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Serious injury due to transport accidents involving a railway train, Australia 2002–03 to 2006–07

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ARA	Australian Railway Association
ATC	Australian Transport Council
ATSB	Australian Transport Safety Bureau
BTRE	Bureau of Transport and Regional Economics
CI	Confidence Interval
ICD	International Classification of Diseases
ICD-10-AM	International Classification of Diseases, 10th Revision, Australian Modification
NHMD	National Hospital Morbidity Database

Summary

Serious injury involving a train

For the 5-year period from 2002–03 to 2006–07, 910 persons were seriously injured in Australia due to transport accidents involving a train, an average of 182 per year.

Victoria (37.1%), New South Wales (34.3%) and Queensland (17.5%) accounted for almost 90% of serious injury cases due to a transport injury involving a train.

Age-standardised rates of serious injury due to transport accidents involving a train declined by an annual average of 4.6% [95%CI: 2.0%, 7.1%] over the 7-year period from 2000–01 to 2006–07.

Approximately one rail user was seriously injured per 100 million passenger kilometres travelled in 2006–07. The risk of serious injury, based on kilometres travelled, is more than 10 times as high for passengers travelling by car compared with passengers travelling by rail.

On a population basis, age-standardised serious injury rates tended to be higher for those aged 70 years and over. This tendency was observed among both sexes.

For the period from 2002–03 to 2006–07, rail users made up two-thirds (66.0%) of all serious injury cases due to transport accidents involving a train, with the most common circumstance of injury being injury while boarding or alighting from a train (25.1% of all serious injury cases). Pedestrians injured in a collision with a train (14.8%) and car occupants injured in a collision with a train (12.5% of all serious injury cases) accounted for most of the non-rail user cases.

The mean length of stay in hospital for a transport accident involving a train was 8.1 days, which was more than twice the mean length of stay for all hospitalisations involving non rail-related injuries (4.0 days).

Serious injury due to level crossing accidents

For the period from 2002–03 to 2006–07, 253 persons were seriously injured in Australia due to a level crossing accident, an average of 51 per year.

Victoria accounted for over half (53.0%) of level crossing-related serious injury cases, followed by Queensland (19.0%), South Australia (12.6%) and New South Wales (10.7%).

Rates of serious injury remained stable over the 5-year period ranging from 0.21 serious injury cases per 100,000 population in 2005–06 to 0.33 serious injury cases per 100,000 population in 2001–02.

Serious injury rates, on an age-specific basis, were highest among young adults (20–24 years).

The most common circumstances of injury involved car occupants injured in a collision with a train (42.3%) and pedestrians injured in a collision with a train (29.6%).

The mean length of stay in hospital for a level crossing accident was 11.9 days, which was almost 3 times the mean length of stay for all hospitalisations involving non rail-related injuries (4.0 days).

1 Introduction

The primary purpose of this publication is to provide a national overview of serious non-fatal injury in Australia due to transport accidents involving a railway train in the period 2002–03 to 2006–07, including level crossing accidents. Trends in non-fatal injury rates are examined over a 7-year period, 2000–01 to 2006–07.

This report includes all injuries that were serious enough to require hospitalisation but did not result in death. The definition of transport injury used in this report includes only unintentional injuries. Hence, cases given an external cause of intentional self-harm, assault or undetermined intent are excluded (see Table A2 in Data Issues section for further information on how many of such cases may be rail-related). Readers should consult the Data Issues section for notes on the methodology employed and for the meaning of technical terms used in this report such as 'separations'.

This is the third report on the topic of serious non-fatal injury in Australia due to transport accidents involving a railway train, using a rolling 5-year observational period. It has a similar scope to the previous reports (Flood et al. 2007; Berry & Harrison 2008). The literature review of the earlier of these two reports (Flood et al. 2007) considers in detail the characteristics of major railway disasters, level crossing accidents, suicide and attempted suicides, railway trespassers and boarding and alighting injuries. Thus, these issues are either not examined here or only mentioned briefly.

Major railway disasters

Major railway disasters are uncommon, however when they do occur, they:

- Often involve a number of fatalities and persons seriously injured. Usually there are a small number of fatalities but occasionally many deaths result from a single event, e.g. the Granville train disaster in 1977 with 83 fatalities (Sydney Morning Herald 2004) and the level crossing crash near Kerang in Victoria in 2007 with 11 fatalities.
- Are widely reported in the media.
- Are expensive. The estimated cost of 'rail accidents'(1) that occurred in Australia in 1999 was $133 million ($22 million of this cost was due to level crossing rail accidents with no motor vehicle involvement, for example, where a pedestrian was struck by a train) (BTRE 2002). Approximately $14 million of the cost of 'rail accidents' was accounted for by the accident at Glenbrook in 1999 with 7 fatalities and 57 minor injuries (BTRE 2002).
- During 1999, rail-related suicides and attempted suicides were estimated to have cost $53 million (BTRE 2002).

(1) For the purpose of relevant comparisons with cost estimates for other transport modes (such as road crash statistics), a 'rail accident' was defined in the Bureau of Transport and Regional Economics report (BTRE 2002) as a transport accident involving a railway train or other railway vehicle operated on rails, whether in motion or not. It excluded some rail-related incidents, the most important of which were level crossing accidents involving motor vehicles, and rail-related suicides and attempted suicides. Cost estimates for these were presented separately.

In 2006–07, state rail authorities recorded 133 derailments, 20 train-train collisions, 6 train-rolling stock collisions, 42 train-person collisions (not at level crossings), 113 train-infrastructure collisions and 16 train-road vehicle collisions (not at level crossings) (ATSB 2009).

In 1999, there was a total of 79 rail-related fatalities, of which 43 resulted from 'rail accidents', 5 were level crossing accidents that involved a motor vehicle and 31 were suicides (BTRE 2002). In 1999, Australia had an accident rate of approximately 2.3 per million train kilometres travelled and fatality rate of 0.28 per million train kilometres (BTRE 2002). The risk of fatal injury, based on passenger kilometres travelled, is 5 times as great for passengers travelling by car compared with passengers travelling by rail (ATSB 2006). The Bureau of Transport and Regional Economics (BTRE) suggests that the main issues for rail safety in Australia are suicides, level crossing accidents and pedestrians struck by trains (BTRE 2002).

Level crossing accidents

The intersection between a public or private roadway or footpath and a railway track at the same level ('at-grade intersection') in Australia is commonly called a level crossing. There are several types of level crossing:

- active level crossings with automatic warning systems such as flashing lights, bells and/or boom gates; as well as static signage;
- passive level crossings that usually have a crossbuck (Railway Crossing sign) and a 'Give Way' sign, inverted red triangle or stop sign;
- occupational or accommodation crossings between private property and public roads;
- maintenance crossings; and
- illegal crossings.
  (Standing Committee on Transport and Regional Services 2004)

Approximately 28% (2,650) of the 9,400 public level crossings in Australia have 'active' protection, 64% (6,060) have 'passive' protection and the remainder have other control or protection (Ford & Matthews 2002). Additionally, there are numerous private, occupational and cane railway level crossings (ATC 2003).

The total cost of level crossing accidents was estimated to be $32 million in 1999. About $10 million of this is estimated to be due to level crossing accidents involving motor vehicles (BTRE 2002).

In 2006–07, state rail authorities recorded 74 train-road vehicle collisions and 9 train-person collisions at level crossings (ATSB 2009).

