2.20: Sports-related eye injury cases, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Orbital bone fracture	1,846	56.1	284	47.7	2,130	54.8
Open wound of eyelid & periocular area	727	22.1	153	25.7	880	22.6
Injury of eye and orbit	576	17.5	109	18.3	685	17.6
Superficial injury of eyelid & periocular area	99	3.0	37	6.2	136	3.5
Foreign body in eye	29	0.9	8	1.3	37	1.0
Injury to a nerve	12	0.4	2	0.3	14	0.4
Burns	2	0.1	2	0.3	4	0.1
Total sports-related eye injuries	**3,291**	**100**	**595**	**100**	**3,886**	**100**

Source: AIHW National Hospital Morbidity Database.

The types of sports commonly associated with eye injury cases differed for males and females. Table 2.21 provides an overview of the top 5 sporting activities males and females were participating in when they sustained an eye injury. Football (including Australian Rules, rugby and soccer) was the most common sporting activity reported for male cases (37%), followed by cycling (11%). For female cases, the sports-related eye injury was most frequently sustained while trail or general horseback riding (12%), followed by cycling (10%).

Table 2.21: Top 5 sports associated with eye injury, by sex, Australia, 2010–11 to 2014–15

Males			Females		
Type of sport	**Number**	**%**	**Type of sport**	**Number**	**%**
Football	1,219	37.0	Trail or general horseback riding	74	12.4
Cycling	359	10.9	Cycling	60	10.1
Cricket	281	8.5	Football	51	8.6
Skate boarding	160	4.9	Hockey	38	6.4
Surfing and boogie boarding	132	4.0	Swimming	27	4.5
All other sports combined	1,140	33.7	All other sports combined	345	58.1
Total	**3,291**	**100**	**Total**	**595**	**100**

Source: AIHW National Hospital Morbidity Database.

Eye injuries while working for income

Almost 3,000 cases (6%) listed working for income as the activity they were engaged in at the time they sustained their eye injury. More than 1 in 3 (37%) eye injury cases sustained *While working for income* had no specified employment sector reported (Table 2.22). Male cases who sustained an eye injury *While working for income* outnumbered female cases by nearly 10 to 1 (male to female ratio 9.3:1). Where an employment sector was specified, the sector differed for males and females. For male eye injury cases, *Construction* was the most commonly reported employment sector (15%), followed by *Agriculture, forestry and fishing* (8%). For female eye injury cases, the most common employment sector specified was *Health services* (13%), followed by *Wholesale and retail trade* (7%).

Table 2.22: Work-related eye injury cases, by employment sector, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Employment sector	**Number**	**%**	**Number**	**%**	**Number**	**%**
Construction	397	14.9	3	1.1	400	13.6
Agriculture, forestry and fishing	220	8.3	48	17	268	9.1
Transport and storage	159	6.0	3	1.1	162	5.5
Manufacturing	142	5.3	5	1.8	147	5.0
Mining	78	2.9	4	1.4	82	2.8
Wholesale and retail trade	49	1.8	21	7.4	70	2.4
Health services	19	0.7	38	13.4	57	1.9
Government administration and defence	26	1.0	3	1.1	29	1.0
While working for income, unspecified	1,005	37.8	78	27.6	1,083	36.8
Other specified work for income	561	21.1	80	28.3	641	21.8
Total	**2,656**	**100**	**283**	**100**	**2,939**	**100**

Source: AIHW National Hospital Morbidity Database.

The most common type of eye injury sustained *While working for income* was an *Injury of eye and orbit* (35%), followed by *Orbital bone fracture* (22%) (Table 2.23). Among males there was a larger proportion of foreign body in the eye injuries compared with females (8%).

Table 2.23: Work-related eye injury cases, by type of eye injury, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Injury of eye and orbit	950	35.8	87	30.7	1,037	35.3
Orbital bone fracture	567	21.3	80	28.3	647	22.0
Foreign body in eye	553	20.8	22	7.8	575	19.6
Burns	308	11.6	44	15.5	352	12.0
Open wound of eyelid & periocular area	245	9.2	37	13.1	282	9.6
Superficial injury of eyelid & periocular area	28	1.1	13	4.6	41	1.4
Injury to a nerve	5	0.2	0	0	5	0.2
Total	**2,656**	**100**	**283**	**100**	**2,939**	**100**

Source: AIHW National Hospital Morbidity Database.

