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Serious injury due to transport accidents, Australia, 2003–04

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Flinders UNIVERSITY

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Serious injury due to transport accidents, Australia, 2003–04

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ATSB	Australian Transport Safety Bureau
ICD	International Classification of Diseases
ICD-10-AM	International Classification of Diseases, 10th Revision, Australian Modification
ICISS	ICD-based Injury Severity Score
NHMD	National Hospital Morbidity Database

1 Introduction

Transport accidents are a leading cause of injury, both fatal and non-fatal. The primary purpose of this publication is to provide a broad overview of serious injury due to transport accidents in Australia in the one-year period 2003–04 (Table 1.1), the latest year for which data are available.

Table 1.1: Transport injury, Australia, 2003–04

Case numbers	Males	Females	Persons
Persons seriously injured†	32,861	15,297	48,160[(a)]

Notes

1. † In this report 'seriously injured' means admitted to hospital due to injury (see Data Issues 'Serious injury', p. 8)
2. (a) Includes cases where sex is missing or indeterminate

Serious injury 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). This report presents estimates of the numbers of persons seriously injured in Australia due to transport accidents in the one-year period 2003–04. Readers should consult the appendix for notes on the methodology employed and for the meaning of technical terms occasionally used in this report where necessary, terms such as 'separations' for example.

2 Main findings

The main findings of the report are that:

- During the one-year period 2003–04, transport accidents accounted for 0.8% of all hospital separations in Australia and 12.0% of all injury-related hospital separations. A 'separation', defined in the appendix, can be understood as a stay in a hospital ward.

- There were 220,170 transport-related patient days in hospital, 0.9% of total patient days in Australia and 11.9% of all injury-related patient days. The mean length of stay in hospital for a transport accident was 4.6 days.

- On a population basis, the age-standardised rate of serious injury was 242 admissions to hospital per 100,000 population. Males had 2.2 times the rate of serious injury in transport accidents of females, 330 per 100,000 population compared with 152 per 100,000 population.

- More than a third (37.4%) of persons seriously injured in a transport accident were car occupants. The age-standardised rate of serious injury for car occupants was 90 cases per 100,000 population. The majority (88%) of car occupants seriously injured were injured on public roads.

- Over a fifth (22.0%) of persons seriously injured in a transport accident were motorcyclists (54 serious injury cases per 100,000 population). About half (51%) of motorcyclists seriously injured were injured on public roads and close to half (46%) were injured off-road.

- Another 16.5% of persons seriously injured in a transport accident were pedal cyclists (40 serious injury cases per 100,000 population). Half of pedal cyclists seriously injured were injured off-road and close to half (46%) were injured on public roads.

- Another 7.7% of serious injury cases were pedestrians and 6.3% were animal riders or occupants of an animal-drawn vehicle.

- Over half (53%) of the persons seriously injured in a transport accident were less than 30 years of age. Young people aged 15–24 years represented over a quarter (27%) of all transport-related serious injury cases.

3 National overview 2003–04

Key indicators and mode of transport

This report includes non-fatal injury due to road and rail transport, water and air transport. Road and rail transport includes traffic (occurring on a public road), non-traffic and unspecified as to whether traffic or non-traffic. This definition of transport injury excludes injury recorded as being due to intentional self harm, assault or undetermined intent.

In 2003–04, transport was the third[(a)] leading cause of serious injury (11.7%) (Table 3.1). The first and second ranked leading causes of serious injury were fall injuries (29.4%) and complications of surgical and medical care (16.8%). Nearly a quarter (23.2%) of transport injuries represented a high threat to life (Table 3.1). Only injuries resulting from drowning and immersion (89.4%) and fall-related injuries (24.5%) posed a higher threat to life.