Level crossing crashes cause more than 40% of rail-related fatalities in Australia (Cairney 2003). In Australia, from 1997–2002, there was a yearly average of 36.8 level crossing accident fatalities (range 19–44; total of 221) excluding collisions on private roadways and deaths reported as suicide by a coroner (ATSB 2004). The yearly average from 1997–2002 for deaths due to a collision between a motor vehicle and train at a level crossing was 12.3 (range 5–23; total of 74) (ATSB 2004).

2 Serious injury involving a train

Number and rate of serious injury

From 2000–01 to 2006–07, 1,338 persons were seriously injured in Australia due to transport accidents involving a train (Table 2.1). For the period of interest for this report from 2002–03 to 2006–07, 910 persons were seriously injured(2), an average of 182 per year. They include persons seriously injured due to level crossing accidents.

Victoria (37.1%, *n* = 338), New South Wales (34.3%, *n* = 312) and Queensland (17.5%, *n* = 159) accounted for almost 90% of seriously injured cases due to a transport accident involving a train. These were the three most populous jurisdictions in Australia over the reporting period, together constituting 77.5% of the nation's population.

For the period from 2002–03 to 2006–07, New South Wales accounted for 40% of passenger train kilometres (the kilometres travelled by passenger trains as opposed to freight trains in Australia), Victoria 30% and Queensland 13% (ATSB 2009).

Table 2.1: Persons seriously injured due to transport accidents involving a train, Australia 2000–01 to 2006–07: by state or territory of hospitalisation**

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2000–01	78	77	37	8	*	*	*	*	208
2001–02	88	79	25	14	12	*	*	*	220
2002–03	85	69	19	*	17	*	*	*	193
2003–04	59	75	25	*	*	*	*	*	170
2004–05	61	53	67	*	15	*	*	*	202
2005–06	53	65	24	*	14	*	*	*	164
2006–07	54	76	24	8	14	*	*	*	181
Total	**478**	**494**	**221**	**43**	**81**	**10**	**5**	**6**	**1,338**

* Small counts are suppressed (n<5).

** For definition of 'seriously injured' refer to the 'Data issues' section.

For counts by calendar year refer to the 'Data issues' section.

(2) In total, there were 997 admissions to hospital for rail-related injuries for an estimated 932 persons, of whom 22 died whilst in hospital. These deaths are included in estimates of fatal rail-related injury provided elsewhere by organisations such as the Australian Transport Safety Bureau and are omitted from the seriously injured counts in Table 2.1 and throughout the report. The estimate of total patient days includes separations in which the person died in hospital.

Case counts and trends over seven years in the rates of serious injury due to transport accidents involving a train are shown in Table 2.2 and Figure 2.1. Results must be interpreted with caution as there is potential for variation over time in admission practice, especially for lower severity cases, and changes over time in the way external cause codes are assigned to cases involving rail-related injury (Harrison & Steenkamp 2002).

Age-standardised rates of serious injury due to transport accidents involving a train declined by an annual average of 4.6% [95%CI: 2.0%, 7.1%] over the 7-year period from 2000–01 to 2006–07. Rates ranged between from 0.80 serious injury cases per 100,000 population in 2005–06 and 1.13 serious injury cases per 100,000 population in 2001–02.

For males, rates declined by an annual average of 7.8% [95%CI: 4.5%–11.0%] over the 7-year period, with most of this decline occurring between 2000–01 and 2002–03. From 2002–03 onwards, rates remained steady ranging from 0.87 serious injury cases per 100,000 population in 2003–04 to 1.17 serious injury cases per 100,000 population in 2004–05. For females, rates remained steady over the entire period from 2000–01 to 2006–07, ranging from 0.70 serious injury cases per 100,000 population in 2000–01 to 0.92 serious injury cases per 100,000 population in 2002–03.

Table 2.2: Age-standardised rate of serious injury due to transport accidents involving a train; Australia 2000–01 to 2006–07

Seriously injured	Age-standardised rate per 100,000 population (95% CI)						
	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07
Males	1.46 (1.23–1.73)	1.53 (1.27–1.77)	1.03 (0.85–1.27)	0.87 (0.69–1.06)	1.17 (0.98–1.42)	0.88 (0.7–1.07)	0.98 (0.79–1.18)
Females	0.70 (0.51–0.84)	0.73 (0.54–0.88)	0.92 (0.71–1.09)	0.82 (0.61–0.96)	0.82 (0.6–0.94)	0.72 (0.51–0.82)	0.75 (0.53–0.84)
Persons	1.08 (0.93–1.23)	1.13 (0.97–1.27)	0.98 (0.83–1.11)	0.85 (0.71–0.97)	1.0 (0.85–1.12)	0.80 (0.66–0.91)	0.87 (0.72–0.97)
Seriously injured	**Case numbers**						
	2000–01	**2001–02**	**2002–03**	**2003–04**	**2004–05**	**2005–06**	**2006–07**
Males	140	148	101	87	118	90	102
Females	68	72	92	83	84	74	79
Persons	208	220	193	170	202	164	181

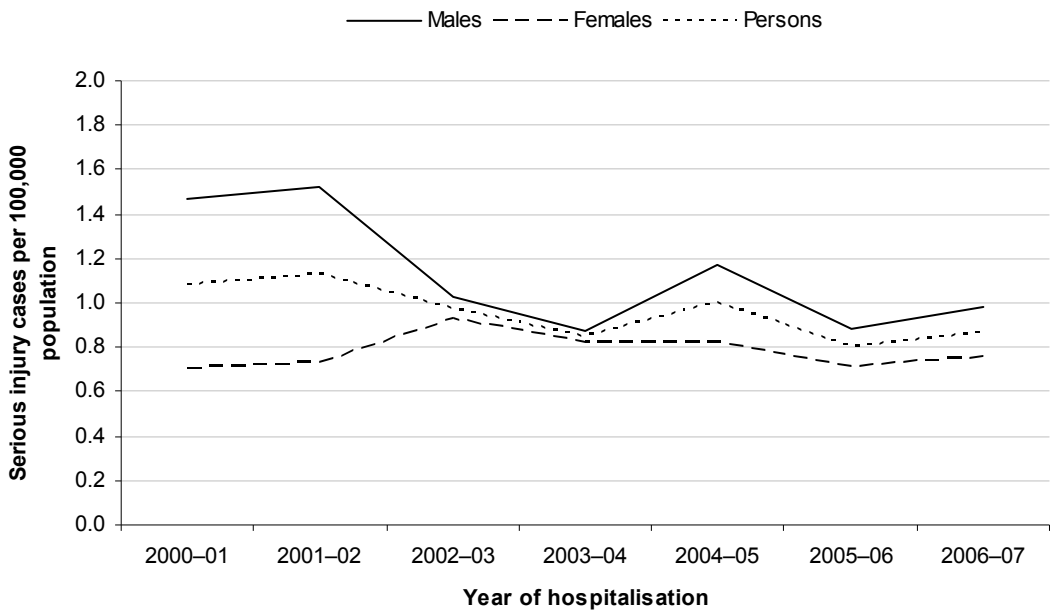

Figure 2.1: Age-standardised rates of serious injury due to transport accidents involving a train; Australia 2000–01 to 2006–07

Table 2.3 presents the number of serious injury cases per 100 million passenger kilometres travelled over the five years for which data on this exposure measure are available (ARA 2008). Only passengers (otherwise referred to as 'rail users' or an 'occupant of a train') are included in the serious injury case numbers in Table 2.3. This definition encompasses any occupant of a train, including a passenger, a railway employee, a person on the outside of a train or a person boarding or alighting from a train, but not pedestrians, pedal cyclists, motorcyclists, car occupants, occupants of other motor vehicles and animal riders or occupants of animal drawn vehicles injured in a collision with a train.

