Hospitalisations due to falls by older people, Australia 2005–06

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Hospitalisations due to falls by older people, Australia 2005–06

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Contents

Summary

This report is the second in a series of biennial reports on hospitalisations due to falls by older people in Australia. The report focuses on hospitalised falls occurring in the financial year 2005–06 and examines trends in fall-related hospitalisations over the period 1999–2006.

Hospitalised falls 2005–06

- The estimated number of hospitalised injury cases due to falls in people aged 65 years and over was 66,800—a rise of 10% since 2003–04.
- The age-standardised rate of fall injury cases for older people (2,415 per 100,000 population) has also risen compared to 2003–04 (2,295 per 100,000).
- As in the previous report, older females accounted for most of the hospitalised fall injury cases and a third of cases had injuries to the hip and thigh.
- Similarly, a fall on the same level, due to slipping, tripping and stumbling, was the most common cause of a hospitalised fall.
- Half of all fall injury cases for people aged 65 years and older occurred in the home. Falls in residential institutions were also common.
- Older people who lived in aged care facilities were found to have a rate of falls five times as high as that for people of the same age who lived in the community and fell in their home.
- The first episode of hospital care for a fall injury case (i.e. care for an acute injury) is frequently followed by further episodes of care that can be described as 'follow-up care'.
- Over 20,000 episodes of fall-related follow-up care were identified for people aged 65 years and older, an increase compared to 2003–04.

Trends in hospitalised fall-related injury 1999–2006

- Age-standardised rates of hospitalised fall-related injury separations have increased over the seven year study period to June 2006, despite a decrease in the rate for femur fractures due to falls.
- The estimated total length of stay per fall injury case has also increased, apparently influenced by increases in the number of bed-days used by episodes of fall-related follow-up care.
- This report shows weakness in commonly used methods for measuring the incidence of serious falls and associated bed-day use from current administrative data. Better measurement, especially of trends, requires use of a method that takes account of all of the episodes of hospital care for a person who has had an injurious fall.

1 Introduction

This report is the second in a series of biannual reports on hospitalisations due to falls by older people in Australia. The first report focused on hospitalised falls occurring in 2003–04 (Bradley & Harrison 2007) and the present report utilises hospital separations data from the National Hospital Morbidity Database (NHMD) for the financial year 2005–06.

Falls are common among older people and often result in fractures or other serious injuries. In Australia, an estimated one in three older persons living at home experience a fall annually (Lord et al. 1993; Dolinis et al. 1997; Morris et al. 2004). In the 2004–05 National Health Survey, approximately 4% of participants aged 75 years and older reported having suffered an injury as a result of a 'low fall' in the four weeks prior to survey (ABS 2006b). A substantial proportion of injurious falls involving older people result in hospitalisation (e.g. Sattin et al. 1990; Hall & Hendrie 2003; Hendrie et al. 2004).

Risk factors for falls and fall-related injury include increasing age, gender, medication use and predisposing medical conditions including Parkinson's disease, osteoporosis and vision problems (e.g. Fildes et al. 1994; Fuller 2000; Lord et al. 2001; Wood et al. 2002; Lewis et al. 2004; Morris et al. 2004). Social, and socio-economic, factors can also affect the risk of falls for older people (Dolinis et al. 1997; West et al. 2004; Gill et al. 2005; Lechevallier-Michel et al. 2005). Importantly, having had one fall is a risk factor for future falls (e.g. Pluijm et al. 2006).

The cost to the heath system of serious fall-related injuries is considerable. The 2003–04 hospitalised falls report estimated the total cost of fall-related acute episodes of care for older people at $566.0 million (Bradley & Harrison 2007). Further, estimates of the costs associated with injurious falls which include 'lifetime' costs, that is indirect and/or informal costs (e.g. lost production due to incapacitation or premature death and costs borne by the family or community), exceed $1 billion per year (Moller 1998).