Table 3.1: Serious injury† due to external causes of injury and poisoning, Australia, 2003–04

	Serious injury* (b)						
	All cases			High threat-to-life cases**			
External cause of injury	Count	Per cent	Rate‡	Count	Per cent	Rate‡	% high threat-to-life
Unintentional							
Transportation	48,160	11.7%	241.9	11,154	21.5%	55.8	23.2%
Drowning & immersion	460	0.1%	2.3	411	0.8%	2.1	89.4%
Poisoning, pharmaceuticals	7,614	1.8%	38.4	122	0.2%	0.6	1.6%
Poisoning, other substances	2,861	0.7%	14.4	97	0.2%	0.5	3.4%
Falls	121,615	29.4%	596.4	28,536	54.9%	136.5	23.5%
Fires/burns/scalds	5,092	1.2%	25.8	1,056	2.0%	5.3	20.7%
Other unintentional[(a)]	112,588	27.2%	564.5	4,472	8.6%	22.0	4.0%
Intentional							
Self inflicted	22,827	5.5%	114.8	914	1.8%	4.6	4.0%
Inflicted by another person	19,310	4.7%	97.5	3,364	6.5%	17.0	17.4%
Undetermined intent	2,892	0.7%	14.5	123	0.2%	0.6	4.3%
Complications of surgical and medical care	69,557	16.8%	341.4	1,671	3.2%	8.1	2.4%
Other &missing	485	0.1%	2.4	47	0.10%	0.2	9.7%
Total	**413,461**	**100.0%**	**2,054.4**	**51,967**	**100.0%**	**253.4**	**12.6%**

Notes
1. † Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
2. * ICD-10-AM External Causes codes aggregated as in (Berry & Harrison 2007).
3. ** ICD-based Injury Severity Score (ICISS) <0.941 with weights from (Stephenson et al. 2004).
4. ‡ Per 100,000 population, adjusted by direct standardisation to the Australian population in June 2001.

(a) Other unintentional injury was not included in the ranking, as it comprised a heterogenous group of injury types that did not fit within the other specified injury groupings.

(b) The number of persons seriously injured is estimated by omitting inward transfers from one hospital to another.

In the one-year period 2003–04, there were a total of 6,841,192 hospital separations from public, private and psychiatric hospitals in Australia corresponding to a total of 23,583,213 patient days (AIHW 2005). Transport accidents accounted for 0.8% of all hospital separations in Australia and 12.0% of all injury-related hospital separations (Table 3.2).

During 2003–04, there were 1,845,452 injury-related patient days in hospital, with a mean length of stay of 4.5 days. There were 220,170 transport–related patient days, with a mean length of stay of 4.6 days, which accounted for 0.9% of all patient days in Australia and 11.9% of all injury-related patient days.

The number of persons seriously injured is shown in Table 3.2 and is estimated by omitting inward transfers from one hospital to another. In 33% of serious injury cases, the injured person was discharged on the same day as they were admitted.

The age-standardised rate of transport serious injury was 242 admissions to hospital per 100,000 population. The male: female age-standardised rate ratio was 2.2:1.0, indicating that, after accounting for any differences in age composition, twice as many males as females were hospitalised as a result of transport injury, 330 per 100,000 population, compared with 152 per 100,000 population.

Table 3.2: Key indicators for serious transport injury, Australia, 2003–04

Indicator	Males	Females	Persons*
Seriously injured † (c)			
Persons admitted to hospital (d)	32,861	15,297	48,160
Percentage of all hospital separations	1.2	0.5	0.8
Percentage of all hospital separations due to injury	14.4	8.7	12.0
Same day hospitalisations	10,464	5,189	15,654
Mean length of stay in hospital (days)‡	4.5	4.6	4.6
Total patient days (including same day and deaths in hospital)	149,262	70,906	220,170
Crude rate/100,000 population**	330.9	152.2	241.0
Age-standardised rate/100,000 population***	330.1	152.4	241.9

Notes
1. † Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
2. * Includes cases where sex is missing or indeterminate.
3. ** Using population denominators in December 2003.
4. *** Adjusted by direct standardisation to the Australian population in June 2001.
5. ‡ This is the average number of days a person is likely to stay in hospital when seriously injured.

(c) The terms *seriously injured* and *hospitalisation* are used interchangeably and represent a person being admitted to hospital for injury 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). Discharge from hospital can include transfer to home, to another acute care hospital and to another form of care (e.g. rehabilitation). In this report, a method has been used 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.

(d) In total, there were 53,729 admissions to hospital for transport injury for an estimated 48,541 persons, of which 381 (0.8%) died while in hospital. These deaths are probably included in estimates of fatal transport injuries and are omitted from the seriously injured counts in Table 3.2 and throughout the report in order to avoid double-counting. The estimate of total patient days includes separations in which the person died in hospital.