Eye injuries in Aboriginal and Torres Strait Islander people

A total of 3,720 Aboriginal and Torres Strait Islander people were diagnosed with an eye injury during the period 2010–11 to 2014–15 (Table 2.24). The pattern of distribution by age and sex for Indigenous Australians differed from that of non-Indigenous Australians, more so when comparing females from the 2 groups. A greater number of cases of eye injury were reported in males than in females for both population groups; however, the proportion of eye injury cases for Indigenous females (43%) was higher than for non-Indigenous Australian females (34%). The highest number of eye injury cases for Indigenous Australians occurred

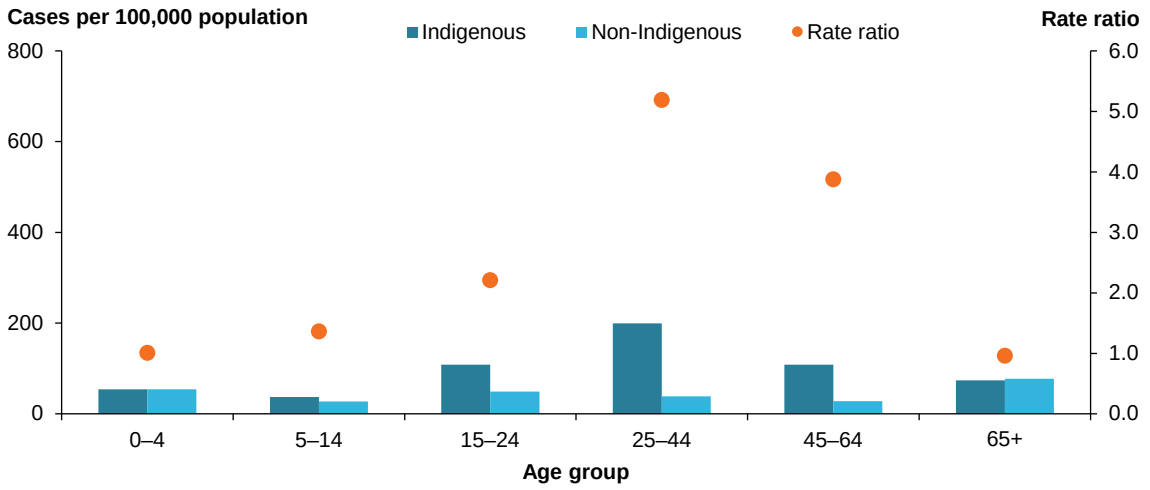
among adults aged 25–44 (44% of Indigenous men and 53% of Indigenous women). Non-Indigenous Australian males also reported the highest number of eye injuries among those aged 25–44 (31%), while just under half of the identified eye injury cases for non-Indigenous Australian females occurred in those aged 65 or over (46%).

Table 2.24: Hospitalised eye injury cases, by age group, by sex, by Indigenous status, Australia, 2010–11 to 2014–15

	Indigenous		Non-Indigenous Australians	
	Number	**%**	**Number**	**%**
Males				
0–4	145	6.9	2,377	7.6
5–14	194	9.2	2,452	7.8
15–24	410	19.4	5,950	19.0
25–44	919	43.5	9,746	31.1
45–64	385	18.2	5,612	17.9
65+	59	2.8	5,240	16.7
Total males	*2,112*	*100*	*31,378*	*100*
Females				
0–4	82	5.1	1,437	9.1
5–14	98	6.1	1,155	7.3
15–24	349	21.7	1,314	8.3
25–44	857	53.3	2,435	15.4
45–64	189	11.8	2,181	13.8
65+	33	2.1	7,285	46.1
Total females	*1,608*	*100*	*15,807*	*100*
Total cases	**3,720**	**100**	**47,185**	**100**

Source: AIHW National Hospital Morbidity Database.

The age-specific rates and rate ratios are shown in Figure 2.6. Aboriginal and Torres Strait Islander people generally had higher rates of eye injury than non-Indigenous Australians, especially among those aged 25–44, where the rate ratio was 5:1. The age-specific rate for Indigenous Australians aged 25–44 was 199 cases per 100,000 population compared with 38 cases per 100,000 for non-Indigenous Australians.



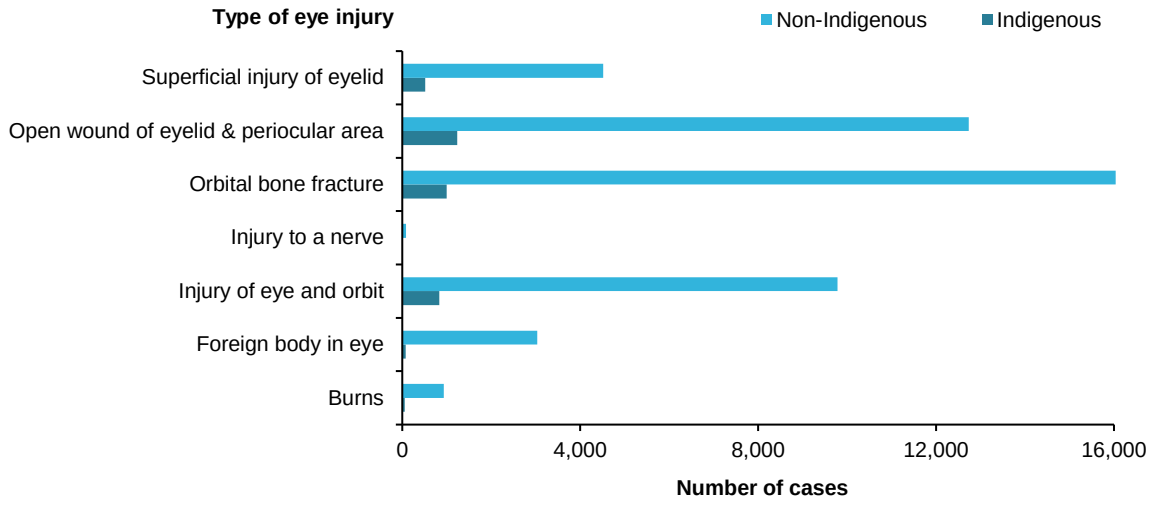
Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.6: Age-specific rates for hospitalised eye injury cases, by Indigenous status, Australia, 2010–11 to 2014–15