This report examines fall-related hospitalisations in 2005–06 for Australians aged 65 years and older. Using NHMD records of separations ending during 2005–06, this analysis includes all separations for people aged 65 years and older which included both an injury diagnosis (S00–T75 or T79) and an external cause code signifying an unintentional fall (W00–W19). These codes could appear anywhere within the record (i.e. analysis was not restricted to records which had a principal diagnosis indicating that the injury was the primary reason for the episode of hospital care).

Two major aspects of hospitalised fall-related injury are discussed:

1. the annual incidence of new cases; and
2. the burden to the hospital system (i.e. bed-days attributed to fall-related episodes of care).

Chapter 2 presents the estimated annual incidence of fall events resulting in injury and hospitalisation in 2005–06 for people aged 65 years and older. Chapter 3 describes the characteristics of these fall injury cases, including the mechanism and circumstances (place of occurrence, activity) of the event. Chapter 4 provides a brief description of a set of separations omitted from Chapters 2 and 3; hospital records which meet the definition of an incident case, but have been generated through an admitted patient being transferred from one hospital to another ('inward transfers'). Including these separations in incidence estimates would result in the multiple counting of some injurious fall events.

Chapter 5 describes estimates of the nature and burden of hospital inpatient care provided in Australia in 2005–06 due to fall-related injuries involving older people. In addition to fall injury cases and inward transfers, separations in these analyses include episodes of fall-related follow-up care and 'other fall-related' separations for which the primary reason for the episode of hospital care was not an injurious fall, but injury and unintentional fall codes featured in the record.

Chapter 6 presents a short analysis of the trends over time for fall-related hospitalisations between July 1999 and June 2006. Rates for fall injury cases, inward transfers and fall-related follow-up care separations over this period are examined, as are the bed-days attributed to these episodes of care.

While public sector cost weight data is available for the 2005–06 financial year, private sector data have not been available since 2002–03. Without the ability to correctly cost private sector hospital admissions, and still lacking a method to adequately apportion costs for non-acute care, this report has not included an update of the cost analysis in Bradley and Harrison (2007).

2 Fall injury incidence

During 2005–06, over 2.5 million hospital separations in Australia were generated by people aged 65 years and older (AIHW 2007a). Of these, 97,827 (3.8%) had a principal diagnosis in the range S00–T75 or T79, denoting community injury (i.e. excluding injuries sustained in the context of surgical and medical care, such as complications or sequelae). Three-quarters of these injury separations (76.4%) also had a first external cause code in the range W00–W19, denoting an unintentional fall (Table 1).

The number of new cases of fall-related injury resulting in hospitalisation is difficult to estimate, due to certain limitations of data available at a national level. The incidence of injury events resulting in hospitalisation can be estimated from NHMD data by excluding any separation meeting the specified selection criteria which also has a mode of admission denoting 'transfer from another acute hospital' (see Data Issues section). This method accounts for transfers between hospitals but not readmissions, if these are also recorded as injury cases due to a fall.

Calculated in this way, the estimated number of hospitalised injury cases due to falls in people aged 65 years and over in 2005–06 was 66,784—a rise of 6,287 cases since 2003–04 (10.4%). These 66,784 fall injury cases represent 2.6% of all hospital separations for the population aged 65 years and older in 2005–06.

Table 1: Key indicators for hospital separations of people aged 65+ years, Australia 2005–06

Key indicators	Males	Females	Persons
All hospital separations 2005–06, aged 65+ years [(a), (b)]	1,328,329	1,266,422	2,594,755
Principal diagnosis S00–T75 or T79	32,909	64,918	97,827
Principal diagnosis S00–T75 or T79 and external cause W00–W19	21,819	52,929	74,748
Estimated fall injury cases	19,485	47,299	66,784
As percentage of all hospital separations aged 65+ years	1.5	3.7	2.6
As percentage of all S00–T75 or T79 injuries aged 65+ years	59.2	72.9	68.3
Mean length of stay for fall injury cases: days (SD)	7.6 (14.1)	7.8 (12.7)	7.7 (13.1)
Total bed-days, fall injury cases	147,425	366,957	514,382
As percentage of all hospital patient days aged 65+ years	2.7	5.8	4.4

(a) Data source: *Australian hospital statistics 2005–06* (AIHW 2007a).