In the one-year period 2003–04, 37.4% of persons seriously injured in a transport accident were occupants of a car. Another 22.0% were motorcyclists, 16.5% were pedal cyclists, 7.7% were pedestrians and 6.3% were animal-riders or occupants of an animal-drawn vehicle (Table 3.3).

Table 3.3: Mode of transport for serious injury, Australia, 2003–04

Seriously injured person	Count	Per cent	Rate‡
Car occupant	18,013	37.4%	90.1
traffic	*15,769*	*32.7%*	*78.9*
non-traffic	*1,775*	*3.7%*	*8.9*
Motorcyclist	10,612	22.0%	53.6
traffic	*5,385*	*11.2%*	*27.1*
non-traffic	*4,873*	*10.1%*	*24.6*
Pedal cyclist	7,929	16.5%	40.2
traffic	*3,676*	*7.6%*	*18.6*
non-traffic	*3,964*	*8.2%*	*20.1*
Pedestrian	3,716	7.7%	18.6
traffic	*2,578*	*5.4%*	*12.9*
non-traffic	*697*	*1.4%*	*3.5*
Occupant of pick-up truck or van	584	1.2%	2.9
traffic	*352*	*0.7%*	*1.8*
non-traffic	*167*	*0.3%*	*0.8*
Occupant of heavy transport vehicle	749	1.6%	3.7
traffic	*406*	*0.8%*	*2.0*
non-traffic	*233*	*0.5%*	*1.2*
Bus occupant	394	0.8%	1.9
traffic	*152*	*0.3%*	*0.8*
non-traffic	*87*	*0.2%*	*0.4*
Animal rider or occupant of animal-drawn vehicle	3,054	6.3%	15.4
Occupant of a special all-terrain or off-road motor vehicle	606	1.3%	3.0
Occupant of three-wheeled motor vehicle	90	0.2%	0.4
Occupant of a tram	88	0.2%	0.4
Occupant of a train	112	0.2%	0.6
Occupant of a special industrial vehicle	135	0.3%	0.7
Occupant of a special agricultural vehicle	191	0.4%	0.9
Occupant of a special construction vehicle	71	0.1%	0.4
Occupant of watercraft	660	1.4%	3.3
Occupant of aircraft	174	0.4%	0.9
Other and unspecified	982	2.0%	4.9
Total	**48,160**	**100.0%**	**241.9**

Notes

1. Shading denotes the 3 highest figures for a column. 'Mode of transport' here means the vehicle the person was travelling in at the time of being injured in a transport accident. 'Other and unspecified' includes V87, V88, V89, V98, and V99 for ICD-10-AM (hospitals). A 'special all-terrain or off-road motor vehicle' refers only to such vehicles that are not registrable for on-road use and does not include registrable 4WDs (e.g. Pajeros) which are included under 'car occupants'. A traffic accident is any vehicle accident occurring on a public road [i.e. originating on, terminating on, or involving a vehicle partially on the road]. A non-traffic accident is any vehicle accident that occurs entirely at any place other than a public road. For a certain proportion of cases, whether an accident was traffic or non-traffic was unknown. These cases are included in the totals for each mode of transport and this is the reason the sum of traffic and non-traffic cases is sometimes less than the total for each mode.
2. ‡ Per 100,000 population, adjusted by direct standardisation to the Australian population in June 2001.

Rates of serious injury by mode of transport

Most transport serious injury cases (97.3%; n=46,862) were known to have involved land transport. The rate of serious injury was highest for car occupants with an age-standardised rate of 90 serious injury cases per 100,000 population (Table 3.3). Eighty-eight per cent of serious injury cases among car occupants were injured in traffic conditions (i.e. on public roads).

The second most common mode of transport was a motorcycle (54 serious injury cases per 100,000). About half (51%) of seriously injured motorcyclists were injured in traffic conditions (i.e. on public roads) and 46% were injured in non-traffic conditions.

The third most common mode of transport was a pedal cycle (40 serious injury cases per 100,000). Half of the seriously injured cyclists were injured in non-traffic conditions and 46% were injured in traffic conditions.

The fourth most common mode of transport was walking (pedestrians, 19 serious injury cases per 100,000). The majority (69%) of pedestrians seriously injured were injured in traffic conditions.

The fifth most common mode of transport was an animal or animal-driven vehicle (15 serious injury cases per 100,000).