In 2006–07, 0.94 persons were seriously injured in a transport accident involving train per 100 million passenger kilometres travelled. A comparison of risk for other major forms of land transport (i.e. cars, motorcycles, pick-up trucks and vans, heavy transport vehicles and buses) per 100 million vehicle kilometres travelled is provided in another report in the series entitled 'Serious injury due to land transport accidents, Australia, 2006–07' (Henley & Harrison 2009). In 2006–07, 10.3 car occupants were seriously injured per 100 million kilometres travelled (Henley & Harrison 2009). It would be preferable that a comparison of serious injury rates for the major forms of land transport be made on a passenger-kilometre basis, but the relevant data are only available for rail transport. Nevertheless, the risk of serious injury, based on passenger kilometres travelled (rail) and vehicle kilometres travelled (car), is 11 times as great for passengers travelling by car compared with passengers travelling by rail.

Table 2.3: Serious injury rate per 100 million passenger kilometres travelled for transport accidents involving a train; Australia 2002–03 to 2006–07

Seriously injured	Case numbers for rail users	Passenger kilometres* (billion)[(a)]	Injury rate per 100 million passenger kilometres travelled (95% CI)
2002–03	125	10.92	1.15 (0.96–1.36)
2003–04	112	11.10	1.01 (0.84–1.21)
2004–05	132	10.88	1.21 (1.02–1.44)
2005–06	116	11.36	1.02 (0.85–1.23)
2006–07	116	12.31	0.94 (0.79–1.13)

* Sourced from the Australasian Railway Association, Industry Report 2007 (ARA 2008) .

(a) One billion is equal to 1,000 million.

The total number of serious injury cases over the 5-year period by age group and sex is shown in Figure 2.2. For males, the peak was in the 15–19 year age group with 61 serious injury cases. For females, the peak was in the 75–79 year age group with 48 serious injury cases. For males and females combined, the peak was in the 20–24 year age group with 83 serious injury cases (Figure 2.2).

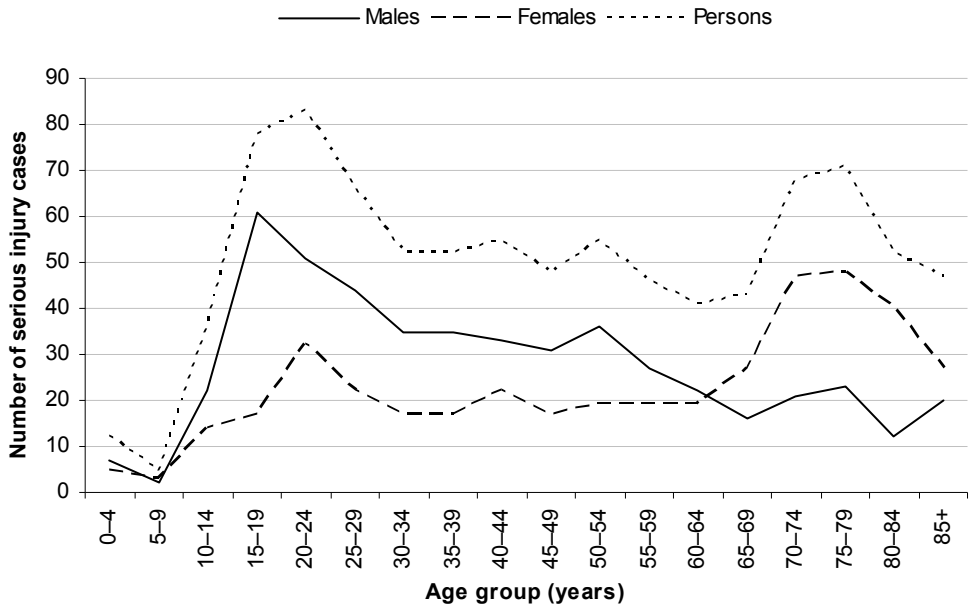

Figure 2.2: Persons seriously injured due to transport accidents involving a train, by age group and sex; Australia 2002–03 to 2006–07

On a population basis, age-standardised serious injury rates were highest in those aged 70 years and over with rates in this group ranging from 2.14 serious injury cases per 100,000 population for those aged 70–74 years to 2.82 serious injury cases per 100,000 population for those aged 85 years and over (Figure 2.3). Rates for those aged less than 70 years peaked in the 20–24 year age group with a rate of 1.12 serious injury cases per 100,000 population.

For males, there were peaks in the 85 years and older age group with 3.66 serious injury cases per 100,000 population, the 75–79 year age group (1.82 serious injury cases per 100,000 population) and in the 15–19 year age group (1.67 serious injury cases per 100,000 population). For females, the peak was in the 75–79 and 80–84 year age groups with 3.22 and 3.33 serious injury cases per 100,000 population, respectively. Males had, on average, 1.4 times the rate of serious injury of females (based on age-standardised rates).

Figure 2.3: Age-specific rates of serious injury due to transport accidents involving a train by sex, Australia 2002–03 to 2006–07

Circumstances of injury

Nationally, from 2002–03 to 2006–07, rail users made up two-thirds (66.0%) of the serious injury cases due to transport accidents involving a train (Table 2.4). The most common circumstances of injury for all persons involved in rail transport accidents (rail users, pedestrians and occupants of other vehicles) were:

- a person injured while boarding or alighting from a train (25.1%);
- a pedestrian injured in a collision with a train (14.8%);
- an occupant of a train injured by a fall in a train (13.3%);
- a car occupant injured in a collision with a train (12.5%); and
- an occupant of a train injured by a fall from a train (10.2%).

Train occupants who were injured in a train crash (collision or derailment) constituted 11.4% of train-related serious injury cases.

Over a third (34.3%) of cases due to a transport accident involving a train were hospitalised in New South Wales. An occupant of a train was injured in the majority (86.5%) of these cases (270 serious injury cases); most commonly while boarding or alighting, or by falling while in the train or falling from the train. By far the greatest number of train passenger journeys in Australia are undertaken in New South Wales, reflecting train usage in Sydney in particular (unpublished data obtained from the ATSB).

Victoria accounted for 37.1% of serious injury cases. Rail users made up over half (57.7%) of these cases, while 19.2% were pedestrians, 15.4% were car occupants injured in a collision with a train and a further 5.4% were occupants or riders of other motor vehicles, including trucks, pick-up trucks or vans, buses and motorcycles. Victoria has the second highest number of train passenger journeys in Australia (but only about half the number in New South Wales) and a large number of level crossings (unpublished data obtained from the ATSB).

Queensland accounted for 17.5% of serious injury cases. More than half (57.2%) of the cases in Queensland were rail users, 13.2% were pedestrians, 17.6% were car occupants injured in a collision with a train and a further 9.4% were occupants or riders of other motor vehicles, including trucks, pick-up trucks or vans, buses and motorcycles.