Types of eye injuries

The types of eye injuries reported as the principal diagnosis for Indigenous and non-Indigenous Australians are presented in Figure 2.7. The most frequently reported eye injury for Indigenous Australians was *Open wound of the eyelid and periocular area* (33% or 1,233 cases) followed by *Orbital bone fracture* (27%; 996 cases). This differed slightly from the pattern for non-Indigenous Australians whose most frequently reported type of injury was *Orbital bone fracture* (34% or 16,090 cases), followed by *Open wound of the eyelid and periocular area* (27% or 12,996 cases).



Note: Data underpinning this figure can be found in Appendix C.

Source: AIHW National Hospital Morbidity Database.

Figure 2.7: Type of eye injuries cases, by Indigenous status, Australia, 2010–11 to 2014–15

External cause

The most commonly reported external cause of eye injury differed for Indigenous and non-Indigenous Australians (Table 2.25). For Indigenous Australians, the most frequently (61%) reported cause was *Assault* (2,270 cases), followed by *Falls* (13%) and *Exposure to inanimate mechanical forces* (10%). For non-Indigenous Australians, *Falls* (36%; 17,134 cases) were the most common cause of eye injury. *Exposure to inanimate mechanical forces* (21%) *and Assaults* (20%) rounded out the top 3 external causes of eye injury for non-Indigenous Australians.

Table 2.25: External causes of eye injury cases, by Indigenous status, Australia, 2010–11 to 2014–15

	Indigenous		Non-Indigenous	
External cause	**Number**	**%**	**Number**	**%**
Transport crash	232	6.2	4,241	9.0
Accidental drowning and submersion	0	0.0	10	0.0
Accidental poisoning	29	0.8	878	1.9
Falls	495	13.3	17,134	36.3
Thermal causes	22	0.6	229	0.5
Exposure to inanimate mechanical forces	385	10.3	9,983	21.2
Exposure to animate mechanical forces	120	3.2	2,428	5.1
Intentional self-harm	4	0.1	87	0.2
Assault	2,270	61.0	9,317	19.7
Other external causes of accidental injury	140	3.8	2,434	5.2
Undetermined intent	19	0.5	254	0.5
Other[(a)]	4	0.1	190	0.5
Total	**3,720**	**100**	**47,185**	**100**

(a) External causes in this residual category includes cases due to complications of medical and surgical care, sequelae and supplementary factors related to causes of morbidity and mortality classified elsewhere.

Source: AIHW National Hospital Morbidity Database.

3 Eye injury presentations to emergency departments, 2013–14 to 2014–15

This section provides an overview of eye injury presentations to an ED from 2013–14 to 2014–15, using the NNAPEDCD.

A total of 86,602 people presented to an ED for an eye injury in this 2-year period (Table 3.1). Approximately 2 in 5 (44%) of these ED presentations were for a *Foreign body in the eye* (38,090 cases). A similar proportion (41%) were for an *Injury of the eye and orbit*. Of this latter category, 17,189 cases had a principal diagnosis of *Conjunctiva and corneal abrasion without mention of foreign body*, while the remaining 18,246 presentations were some *Other injury of eye and orbit.* An *Injury to a nerve* was rare (0.1%), with only 53 presentations to an ED over the 2 years.

Just under two-thirds (62%) of people presenting to an ED with an injury to an eye-related nerve were admitted to hospital and nearly 49% of those presenting with an *Orbital bone fracture* were admitted to hospital. Least likely to be admitted were people presenting with a foreign body in the eye or with an injury of conjunctiva and corneal abrasion (1% each).

Table 3.1: Number of eye injury presentations to an emergency department and proportion of these admitted to hospital, by type of eye injury, Australia, 2013–14 to 2014–15

Type of eye injury	Presentations to ED	%	Number of ED presentations resulting in admission	%
Superficial injury of eyelid & periocular area	2,508	2.9	178	7.1
Open wound of eyelid & periocular area	4,779	5.5	461	9.6
Orbital bone fracture	2,726	3.1	1,324	48.6
Injury to optic, oculomotor, trochlear and abducent nerves and pathways	53	0.1	33	62.3
Injury of the eye and orbit	35,435	41.0	1,496	8.0
Injury of conjunctiva and corneal abrasion without mention of foreign body	*17,189*	*19.8*	*187*	*1.1*
Other injury of eye and orbit	*18,246*	*21.1*	*1,309*	*7.2*
Foreign body in eye	38,090	44.0	321	0.8
Burns to the eye area	3,011	3.5	98	3.3
Total	**86,602**	**100**	**3,911**	**4.5**

Source: National Non-admitted Patient Emergency Department Care Database.