Age and sex distribution

Males accounted for over two-thirds (68%; n=32,861) of transport serious injury in 2003–04. The higher rate for males can be observed at almost all ages (except for the 80–84 year age group). The rates of serious injury were high at ages 15–24 years (males: 677 per 100,000 among 15–19 years and 628 per 100,000 among 20–24 years, females: 297 per 100,000 among 15–19 years and 242 per 100,000 among 20–24 years) (Figure 3.1 and Table 3.4).

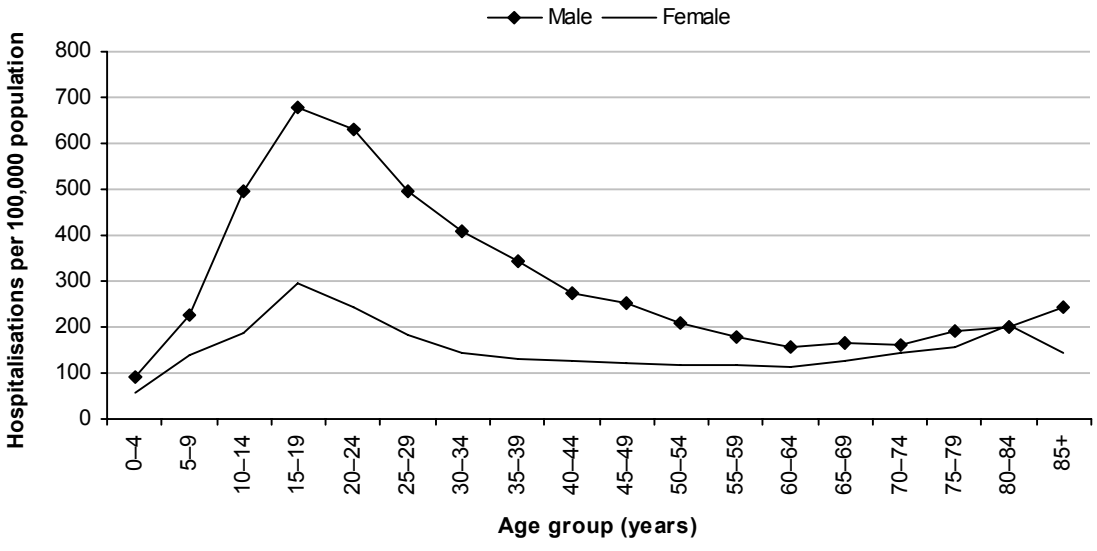

Figure 3.1: Age-specific serious injury rates for transport injury by sex; Australia, 2003–04

Over half (53%; n=25,546) of the persons seriously injured in a transport accident were less than 30 years of age. Young people aged 15–24 years represented over a quarter (27%) of all transport-related serious injury cases (Table 3.5).

Table 3.4: Age-specific and age-standardised rates of serious injury due to transport; Australia, 2003–04

Indicator	Age group (years)																	All ages (crude)	Age Std*
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+	
Serious injury																			
Males	91.3	226.8	495.4	676.7	628.3	493.5	409.6	342.8	273.8	252.4	209.9	177.9	154.4	164.1	162.7	192.3	201.4	243.4	330.9	330.1
Females	55.0	141.2	185.8	297.4	241.5	182.7	141.5	128.8	123.9	121.3	116.8	117.0	111.5	125.9	142.6	155.3	204.4	144.0	152.2	152.4
Persons	73.7	185.1	344.6	491.7	439.3	339.1	274.6	235.1	198.6	186.4	163.1	147.7	133.1	144.7	152.2	171.9	203.2	175.4	241.0	241.9
M:F rate ratio	1.7	1.6	2.7	2.3	2.6	2.7	2.9	2.7	2.2	2.1	1.8	1.5	1.4	1.3	1.1	1.2	1.0	1.7	2.2	2.2

Note: * Adjusted by direct standardisation to the Australian population in June 2001.