Table 2.4: Persons seriously injured due to transport accidents involving a train, Australia 2002–03 to 2006–07: circumstances of injury by state or territory of hospitalisation

Circumstance of injury	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Pedestrian injured in collision with train	29	65	21	5	12	*	0	*	135
Pedal cyclist injured in collision with train	0	8	*	0	*	0	0	0	13
Motorcyclist injured in collision with train	*	8	*	0	*	0	0	0	16
Car occupant injured in collision with train	6	52	28	*	20	*	*	*	114
Occupant of other motor vehicle injured in collision with train†	*	10	11	0	5	0	0	*	31
Animal-rider or occupant of an animal-drawn vehicle injured in collision with train	0	0	0	0	0	0	0	0	0
Occupant of train** injured:									
in collision with motor vehicle	7	19	*	0	0	0	0	*	29
in collision with or hit by rolling stock	*	*	*	*	0	0	0	0	6
in collision with other object	5	*	*	0	0	0	0	0	9
while boarding or alighting from train	111	80	19	7	8	*	*	*	228
by fall in train	66	42	8	*	*	0	0	*	121
by fall from train	36	33	12	*	9	*	0	0	93
in derailment without antecedent collision	19	5	34	0	*	*	*	*	60
in unknown transport accident	25	11	14	*	*	*	0	0	55
Person (mode of transport unknown) injured in collision between train and car	0	0	0	0	0	0	0	0	0
Total	**312**	**338**	**159**	**21**	**63**	**6**	**5**	**6**	**910**

Note: Shaded areas indicate the highest 5 figures for the total column.

* Small counts are suppressed (n<5).

† 'Occupant of other motor vehicle' includes any occupant of a heavy transport vehicle, pick-up truck or van, bus or three-wheeled motor vehicle.

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee, a person on the outside of a train or a person boarding or alighting from a train. Persons waiting at a station for a train ('intending passengers') are excluded.

Males accounted for 54.7% of persons seriously injured due to transport accidents involving a train (Table 2.5). The ratio of male:female serious injury cases varied with the circumstances. More females than males were seriously injured whilst boarding or alighting from a train (1.5:1.0) and by a fall within a train (1.5:1.0). More males than females were seriously injured in falls from trains (2.3:1.0) and in collisions involving injury to pedestrians (2.2:1.0) and car occupants (1.4:1.0).

Table 2.5: Persons seriously injured due to transport accidents involving a train, Australia 2002–03 to 2006–07: circumstances of injury by sex

Circumstance of injury	Males	Females	Persons
Pedestrian injured in collision with train	93	42	135
Pedal cyclist injured in collision with train	11	*	*
Motorcyclist injured in collision with train	13	*	*
Car occupant injured in collision with train	67	47	114
Occupant of other motor vehicle injured in collision with train†	29	*	*
Animal-rider or occupant of animal-drawn vehicle injured in collision with train	0	0	0
Occupant of train** injured:			
in collision with motor vehicle	9	20	29
in collision with or hit by rolling stock	*	*	6
in collision with other object	*	*	9
whilst boarding or alighting from train	93	135	228
by fall in train	48	73	121
by fall from train	65	28	93
in derailment without antecedent collision	24	36	60
in unknown transport accident	35	20	55
Person (mode of transport unknown) injured in collision between train and car	0	0	0
Total	**498**	**412**	**910**

Note: Shaded areas indicate the highest 5 figures for the total column.

* Small counts are suppressed (n<5). The total of some rows are suppressed to prevent calculation of some small numbers.

† 'Occupant of other motor vehicle' includes any occupant of a heavy transport vehicle, pick-up truck or van, bus or three-wheeled motor vehicle.

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee, a person on the outside of a train or a person boarding or alighting from a train. Persons waiting at a station for a train ('intending passengers') are excluded.

The most prominent circumstances of serious injury due to a transport accident involving a train vary with age (Table 2.6). For people aged 65 years and older, 42.7% of the cases were rail users seriously injured while boarding or alighting from a train and 24.9% were rail users injured by falling while in a train. These types of injury were much less common at younger ages. Falls from trains rather than falls in trains accounted for about one-fifth of cases in the 0–14 age group (18.9%) whereas they accounted for only a small proportion of cases in the 65 years and older group (8.9%). Rail-related serious injury at ages 15–44 years was most likely to involve a pedestrian injured in a collision with a train (25.1%) and a car occupant injured in a collision with a train (17.6%). A further 7.5% of 15–44 year olds were occupants or riders of other motor vehicles, including trucks, pick-up trucks or vans, buses and motorcycles. Pedestrian cases were also prominent among cases in the 0–14 group (18.9%) but much less so among cases in the 65 years and older group (2.8%).

Table 2.6: Persons seriously injured due to transport accidents involving a train, Australia 2002–03 to 2006–07: circumstances of injury by age group

Circumstance of injury	0–14	15–24	25–44	45–64	65+	Total
Pedestrian injured in collision with train	10	35	62	20	8	135
Pedal cyclist injured in collision with train	*	*	8	*	*	13
Motorcyclist injured in collision with train	0	7	8	*	0	16
Car occupant injured in collision with train	*	28	40	29	14	114
Occupant of other motor vehicle injured in collision with train[†]	*	*	10	12	*	31
Animal-rider or occupant of an animal-drawn vehicle injured in collision with train	0	0	0	0	0	0
Occupant of train[**] injured:						
in collision with motor vehicle	0	*	6	8	13	29
in collision with or hit by rolling stock	0	0	*	*	*	6
in collision with other object	0	*	*	*	0	9
whilst boarding or alighting from train	10	23	31	44	120	228
by fall in train	7	7	13	24	70	121
by fall from train	10	21	20	17	25	93
in derailment without antecedent collision	*	9	10	19	20	60
in unknown transport accident	6	21	12	9	7	55
Person (mode of transport unknown) injured in collision between train and car	0	0	0	0	0	0
Total	**53**	**161**	**225**	**190**	**281**	**910**

Note: Shaded areas indicate the highest 5 figures for the total column.

* Small counts are suppressed (n<5).

† 'Occupant of other motor vehicle' includes any occupant of a heavy transport vehicle, pick-up truck or van, bus or three-wheeled motor vehicle.

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee, a person on the outside of a train or a person boarding or alighting from a train. Persons waiting at a station for a train ('intending passengers') are excluded.

Table 2.7 shows the five most frequent circumstances of injury by age group and sex. More females than males were injured 'whilst boarding or alighting from train'. When age group is considered, there were more male than female boarding and alighting injuries in the 15–64 year age range, but more female than male boarding and alighting injuries in the 65 years and older age group.

Males outnumbered females for 'Pedestrian injured in collision with train'. In the 15–64 year age range, there were over twice as many males as females injured.

In 60% of cases, the 'Occupant of train injured by fall in train' was female. More than twice as many females as males were seriously injured in this way in the 65 years and older age groups.

There were more than twice as many males as females injured for 'Car occupant injured in collision with train' at ages 15–24 years and almost twice as many males as females injured in this group at ages 45–64 years. Numbers in all other age groups were similar for males and females.

In 70% of cases, the 'Occupant of train injured by fall from train' was male. In the 15–64 year age range, there were over 4 times as many males as females injured in this way.

Table 2.7: Persons seriously injured due to transport accidents involving a train, Australia 2002–03 to 2006–07: top five circumstances of injury by age group and sex

Circumstance of injury	0–14	15–24	25–44	45–64	65+	Total
Person injured whilst boarding or alighting from train						
Males	*	15	12	26	36	93
Females	6	8	19	18	84	135
Pedestrian injured in collision with train						
Males	5	23	48	13	*	93
Females	5	12	14	7	*	42
Occupant of train injured by fall in train**						
Males	6	*	5	13	21	48
Females	*	*	8	11	49	73
Car occupant injured in collision with train						
Males	0	20	22	19	6	67
Females	*	8	18	10	8	47
Occupant of train injured by fall from train**						
Males	6	18	16	13	12	65
Females	*	*	*	*	13	28
Total	**40**	**114**	**166**	**134**	**237**	**691**

Note: *Small counts are suppressed (<5).