Appendix A: Data issues

Data Quality

National Hospital Morbidity Database

The National Hospital Morbidity Database (NHMD) is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals. The data supplied are based on the national minimum data set (NMDS) for *Admitted patient care* and include demographic, administrative and length of stay data, as well as data on the diagnoses of the patients, the procedures they underwent in hospital and external causes of injury and poisoning.

The purpose of the NMDS for *Admitted patient care* is to collect information about care provided to admitted patients in Australian hospitals. The scope of the NMDS is episodes of care for admitted patients in all public and private acute and psychiatric hospitals, free-standing day hospital facilities, and alcohol and drug treatment centres. Hospitals operated by the Australian Defence Force, corrections authorities and in Australia's off-shore territories are not in scope but some are included.

The reference period for this data set is 2010–11 to 2014–15. The data set includes records for admitted patient separations between 1 July 2010 and 30 June 2015.

A complete data quality statement for the NHMD is available online at <www.aihw.gov.au>.

National Non-admitted Patient Emergency Department Care Database

The National Non-admitted Patient Emergency Department Care Database (NNAPEDCD) provides information on the care provided (including waiting times for care) for non-admitted patients registered for care in emergency departments in public hospitals where the emergency department meets the following criteria:

- purposely designed and equipped area with designated assessment, treatment and resuscitation areas
- ability to provide resuscitation, stabilisation and initial management of all emergencies
- availability of medical staff in the hospital 24 hours a day
- designated emergency department nursing staff 24 hours a day 7 days a week
- designated emergency department nursing unit manager.

The complete data quality statement for the NNAPEDCD is also available online at <www.aihw.gov.au>.

Estimating incident cases

Each record in the NHMD refers to a single episode of care in a hospital. Some injuries result in more than one episode in hospital and, hence, more than one NHMD record. This can occur in two main ways:

- a person is admitted to one hospital, then transferred to another or has a change in care type (for example, acute to rehabilitation) within the one hospital
- a person has an episode of care in hospital, is discharged home (or to another place of residence) and is then admitted for further treatment for the same injury, to the same hospital or another one.

The NHMD does not include information designed to enable the set of records belonging to an injury case to be recognised as such. Hence, there is potential for some incident injury cases to be counted more than once, which exists when a single incident injury case results in two or more NHMD records being generated, all of which satisfy the selection criteria being used.

Information in the NHMD enables this problem to be reduced, though not eliminated. The approach used for this report makes use of the 'Mode of admission' variable, which indicates whether the current episode began with inward transfer from another acute care hospital. Episodes of this type (inward transfers) are likely to have been preceded by another episode that also met the case selection criteria for injury cases, so are omitted from our estimated case counts.

This procedure should largely correct for over-estimation of cases due to transfers, but will not correct for over-estimation due to readmissions.

Rates

All age-specific rates in this report were calculated using, as the denominator, the estimated resident population (ERP) for the 31 December 2010 to 31 December 2015. Direct standardisation was used to age-standardise rates using the Australian population in 2001 as the standard (ABS 2003).

Australian ERPs for 30 June 2001 (persons, by 5-year age groups to the same oldest group present in the population denominator data) were used as the standardising population throughout the report (ABS 2003).

Indigenous status

In this report, the terms 'Aboriginal and Torres Strait Islander people' and 'Indigenous Australians' are used to refer to people identified as such in Australian hospital separations data and population data collections. Separations for which Indigenous status was 'not stated' have been excluded from the analyses of non-Indigenous Australians.

Quality of Indigenous status data

The AIHW report *Indigenous identification in hospital separations data: quality report* (AIHW 2013) presents the latest findings on the quality of Indigenous identification in hospital separations data in Australia, based on studies conducted in public hospitals during 2011. Private hospitals were not included in the assessment. The results of the study indicate that, overall, the quality of Indigenous identification in hospital separations data was similar to that

achieved in a previous study (AIHW 2010). However, the survey for the 2013 report was performed on larger samples for each jurisdiction/region and is therefore considered more robust than the previous study.

The report recommends using data from all jurisdictions in national analyses of Indigenous admitted patient care for data from 2010–11 onwards.

Errors, inconsistencies and uncertainties

Due to rounding, the sum of the percentages in tables may not equal 100 per cent.

NHMD data are generally abstracted from records, entered and coded in hospitals, passed to state and territory health departments, then to the AIHW before being provided to the National Injury Surveillance Unit. Processing occurs at each of these steps. Errors and inconsistencies can arise due to the large number of people and processes involved in providing the data. Some variations occur in reporting and coding, although coding standards, national minimum data sets and other steps have reduced this.