Table 3.5: Serious injury due to transport by age group, Australia, 2003–04

Age group	Males		Females		Persons	
	Count	Per cent	Count	Per cent	Count	Per cent
0–14 years	5,657	17.2%	2,508	16.4%	8,167[(a)]	17.0%
15–24 years	9,158	27.9%	3,605	23.6%	12,763	26.5%
25–44 years	11,061	33.7%	4,224	27.6%	15,285	31.7%
45–64 years	4,906	14.9%	2,811	18.4%	7,717	16.0%
65+ years	2,079	6.3%	2,149	14.0%	4,228	8.8%
Total	**32,861**	**100.0%**	**15,297**	**100.0%**	**48,160[(a)]**	**100.0%**

(a) Includes cases where sex is missing or indeterminate.

Appendix: Data issues

Serious injury

National hospital separations data were provided by 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.

Hospital cases were defined as being due to transportation if they contained a first reported Chapter 20 external cause code in the ICD-10-AM range V01–V99. Cases with a Principal Diagnosis other than injury and cases in which an external cause code for transportation only appears as an Additional Diagnosis were excluded on the grounds that injury due to a transport accident was not recorded as being the main reason for admission to hospital (Table A1), resulting in a starting file of 53,729 records.

Table A1: Selection criteria for hospital records of transport injury

Record occurring from 1 July 2003 to 30 June 2004	Persons
Records with an ICD-10-AM 'Transport Accident' code (V01–V99) as external cause anywhere in the record.*	60,295
Records with a 'Transport Accident' as first reported external cause†, and	59,795
• Injury as a Principal Diagnosis (S00–T98)	53,729

Notes

1. * There were 500 records with a first reported external cause code of another type of injury (e.g. other unintentional injuries, complications of surgical and medical care, falls, intentional self-harm etc.) but a 2nd or subsequent external cause code of transportation.
2. † There were 6,066 cases with a first reported external cause code of transportation but a Principal Diagnosis outside of the injury range (S00–T98). The most common Principal Diagnoses were *care involving use of rehabilitation procedure, unspecified* (n=1,658), *examination and observation following transport accident* (n=632), *cervicalgia* (n=295), *other specified diseases and conditions complicating pregnancy, childbirth and the puerperium* (n=265) and *other specified surgical follow-up care* (n=209).

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). The terms *seriously injured* and *hospitalisation*s are used interchangeably in the report. 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 2003 to 30 June 2004, coded according to the third edition of ICD-10-AM (NCCH 2002)
- 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
- Mode of separation has any value except the one indicating that the persons died while in hospital.

High threat to life hospitalisations are cases with injury diagnoses that have been found to be associated with a probability of death before discharge from hospital of 5.9% or higher according to the ICD-based Injury Severity Score (ICISS) method, as implemented by Stephenson et al. (2004), using Australian hospital separations data.

The calculation of transport accidents as a percentage of all hospital separations and the calculation of total patient days (including same day, which are assigned a stay of one day) requires the inclusion of 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).

Population and other denominators

All rates in this report were calculated using, as the denominator, the final estimate of the estimated resident population as at 31 December 2003, obtained from the AIHW.

Direct standardisation was used to age-standardise rates, using the Australian population in 2001 as the standard (ABS 2003). Confidence intervals (95%; based on a Poisson distribution) were calculated using a method elsewhere described (Anderson & Rosenburg 1998).

Comparability with other ATSB 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 ATSB 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.

Serious injury data series published previously by the ATSB for the period 1999–00 to 2002–03 excluded same-day separations from the definition of serious injury, resulting in figures that are substantially lower than those provided in this report. In 2003–04, for example, same-day separations accounted for one-third of separations due to transport injury. It has been found that persons with injuries that pose a high threat to life can still be admitted to and discharged from hospital on the same day. In 2003–04, for example, there were over 2,000 such transport injury cases. Consequently, same-day separations are now included in the figures. This effectively means the threshold for serious injury is now 'admitted to hospital', regardless of the length of stay.

The 1999–00 to 2002–03 data series also focused only on serious injury in traffic or accidents on public roads whereas the current report has broadened the scope to

include non-traffic or off-road accidents, further increasing the overall figures above those previously reported.

For national road deaths, readers should refer to the 'road safety/statistics' part of the ATSB website at <www.atsb.gov.au>, where road death statistics are published on a monthly basis. Similarly, for details on marine, rail and air safety (aviation death statistics are published monthly), the relevant part of the ATSB website should be consulted.

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AIHW

This report presents national statistics on serious injury due to transport accidents that resulted in admission to hospital in Australia during the one-year period 2003–04. It examines variables such as mode of transport, gender and age group.

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