This table shows the major circumstances accounting for 75.9% of transport accidents involving a railway train or vehicle.

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee, a person on the outside of a train or a person boarding or alighting from a train. Persons waiting at a station for a train ('intending passengers') are excluded.

Length of hospital stay

From 2002–03 to 2006–07, there were 7,388 patient days in hospital due to a transport accident involving a train, at an average of 1,478 patient days per year. Serious injury due to a transport accident involving a train accounted for 0.08% of all injury-related patient days in hospital for the same period (9,550,742) and 0.67% of all transport-related patient days (1,110,238).

Mean length of stay can be used as a crude indicator of severity of injury. The mean length of stay for persons seriously injured due to transport accidents involving a train was 10.0 days for males, 5.9 days for females and 8.1 days for persons. These are considerably longer than the mean length of stay of 3.3 days for males, 4.9 days for females and 4.0 days for persons for non rail-related injuries, 2004–05 (Bradley & Harrison 2008).

The mean length of stay values are influenced by a small number of cases involving very long stays in hospital. There were two cases with lengths of stay greater than 250 days; when these are omitted, the mean length of stay for persons shortens from 8.1 days to 7.5 days.

3 Serious injury due to level crossing accidents

Scope

The intersection between a public or private roadway or footpath and a railway track at the same level ('at-grade intersection') in Australia is commonly called a level crossing. This section focuses on serious non-fatal injury cases due to a collision between a train and a pedestrian or road vehicle where a public roadway, with or without an adjoining footpath, crosses one or more railway tracks at grade. Such cases form a subset (27.8%) of the cases examined in the earlier part of this report dealing with all rail transport accidents, as only cases with a first reported external cause code which specifies a traffic accident have been included. For a list of the codes included, see the 'Data issues' section.

Number and rate of serious injury

From 2000–01 to 2006–07, 370 persons were seriously injured in Australia due to transport accidents involving a railway train at a level crossing (Table 3.1). For the period of interest for this report from 2002–03 to 2006–07, there were on average 51 persons seriously injured, with 253 persons seriously injured over the 5-year period. There was a relatively even spread of serious injury cases over the twelve-month periods.

Victoria accounted for over half (53.0%) of level crossing-related serious injury cases with 134, followed by Queensland (19.0%, *n* = 48), South Australia (12.6%, *n* = 32) and New South Wales (10.7%, *n* = 27). There were small numbers of serious injury cases in the other jurisdictions (Table 3.1). Queensland has the most public level crossings, followed by Victoria, Western Australia, New South Wales and South Australia, in that order (Ford & Matthews 2002).

Table 3.1: Persons seriously injured due to level crossing accidents, Australia 2000–01 to 2006–07: by state or territory of hospitalisation

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2000–01	11	32	16	*	*	*	0	0	63
2001–02	9	25	9	7	*	*	0	0	54
2002–03	*	25	10	0	12	*	*	*	50
2003–04	10	28	9	*	0	*	0	*	50
2004–05	*	29	12	0	6	0	*	0	51
2005–06	*	22	10	*	7	*	*	0	44
2006–07	9	30	7	*	7	*	0	*	58
Total	**47**	**191**	**73**	**11**	**37**	*	*	*	**370**
Proportion of all rail transport cases (%)	**9.8**	**38.7**	**33.0**	**25.6**	**45.7**	*	*	*	**27.7**

* Small counts are suppressed (n<5).

For counts by calendar year refer to the 'Data issues' section.

The body of Table 3.1 is restricted to cases that were coded as occurring in traffic. The proportion of included cases that were specified as occurring in traffic differed by jurisdiction and, notably, was lowest for New South Wales. Cases that were not specified as either traffic or non-traffic might include some cases in which a person was seriously injured in a level crossing accident. However, the available data do not allow such a distinction to be made.

Case counts and trends over seven years in the rates of serious injury due to a transport accident involving a collision with a train at a level crossing are shown in Table 3.2 and Figure 3.1. Results must be interpreted with caution as there is potential for variation over time in admission practice, especially for lower severity cases and changes over time in the way external cause codes are assigned to cases involving rail-related injury (Harrison & Steenkamp 2002).

Age-standardised rates of serious injury due to level crossing accidents fluctuated over the 7-year period from 2000–01 to 2006–07. Overall, rates remained stable over the 7-year period ranging from 0.21 serious injury cases per 100,000 population in 2005–06 to 0.33 serious injury cases per 100,000 population in 2000–01. For males, rates remained relatively steady over the entire period from 2000–01 to 2006–07, fluctuating between 0.24 serious injury cases per 100,000 population in 2005–06 to 0.44 serious injury cases per 100,000 population in 2000–01 and 2001–02. For females, rates also remained relatively steady over the entire period from 2000–01 to 2006–07, fluctuating between 0.11 serious injury cases per 100,000 population in 2001–02 to 0.24 serious injury cases per 100,000 population in 2003–04.

Due to relatively small case numbers as shown in Table 3.2, rates of serious injury cases can be markedly affected by comparatively small changes from year to year in the number of cases admitted to hospital. Hence, any observed decline or rise in rates over a relatively short time span should be treated with caution.

Table 3.2: Age-standardised rates of serious injury due to a transport accident involving a collision with a train at a level crossing; Australia 2000–01 to 2006–07

Seriously injured	Age-standardised rate per 100,000 population (95% CI)						
	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07
Males	0.44 (0.31–0.59)	0.44 (0.3–0.57)	0.37 (0.25–0.49)	0.26 (0.16–0.37)	0.32 (0.20–0.42)	0.24 (0.14–0.33)	0.40 (0.27–0.51)
Females	0.22 (0.12–0.31)	0.11 (0.04–0.18)	0.14 (0.06–0.22)	0.24 (0.14–0.33)	0.19 (0.09–0.26)	0.18 (0.10–0.27)	0.16 (0.07–0.23)
Persons	0.33 (0.24–0.41)	0.28 (0.20–0.35)	0.25 (0.18–0.33)	0.25 (0.17–0.32)	0.25 (0.18–0.32)	0.21 (0.14–0.27)	0.28 (0.20–0.35)

Seriously injured	Case numbers						
	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07
Males	42	43	36	26	32	25	41
Females	21	11	14	24	19	19	17
Persons	63	54	50	50	51	44	58

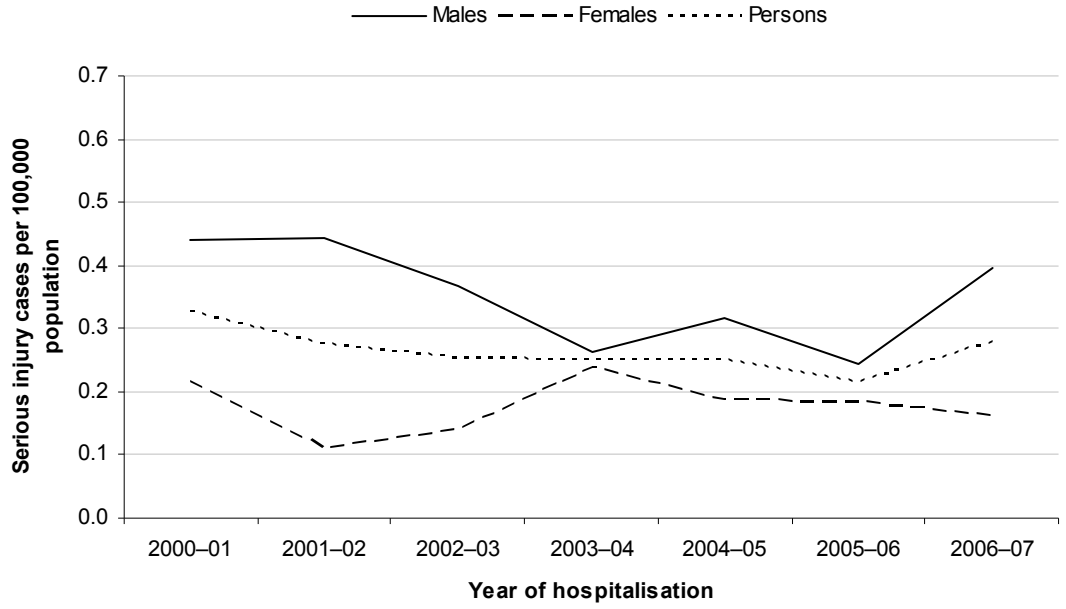

Figure 3.1: Age-standardised rates of serious injury due to transport accident involving a collision with a train at a level crossing; Australia 2000–01 to 2006–07