Appendix B: Other eye-related injury data

As noted in the Introduction, while eye injury generally refers to an injury that might have been due to mechanical trauma (blunt or penetrating), or chemical agents or radiation (Adelman & Raducu 2016), some eye injury surveillance programs, such as the USEIR, and the AFHSB also recognise that an eye injury may be due to an eye disease usually attributable to injury, such as traumatic cataracts, retinal detachments and corneal disorders. In ICD-10-AM, 3 specific disease conditions within *Chapter 7 Diseases of the eye and adnexa* require additional information to be included from *Chapter 20 External causes of morbidity and mortality* (NCCC 2012). In each of these conditions clinical coders are asked to use additional external cause codes to identify the cause or the drug, if drug-induced. These diseases are:

- *Corneal pigmentations and deposits* (H18.0)
- *Traumatic cataract* (H26.1)
- *Drug-induced cataract* (H26.3).

The purpose of this Appendix is to provide broader information on hospital separations that include injuries to the eye. In this Appendix, the term 'eye-related injury' is used to describe a separation record with a) any eye injury diagnosis code from *Chapter 19 Injury, poisoning and other consequences of external causes* or b) any eye disease usually attributable to injury diagnosis codes from *Chapter 7 Diseases of the eye and adnexa*.

Methods

In this Appendix, the NHMD data is presented as number of separations, rather than number of cases (see Box 1.3 and Glossary). Additionally, the search for relevant eye-related injury diagnoses codes was expanded to include the principal diagnosis and all additional diagnosis fields. (As a reminder, the principal diagnosis is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care, whereas an additional diagnosis is a condition or complaint either coexisting with the principal diagnosis or arising during the patient's episode of admitted patient care.) This search strategy allows for the inclusion of eye-related injury separations where a more serious injury was recorded as the principal diagnosis.

Selection criteria for eye-related injury separation

Records in the NHMD that met the following criteria were included as hospitalised eye injury separations:

- episode of admitted patient care was between 1 July 2010 and 30 June 2015
- had any of the following ICD-10-AM codes recorded in any diagnosis field:
  - *Superficial injury of eyelid and periocular area* (S00.1 & S00.2)
  - *Open wound of eyelid and periocular area* (S01.1)
  - *Orbital bone fracture* (S02.1, S02.3 & S02.8)
  - *Injury to optic, oculomotor, trochlear, and abducent nerves and pathways* (S04.0–S04.2 & S04.4)
  - *Injury of eye and orbit* (any S05 code)
  - *Foreign body in eye* (T15.0, T15.1, T15.8 & T15.9)

- *Burns to the eye area* (T26.0–T26.4)
- *Corneal pigmentations and deposits* (H18.0)
- *Traumatic cataract* (H26.1)
- *Drug-induced cataract* (H26.3).

Direct standardisation was used to age-standardise rates using the Australian population in 2001 as the standard (ABS 2003).

Separations with any eye-related injury

About 150,000 episodes of admitted patient care with any eye injury diagnosis or any diagnosis of an eye disease usually attributable to injury in their record occurred in Australian hospitals between 1 July 2010 and 30 June 2015 (Table B.1). The majority (62%) of these separations occurred in males. The age-standardised rate for any eye-related injury was 45 separations per 100,000 population. The rates for male and female separations were similar (46 cases and 45 separations per 100,000 population, respectively).

Table B.1: Key indicators for eye-related injury separations, Australia, 2010–11 to 2014–15

Key indicators	Males	Females	Persons
Separations with any eye injury diagnosis or any diagnosis of an eye disease usually attributable to injury	93,067	57,101	150,168
Separations with eye injury as principal diagnosis	36,218	18,679	54,897
Separations with eye disease usually attributable to injury as principal diagnosis	801	220	1,021
All other separations with any eye injury diagnosis or any diagnosis of an eye disease usually attributable to injury	56,048	38,202	94,250
Age-standardised rate of separations per 100,000 population	46.0	44.5	45.0

Note: It should be noted that the difference between the number of records with any eye injury diagnosis and those with a principal diagnosis of an eye injury may be due to a number of factors. For example, an eye injury may occur in conjunction with other more serious injuries. These more serious injuries would be considered as chiefly responsible for occasioning an episode of admitted patient care and would be recorded as the principal diagnosis.

Source: AIHW National Hospital Morbidity Database.

Of the 150,168 separations with any eye-related injury in the record, close to 55,000 had an eye injury as the principal diagnosis. Just 1,021 separations had an eye disease usually attributable to injury as the principal diagnosis. A much greater proportion of eye disease separations occurred in males (78%) than in females.

Financial year of eye-related injury separation

The distribution of separations was similar across the 5 financial years, 2010–11 to 2014–15 (Table B.2). The highest number reported in a single year was 31,381 separations in 2014–15, and 2012–13 had the lowest number with 28,793 separations.

Table B.2: Eye injury separations by financial year of hospitalisation, and by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Financial year	**Number**	**%**	**Number**	**%**	**Number**	**%**
2010–11	18,736	20.1	10,433	18.3	29,169	19.4
2011–12	19,901	21.4	11,410	20	31,311	20.9
2012–13	17,878	19.2	10,915	19.1	28,793	19.2
2013–14	17,853	19.2	11,661	20.4	29,514	19.7
2014–15	18,699	20.1	12,682	22.2	31,381	20.9
Total	**93,067**	**100**	**57,101**	**100**	**150,168**	**100**

Source: AIHW National Hospital Morbidity Database.