The number of persons seriously injured in a level crossing accident by age group is shown in Figure 3.2. Case numbers rose markedly from 5–9 years onwards before peaking at 20–24 years with 35 serious injury cases. From this point onwards, the number of serious injury cases declined with age. A similar pattern was observed for seriously injured males where the number of serious injury cases also peaked at 20–24 years with 23. In females there was less variation in the young adult to middle age range (20–54 years) with a peak in the 20–24 year age group of 12 serious injury cases.

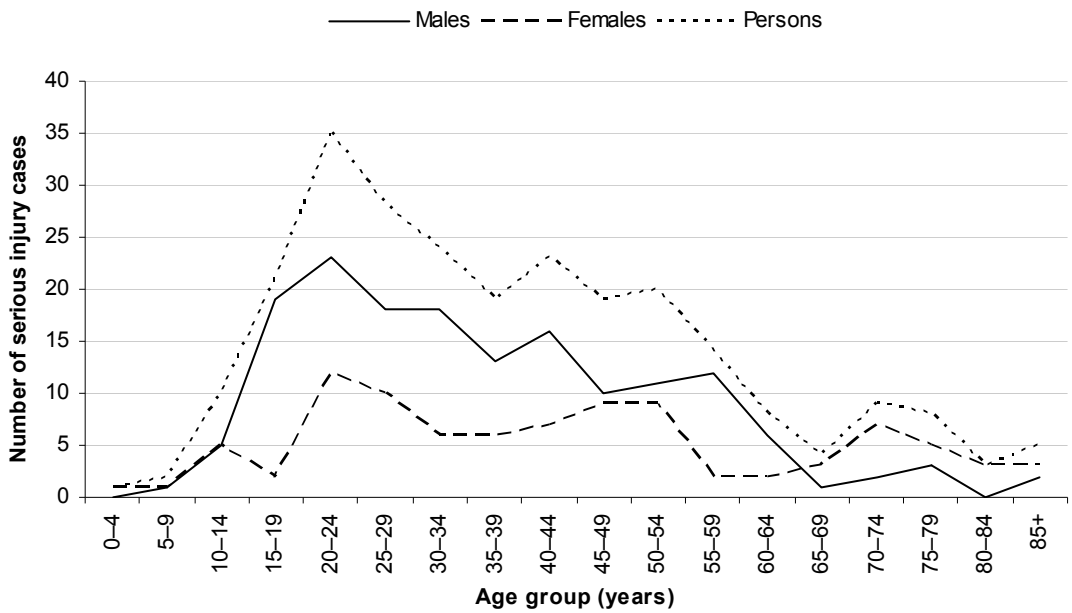

Figure 3.2: Persons seriously injured due to level crossing accidents, by age group and sex, Australia 2002–03 to 2006–07

On a population basis, serious injury rates due to level crossing accidents were highest in the 20–24 year age group with 0.47 serious injury cases per 100,000 population (Figure 3.3). There was a peak in the 20–24 year age group for males (0.61 serious injury cases per 100,000 population) and in the 70–74 year age group for females (0.42 serious injury cases per 100,000 population). Males had, on average, 1.5 times the rate of serious injury of females (based on age-standardised rates).

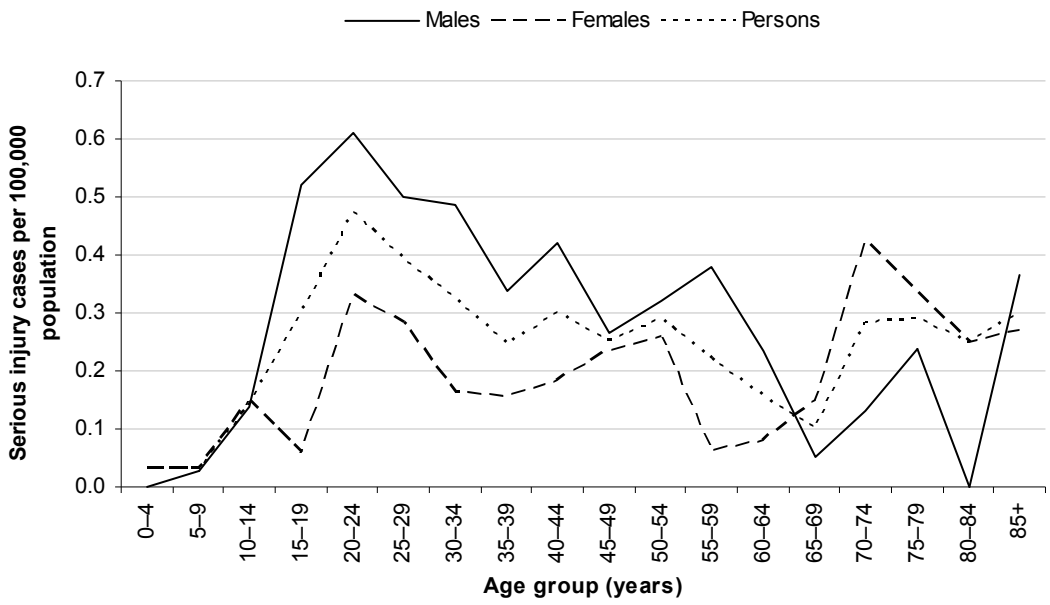

Figure 3.3: Age-specific rate of serious injury due to level crossing accidents by sex, Australia 2002–03 to 2006–07

Circumstances of injury

From 2002–03 to 2006–07, 42.3% of persons seriously injured due to level crossing accidents were a 'Car occupant injured in collision with train' (107 serious injury cases) and 29.6% were a 'Pedestrian injured in collision with train' (75 serious injury cases) (Table 3.3). A further 13.8% were occupants or riders of other motor vehicles, including trucks, pick-up trucks or vans, buses and motorcycles (35 serious injury cases in total). Car occupants injured in a collision with a train accounted for a large proportion of serious injury cases due to level crossing accidents in South Australia (59.4%), Queensland (56.3%), and Victoria (35.8%). Pedestrians injured in a collision with a train accounted for a significant proportion of serious injury cases due to level crossing accidents in New South Wales (44.4%) and Victoria (35.1%).