ICD-10-AM principal diagnosis for eye-related injury separations

Table B.3 identifies the ICD-10-AM chapter of the principal diagnosis of eye-related injury separations for 2010–11 to 2014–15. Nearly 4 in 5 (76%) hospital separations with 1 or more eye injury diagnoses or any diagnosis of an eye disease usually attributable to injury had an injury code from *Chapter 19 Injury, poisoning and other consequences of external causes (S00-T98)* as the principal diagnosis. The next most prominent chapter for principal diagnoses codes was *Chapter 21 Factors influencing health status and contact with health services (Z00-Z99)*, which accounted for 7% of eye-related injury separation records between 2010–11 and 2014–15. Principal diagnoses codes in this chapter include items for examination and investigation, or specific procedures and health care such as follow-up care or fitting and adjusting an artificial eye. A further 5% of separations had a principal diagnosis from *Chapter 7 Diseases of the eye and adnexa (H00-H59).* Of these 6,862 separations, 15% or 1,021 separations had either *Corneal pigmentations and deposits*, *Traumatic cataract* or *Drug-induced cataract* as the primary reason for the hospital admission.

Table B.3: ICD-10-AM chapters for principal diagnosis of eye-related injury separations, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
ICD-10-AM chapter	**Number**	**%**	**Number**	**%**	**Number**	**%**
Certain infectious & parasitic diseases	294	0.3	292	0.5	586	0.4
Neoplasms	762	0.8	547	1.0	1,309	0.9
Diseases of the blood & blood-forming organs etc.	128	0.1	98	0.2	226	0.2
Endocrine, nutritional & metabolic diseases	364	0.4	326	0.6	690	0.5
Mental & behavioural disorders	1,768	1.9	1,250	2.2	3,018	2.0
Diseases of the nervous system	910	1.0	579	1.0	1,489	1.0
Diseases of the eye & adnexa[(a)]	4,014	4.3	2,848	5.0	6,862	4.6
Diseases of the ear & mastoid process	36	0.0	35	0.1	71	0.0
Diseases of the circulatory system	1,681	1.8	1,528	2.7	3,209	2.1
Diseases of the respiratory system	666	0.7	495	0.9	1,161	0.8
Diseases of the digestive system	411	0.4	353	0.6	764	0.5
Diseases of the skin & subcutaneous tissue	376	0.4	248	0.4	624	0.4
Diseases of the musculoskeletal system & connective tissue	257	0.3	290	0.5	547	0.4
Diseases of the genitourinary system	281	0.3	474	0.8	755	0.5
Pregnancy, childbirth & the puerperium	0	0.0	88	0.2	88	0.1
Certain conditions originating in the perinatal period	24	0.0	17	0.0	41	0.0
Congenital malformations & deformations etc.	41	0.0	30	0.1	71	0.0
Symptoms, signs & abnormal findings, not elsewhere classified	2,034	2.2	1,913	3.4	3,947	2.6
Injury, poisoning & other consequences of external causes[(b)]	72,863	78.3	41,215	72.2	114,078	76.0
Factors influencing health status & contact with health services	6,157	6.6	4,475	7.8	10,632	7.1
Total	**93,067**	**100**	**57,101**	**100**	**150,168**	**100**

(a) This chapter includes the 1,021 separations with ICD-10-AM codes H18.0, H26.1 or H26.3 as the principal diagnosis.

(b) This chapter includes the 54,897 separations with an eye injury (see Box 1.1) recorded as the principal diagnosis.

Source: AIHW National Hospital Morbidity Database.

Appendix C: Additional tables

The data included in these additional tables underpin the figures included in Chapter 2. NHMD records must have met the following criteria to be counted as a hospitalised eye injury case:

- episode of admitted patient care was between 1 July 2010 and 30 June 2015
- had an eye injury from *Chapter 19 Injury, poisoning and certain other consequences of external causes* codes recorded as the principal diagnosis (see Box 1.1)
- mode of admission was not a transfer from another acute hospital.

Table C.1: Age-specific rates for hospitalised eye injury cases, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Age group	**Number**	**Rate**	**Number**	**Rate**	**Number**	**Rate**
0–4	2,543	66.1	1,538	42.2	4,081	54.4
5–9	1,478	40.0	822	23.5	2,300	32.0
10–14	1,201	33.5	447	13.1	1,648	23.6
15–19	2,673	71.0	728	20.5	3,401	46.4
20–24	3,794	90.9	963	24.2	4,757	58.3
25–29	3,427	79.6	879	20.9	4,306	50.6
30–34	2,680	65.9	869	21.5	3,549	43.8
35–39	2,437	62.6	835	21.2	3,272	41.8
40–44	2,363	58.6	765	18.6	3,128	38.4
45–49	2,007	52.6	639	16.4	2,646	34.3
50–54	1,676	44.4	667	17.3	2,343	30.7
55–59	1,308	38.4	541	15.5	1,849	26.8
60–64	1,133	36.9	550	17.6	1,683	27.2
65–69	908	35.2	652	24.8	1,560	30.0
70–74	887	46.8	777	39.4	1,664	43.1
75–79	880	64.2	1,102	70.9	1,982	67.8
80–84	1,080	111.7	1,637	129.4	2,717	121.7
85–89	1,023	189.8	1,868	212.5	2,891	203.9
90–94	493	271.4	1,045	264.6	1,538	266.8
95+	102	286.2	360	318.1	462	310.4
All ages	**34,093**	**59.8**	**17,684**	**30.7**	**51,778**	**45.2**