Table 3.3: Persons seriously injured due to level crossing accidents, Australia 2002–03 to 2006–07: circumstances of injury by state or territory of hospitalisation

Circumstance of injury	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Pedestrian injured in collision with train	12	47	7	*	7	*	0	0	75
Pedal cyclist injured in collision with train	0	8	*	0	*	0	0	0	12
Motorcyclist injured in collision with train	*	7	*	0	*	*	*	*	10
Car occupant injured in collision with train	6	48	27	*	19	*	*	*	107
Occupant of pick-up truck or van injured in collision with train	*	*	*	0	0	0	0	0	7
Occupant of heavy transport vehicle injured in collision with train	*	5	5	0	*	0	0	*	13
Bus occupant injured in collision with train	0	*	0	0	*	0	0	0	5
Occupant of three-wheeled motor vehicle injured in collision with train	0	0	0	0	0	0	0	0	0
Occupant of train injured in collision with motor vehicle**	6	15	*	0	0	0	0	*	24
Person (mode of transport unknown) injured in collision between train and car	0	0	0	0	0	0	0	0	0
Total	**27**	**134**	**48**	*****	**32**	*****	*****	*****	**253**

Note: Shaded areas indicate the highest 2 figures for the Australia column.

* Small counts are suppressed (n<5).

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee or a person on the outside of a train. Persons waiting at a station for a train ('intending passengers') and persons boarding or alighting from a train are excluded.

Over the 5-year period, almost two-thirds (63.2%) of persons seriously injured due to level crossing accidents were male (160 serious injury cases) (Table 3.4). The majority of car occupants (57.0%) and pedestrians (66.7%) injured in a collision with a train were male. The majority of pedal cyclists and motorcyclists injured in a collision with a train were also male (at least 80%). All persons in the 'Occupant of pick-up truck or van injured in collision with train' and 'Occupant of heavy transport vehicle injured in collision with train' categories were male.

Table 3.4: Persons seriously injured due to level crossing accidents, Australia 2002–03 to 2006–07: circumstances of injury by sex

Circumstance of injury	Males	Females	Persons
Pedestrian injured in collision with train	50	25	75
Pedal cyclist injured in collision with train	11	*	*
Motorcyclist injured in collision with train	8	*	*
Car occupant injured in collision with train	61	46	107
Occupant of pick-up truck or van injured in collision with train	7	0	7
Occupant of heavy transport vehicle injured in collision with train	13	0	13
Bus occupant injured in collision with train	*	*	*
Occupant of three-wheeled motor vehicle injured in collision with train	0	0	0
Occupant of train injured in collision with motor vehicle**	7	17	24
Person (mode of transport unknown) injured in collision between train and car	0	0	0
Total	**160**	**93**	**253**

Note: Shaded areas indicate the highest 2 figures for the person column.

* Small counts are suppressed (n<5). The total of some rows are suppressed to prevent calculation of some small numbers.

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee or a person on the outside of a train. Persons waiting at a station for a train ('intending passengers') and persons boarding or alighting from a train are excluded.

The majority (83.4%) of persons seriously injured due to a level crossing accident were of 'working age' (aged 15–64 years) (Table 3.5). Two-thirds (67%) of pedestrians and 59% of car occupants were aged 15–44 years, while a further 26% of car occupants were middle-aged (45–64 years). The youngest (0–14 years) and the oldest age groups (65 years and older) comprised 5.1% and 11.5% of all persons seriously injured due to a level crossing accident, respectively.

Table 3.5: Persons seriously injured due to level crossing accidents, Australia 2002–03 to 2006–07: circumstances of injury by age group at admission

Circumstance of injury	0–14	15–24	25–44	45–64	65+	Total
Pedestrian injured in collision with train	6	23	27	14	5	75
Pedal cyclist injured in collision with train	*	*	8	0	*	12
Motorcyclist injured in collision with train	0	*	6	*	0	10
Car occupant injured in collision with train	*	25	38	28	13	107
Occupant of pick-up truck or van injured in collision with train	0	0	*	5	*	7
Occupant of heavy transport vehicle injured in collision with train	0	*	7	5	0	13
Bus occupant injured in collision with train	*	*	*	*	0	5
Occupant of three-wheeled motor vehicle injured in collision with train	0	0	0	0	0	0
Occupant of train injured in collision with motor vehicle**	0	*	6	7	9	24
Person (mode of transport unknown) injured in collision between train and car	0	0	0	0	0	0
Total	**13**	**56**	**94**	**61**	**29**	**253**

Note: Shaded areas indicate the highest 2 figures for the total column.

* Small counts are suppressed (n<5).

** 'Occupant of train' includes any occupant of a train, including a passenger, a railway employee or a person on the outside of a train. Persons waiting at a station for a train ('intending passengers') and persons boarding or alighting from a train are excluded.

Length of hospital stay

From 2002–03 to 2006–07, there were 3,004 patient days in hospital due to a transport accident involving a collision with a train at a level crossing, at an average of 601 patient days per year.

The mean length of stay for persons seriously injured in a level crossing accident was 15.0 days for males, 6.5 days for females and 11.9 days for persons. This was longer than the mean length of stay for all transport accidents involving a train (10.0, 5.9 and 8.1 days for males, females and persons respectively), and much longer than that reported for non rail-related injuries, 2004–05, where the mean length of stay was 3.3, 4.9 and 4.0 days for males, females and persons respectively (Bradley & Harrison 2008). Two cases had a length of stay greater than 250 days. When these cases are omitted, the mean length of stay for persons shortens from 11.9 days to 9.6 days.

Data issues

Serious injury

National hospital separations data were sourced from the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database (NHMD). A 'separation' is a term used in Australian hospitals to refer to a formal, or statistical process, by which an episode of care for an admitted patient ceases (AIHW 2001). An 'episode of care' is a period of health care characterised by only one care type. For the lay person, this is perhaps best understood as a stay in a particular ward in a hospital. For example, a person who is in an intensive care ward and is then transferred to a rehabilitation ward will have undergone two episodes of care and hence two separations within the hospital.

Seriously injured is defined for this report as an injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after one or more nights stay in a hospital bed (i.e. deaths are excluded). As discharge from hospital can include transfer to home, to another acute care hospital and to another form of care (e.g. rehabilitation), a method has been used in this report to reduce over-counting of injury cases by omitting separations in which the mode of admission is recorded as being by transfer from another acute-care hospital, on the grounds that such cases are likely to result in two or more separation records for the same injury.

Records that met the following criteria are included in this report:

- Australian hospital separations occurring 1 July 2002 to 30 June 2007, coded according to the third, fourth and fifth editions of ICD-10-AM (NCCH 2002; NCCH 2004; NCCH 2006);
- Principal Diagnosis in the ICD-10-AM range S00–T98 using Chapter XIX *Injury, poisoning and certain other consequences of external causes* codes;
- First (left-most) external cause of morbidity in ICD-10-AM range V01–V99 (i.e. the 'Transport Accidents' section of Chapter XX *External causes of morbidity and mortality*);
- Mode of admission has any value except the one indicating that transfer from another acute-care hospital has occurred; and
- Mode of separation has any value except the one indicating that the persons died while in hospital.

The calculation of rail transport accidents as a percentage of all injury-related or transport-related hospital separations and the calculation of total patient days (including same day, which are assigned a stay of one day) included all separations (i.e. not omitting separations in which the mode of admission is recorded as being by transfer from another acute-care hospital or separations in which the person died in hospital).

National hospital separations data include information on the state and territory of hospitalisation for the person admitted to hospital and the state and territory of usual residence, but not the location of the crash or where the injury was sustained. There are pluses and minuses for choosing either state and territory of hospitalisation or state and territory of usual residence when reporting jurisdiction. In this report, we have chosen to report serious injury counts by state and territory of hospitalisation.