Source: AIHW National Hospital Morbidity Database.

Table C.2: Proportion of type of eye injuries, by age group, Australia, 2010–11 to 2014–15

	0–4 years		5–14 years		15–24 years		25–44 years		45–64 years		65+ years	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Injury of eye and orbit	517	12.7	984	24.9	1,635	20.0	3,106	21.8	2,150	25.2	2,400	18.7
Foreign body in eye	459	11.2	376	9.5	403	4.9	1,019	7.1	688	8.1	202	1.6
Open wound of eyelid & periocular area	2,180	53.4	1,376	34.9	1,648	20.2	2,696	18.9	1,831	21.5	4,468	34.9
Orbital bone fracture[(a)]	658	16.1	996	25.2	3,612	44.3	5,840	41	2,967	34.8	3,340	26.1
Superficial injury of eyelid & periocular area	181	4.4	181	4.6	663	8.1	1,170	8.2	620	7.3	2,317	18.1
Burns	85	2.1	27	0.7	178	2.2	391	2.7	245	2.9	76	0.6
Injury to a nerve	1	0	8	0.2	19	0.2	33	0.2	20	0.2	11	0.1
Total	**4,081**	**100**	**3,948**	**100**	**8,158**	**100**	**14,255**	**100**	**8,521**	**100**	**12,814**	**100**

(a) Includes 1 case with no specified age.

Source: AIHW National Hospital Morbidity Database.

Table C.3: Place of occurrence for fall-related eye injury cases, by proportion, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Place	**Number**	**%**	**Number**	**%**	**Number**	**%**
Home	3,166	36.8	4,086	44	7,252	40.5
Residential institution	1,028	11.9	1,955	21	2,983	16.7
School, other institution & public administration area	315	3.7	262	2.8	577	3.2
Sports and athletics area	279	3.2	61	0.7	340	1.9
Street and highway	766	8.9	721	7.8	1,487	8.3
Trade and service area	490	5.7	423	4.6	913	5.1
Industrial and construction area	54	0.6	7	0.1	61	0.3
Farm	12	0.1	5	0.1	17	0.1
Other specified place of occurrence	363	4.2	281	3.0	644	3.6
Unspecified place of occurrence	2,130	24.8	1,492	16.1	3,622	20.2
Total	**8,603**	**100**	**9,293**	**100**	**17,896**	**100**

Source: AIHW National Hospital Morbidity Database.

Table C.4: Place of occurrence of assault-related eye injuries, proportion, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Place	**Number**	**%**	**Number**	**%**	**Number**	**%**
Home	955	10.7	895	31.3	1,850	15.7
Residential institution	250	2.8	28	1.0	278	2.4
School, other institution & public administration area	102	1.1	24	0.8	126	1.1
Sports and athletics area	61	0.7	2	0.1	63	0.5
Street and highway	721	8.1	93	3.2	814	6.9
Trade and service area	1,228	13.7	114	4.0	1,342	11.4
Industrial and construction area	9	0.1	0	0.0	9	0.1
Farm	2	0.0	0	0.0	2	0.0
Other specified place of occurrence	359	4.0	97	3.4	456	3.9
Unspecified place of occurrence	5,267	58.8	1,611	56.3	6,878	58.2
Total	**8,954**	**100**	**2,864**	**100**	**11,818**	**100**

Source: AIHW National Hospital Morbidity Database.

Table C.5: Place of occurrence of eye injuries due to exposure to inanimate mechanical forces, by proportion, by sex, Australia, 2010–11 to 2014–15

	Males		Females		Persons	
Place	**Number**	**%**	**Number**	**%**	**Number**	**%**
Home	1,362	16.4	629	28.6	1,991	19
Residential institution	40	0.5	35	1.6	75	0.7
School, other institution & public administration area	280	3.4	111	5.1	391	3.7
Sports and athletics area	469	5.6	75	3.4	544	5.2
Street and highway	63	0.8	23	1.0	86	0.8
Trade and service area	287	3.5	48	2.2	335	3.2
Industrial and construction area	471	5.7	9	0.4	480	4.6
Farm	132	1.6	26	1.2	158	1.5
Other specified place of occurrence	347	4.2	116	5.3	463	4.4
Unspecified place of occurrence	4,850	58.4	1,125	51.2	5,975	56.9
Total	**8,305**	**100**	**2,198**	**100**	**10,503**	**100**

Source: AIHW National Hospital Morbidity Database.