Hospital cases were defined as involving a railway train or railway vehicle if they contained an ICD-10-AM first reported Chapter 20 external cause code of V05, V15, V25, V35, V45, V55, V65, V75, V80.6, V81, V87.6 or V88.6. Cases with a Principal Diagnosis other than injury and cases in which an external cause code for rail transport only appears as an additional external cause code were excluded on the grounds that injury due to a rail transport accident was not recorded as being the main reason for admission to hospital, resulting in a starting file of 997 records (Table A1).

Table A1: Selection criteria for hospital records of rail-related transport injury

Record occurring from 1 July 2002 to 30 June 2007	Persons
Records with an ICD-10-AM 'Rail Transport Accident' code* as external cause anywhere in the record**	1,256
Records with a 'Rail Transport Accident' as first reported external cause†, and	1,214
injury as a Principal Diagnosis (S00–T98), and	997
excluding cases transferred from another acute-care hospital, and	932
excluding deaths in hospital	910

* A record is a 'Rail Transport Accident' if it has an external cause of V05, V15, V25, V35, V45, V55, V65, V75, V80.6, V81, V87.6, V88.6.

** There were 42 records with a first reported external cause code of another type of injury (e.g. complications of surgical and medical care, a transport accident without mention of being rail-related, other unintentional injuries, falls, assault etc.) but a 2nd or subsequent external cause code of rail-related transport.

† There were 217 cases with a first reported external cause code of a 'Rail Transport Accident' but a Principal Diagnosis outside of the injury range (S00–T98). The most common Principal Diagnosis was *Care involving use of rehabilitation procedure, unspecified* (*Z50.9*, *n* = 101) and *Examination and observation following transport accident* (*Z04.1*, *n* = 7).

Hospital cases were defined as being due to level crossing accidents if they contained a Principal Diagnosis in the range S00–T98 and a first reported external cause code of: V05.1, V15.(4,5,9), V25.(4,5,9), V35.(5,6,7,9), V45.(5,6,7,9), V55.(5,6,7,9), V65.(5,6,7,9), V75.(5,6,7,9), V81.1 or V87.6. These codes should only be used for 'traffic' accidents, in which a road vehicle or a pedestrian had collided with a railway vehicle on a public road (i.e. originating on, terminating on, or involving a vehicle partially on a public road). This combination of circumstances is most likely to occur for level crossing crashes. It could, however, also occur in other circumstances e.g. if a railway runs along a road reserve. Note that in the inclusion criteria for a level crossing accident, all but V05.1 specify that a collision occurred between a road vehicle and a railway train or railway vehicle. The code V05.1 specifies a collision between a pedestrian and a railway train or railway vehicle in traffic, i.e. on a public road.

There are a number of cases which may be rail-related but which are not included in the selection criteria as specified in Table A1. In such instances, the person may have been injured as a result of a collision with a train but the intent has been ascribed as intentional self-harm, assault, or undetermined intent. Table A2 lists the number of serious injury cases due to self-harm, assault and undetermined intent that involve a collision between a person and a moving object or by crashing a motor vehicle with another specified vehicle (the ICD-10-AM inclusion notes state this can include a railway train or tram). It should be noted that the ICD-10-AM codes listed in Table A2 do not identify the vehicle type. It is likely that a proportion of these cases are rail-related, but it is not possible to distinguish such detail from the ICD-10-AM codes. For this reason, the selection criterion of this report is restricted to cases with definite rail involvement, thus excluding cases of intentional self-harm, assault and undetermined intent.

Table A2: Serious injury cases due to intentional self-harm, assault or undetermined intent that resulted from a collision with a moving object or vehicle, Australia 2002–03 to 2006–07

External cause of injury		No. of cases
X81	Intentional self-harm by jumping or lying before moving object	200
X82.2	Intentional self-harm by other specified crashing of motor vehicle, non-traffic	*
X82.8	Intentional self-harm by other specified crashing of motor vehicle, traffic	32
Y02	Assault by pushing or placing victim before moving object	50
Y03.2	Assault by other specified crashing of motor vehicle, non-traffic	37
Y03.8	Assault by other specified crashing of motor vehicle, traffic	66
Y31	Falling, lying or running before or into moving object, undetermined intent	33
Y32.2	Other specified crashing of motor vehicle, undetermined intent, non-traffic	*
Y32.8	Other specified crashing of motor vehicle, undetermined intent, traffic	*
Total		**426**

*Small counts are suppressed (n<5).

Serious injury counts by calendar year

Tables A3 and A4 below are equivalent to Tables 2.1 and 3.1 in this report, except that data are reported for calendar years instead of financial years.

Table A3: Persons seriously injured due to transport accidents involving a train, Australia, 2000 to 2006: by state or territory of hospitalisation

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2000	96	65	32	7	10	*	*	*	216
2001	76	82	33	10	*	*	0	0	209
2002	70	71	13	8	19	*	*	*	183
2003	76	80	30	*	*	*	*	0	197
2004	69	59	63	*	11	*	0	*	209
2005	54	62	26	*	14	*	*	*	163
2006	54	67	27	9	13	*	0	*	174
Total	**495**	**486**	**224**	**44**	**79**	*****	*****	*****	**1,351**

*Small counts are suppressed (n<5).

Table A4: Persons seriously injured due to level crossing accidents, Australia, 2000 to 2006: by state or territory of hospitalisation

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2000	15	21	14	0	*	*	*	0	56
2001	7	36	16	5	*	*	*	*	67
2002	6	23	5	*	9	*	0	0	47
2003	*	26	10	0	*	*	0	0	45
2004	9	30	11	*	*	0	0	*	56
2005	*	24	13	0	7	*	*	0	49
2006	6	22	8	*	7	0	0	*	48
Total	**49**	**182**	**77**	**11**	**38**	*	*	*	**368**

*Small counts are suppressed (n<5).

Population and other denominators

Case count data were combined for a 5-year observational period and rates were calculated using, as the denominator, the final estimate of the estimated resident population as at 31 December 2006. The exceptions were the rates in Tables 2.2 and 3.2 and Figures 2.1 and 3.1, which were calculated using, as the denominator, the final estimate of the estimated resident population as at 31 December in the relevant year (e.g. 31 December 2006 for 2006–07 data). Direct standardisation was used to age-standardise rates, using the Australian population in 2001 as the standard (ABS 2003). Age-standardised rates and trend analysis with 95% confidence intervals were calculated in Stata version 10.1 statistical software (Stata Corporation 2008) using the –dstdize- and –poisson- commands respectively.

Suppression of small cell counts in tables

Cell counts in tables that are four cases or fewer have been suppressed as have rates derived from them, to protect confidentiality and because values based on very small numbers are sometimes difficult to interpret. In the instances where only one cell in a row or column has a count of four or less, counts of one or more other cells in the same row or column have generally also been suppressed.

Comparability with other reports

Australian hospitals use an international standard classification called the International Statistical Classification of Diseases (ICD) when compiling data on persons injured and subsequently admitted to hospital (morbidity data). ICD provides a nationally consistent basis for looking at morbidity due to transport accidents of all kinds (road, rail, water and air). However, it is not necessarily consistent with the approach taken by the Australian Transport Safety Bureau (ATSB) or others in looking at safety in each transport mode individually. For example, road safety statistics compiled by the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government are focused on crashes on public roads, whereas ICD covers road crashes both on and off public roads. Aviation statistics compiled by the ATSB do not cover hang-gliders, gliders and other forms of non-powered aircraft, whereas ICD does. For information on deaths involving railway transport, readers should refer to the 'rail safety/statistics' part of the ATSB website at <www.atsb.gov.au>.

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