Table C.6: Age-specific rates for hospitalised eye injury cases, by Indigenous status, Australia, 2010–11 to 2014–15

	Indigenous Australians	Non-indigenous Australians	
Age group	**Cases per 100,000 population**	**Cases per 100,000 population**	**Rate ratio**
0–4	54.3	54.4	1.0
5–14	36.7	27.3	1.3
15–24	108.5	50.1	2.2
25–44	199.4	39.4	5.1
45–64	108.3	28.5	3.8
65+	73.9	78.3	0.9
Total	**107.5**	**43.3**	**2.5**

Source: AIHW National Hospital Morbidity Database.

Table C.7: Type of eye injuries cases, by Indigenous status, Australia, 2010–11 to 2014–15

	Indigenous		Non-Indigenous		Total	
Type of eye injury	**Number**	**%**	**Number**	**%**	**Number**	**%**
Open wound of eyelid & periocular area	1,233	33.1	12,737	27	14,199	27.4
Orbital bone fracture	996	26.8	16,090	34.1	17,414	33.6
Superficial injury of eyelid & periocular area	519	14	4,519	9.6	5,132	9.9
Injury of eye and orbit	835	22.4	9,787	20.7	10,792	20.8
Injury to a nerve	5	0.1	83	0.2	92	0.2
Foreign body in eye	76	2	3,036	6.4	3,147	6.1
Burns	56	1.5	933	2	1,002	1.9
Total	**3,720**	**100**	**47,185**	**100**	**51,778**	**100**

Source: AIHW National Hospital Morbidity Database.

Glossary

Definitions in this Glossary contain, where applicable, an identification number from the Metadata Online Registry (METeOR). METeOR is Australia's central repository for health, community services and housing assistance metadata, or 'data about data'. It provides definitions for data for health- and community services-related topics, and specifications for related NMDSs—such as the NMDSs that form the basis of this report. METeOR can be viewed on the AIHW website at <www.aihw.gov.au>. For further information on the terms used in this report, refer to definitions in the *National health data dictionary,* version 16 (AIHW 2012).

abrasion: Superficial damage to an epithelial layer (for example, skin or cornea).

abducent nerve: The sixth cranial nerve. It carries motor impulses to lateral rectus muscle that moves the eyeball.

activity when injured: The type of activity being undertaken by a person at the time of injury. METeOR identifier: 391320.

additional diagnosis: A condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care. METeOR identifier: 641014.

admitted patient: A patient who undergoes a hospital's admission process to receive treatment and/or care. This treatment and/or care is provided over a period of time and can occur in hospital and/or in the person's home (for **hospital-in-the-home** patients). METeOR identifier: 268957.

adnexa: Appendages of the eye.

age-standardisation: A set of techniques used to remove, as far as possible, the effects of differences in age when comparing 2 or more populations.

avulsion of eye: Traumatic removal of eyeball.

conjunctiva: Lining of the eyelids and front of sclera (white of the eye).

contusion: Bruise.

cornea: Curved transparent layer in front of iris and pupil.

episode of care: The period of admitted patient care between a formal or statistical admission and a formal or statistical separation, characterised by only 1 care type. METeOR identifier: 491557 (Care type), METeOR identifier: 268956 (Episode of admitted patient care).

external cause: The environmental event, circumstance or condition as the cause of injury, poisoning and other adverse effect. METeOR identifier: 514295.

hospital: A health-care facility established under Commonwealth, state or territory legislation as a hospital or a free-standing day procedure unit and authorised to provide treatment and/or care to patients. METeOR identifier: 268971.

International Classification of Diseases (ICD): The World Health Organization's internationally accepted classification of diseases and related health conditions. The 10th revision, Australian modification (ICD-10-AM) is currently in use in Australian hospitals for admitted patients.

mode of admission: The mechanism by which a person begins an episode of care, as represented by a code. METeOR identifier: 269976.

orbital: Pertaining to the eye socket.

periocular: Around the eye.

periorbital: Around the eye socket.

principal diagnosis: The diagnosis established a) after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health-care establishment, or b) at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment. METeOR identifier: 514273 and 590664.

presentation: The presentation of a patient at an emergency department occurs following the arrival of the patient at the emergency department and is the earliest occasion of being registered clerically or triaged. METeOR identifier: 327262.

separation: An episode of care for an admitted patient, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). Separation also means the process by which an admitted patient completes an episode of care either by being discharged, dying, transferring to another hospital or changing type of care.

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This report shows 51,778 people were hospitalised as a result of an eye injury in the 5-year period, 1 July 2010 to 30 June 2015; two-thirds of these were males. Falls (35%) and assaults (23%) were the most common causes of eye injuries. The most common type of eye injury was an open wound of the eyelid and periocular area (27%). Some 86,602 presentations were made to an emergency department due to an eye injury in the 2-year period, 1 July 2013 to 30 June 2015; 1% of these presentations were admitted to hospital.

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