(b) Persons total includes 4 separations for which sex was unreported.

The age-standardised rate of fall injury cases for people aged 65 years and older was 2,414.6 per 100,000 population, an increase from 2003–04 (2,295.3 per 100,000 population). The age-specific rate of fall injury cases was highest for the 95 years and older age group; 12,548.2 fall injury cases per 100,000 population. This represents a 31.6% increase in the rate for this age group compared to 2003–04 (9,535.9 per 100,000, Bradley & Harrison 2007).

Females aged 65 years and older sustained a greater number of injurious falls than males aged 65 years and older, constituting 70.8% of the cases (n = 47,299). The age-standardised rate of hospitalised falls for older females was also higher than that of older males. The rate of fall cases for females 65 years and older was 2,847.7 per 100,000, while the rate of fall cases for males 65 years and older was 1,785.9 per 100,000 population. This represents a M:F ratio of 0.6 hospitalised falls for males for every 1.0 cases for females.

Both the number and rate of hospitalised falls for people aged 65 years and older have increased in the two year period, more so for older males (Table 2). Case counts for males increased by 16.1% between 2003–04 and 2005–06 (n = 2,706) while case counts for females increased by 8.2% (n = 3,581) in this time. The age-standardised rate of fall cases for males demonstrated a 10.0% increase (from 1,623.8 per 100,000 population in 2003–04 to 1,785.9 per 100,000 in 2005–06) while the age-standardised rate for females demonstrated a 3.5% increase (2,751.5 per 100,000 in 2003–04 to 2,847.7 per 100,000 in 2005–06).

Table 2: Comparison of hospitalised falls key indicators for people aged 65+ years, Australia 2003–04 and 2005–06

Key indicators	Males	Females	Persons
Hospitalised falls 2003–04			
Fall cases	16,779	43,718	60,497
Age-standardised rate (per 100,000 population)	1,623.8	2,751.5	2,295.3
Hospitalised falls 2005–06			
Fall cases	19,485	47,299	66,784
Age-standardised rate (per 100,000 population)	1,785.9	2,847.7	2,414.6

Age and sex

Males accounted for only 29.2% of hospitalised fall injury cases for people aged 65 years and older, a slight rise since 2003–04 (Bradley & Harrison 2007). This is due to the smaller proportion of males than females in the older population, combined with the lower age-specific rates for hospitalisations due to falls for males. The males aged 65 years and older who were hospitalised due to an injurious fall were significantly younger than the females who were similarly hospitalised (Mann Whitney U test, $p<0.001$). The mean age of males hospitalised due to an injurious fall was 80.0 years (± 7.8 SD) while the mean age of females was 82.3 years (± 7.8 SD).

Figure 1 describes the age-specific rates of injury cases due to falls for males and females aged 65 years and older. The rate of fall injury cases was greater for females than males in all age groups. The M:F ratio was highest at 65–69 years and 90 years and older, at 0.7 falls for males for every 1.0 falls for females. The M:F ratio remained the same for all other age groups at 0.6 falls for males for every 1.0 falls for females.

The rates of fall injury cases increased substantially after the age of 75 years for both sexes. While convention maintains that fall injury indicators include all people aged 65 years and older, following Pointer et al. (2003) age-standardised rates of fall injury cases were also calculated specifically for the population 75 years and older. In this older aged population, the rate of fall injury cases was almost double that for the 65 years and older population; 4,119.6 per 100,000 persons.

In contrast to 2003–04 (Bradley & Harrison 2007), rates of fall cases continued to rise in the 95 years and older age group for both males and females in 2005–06.

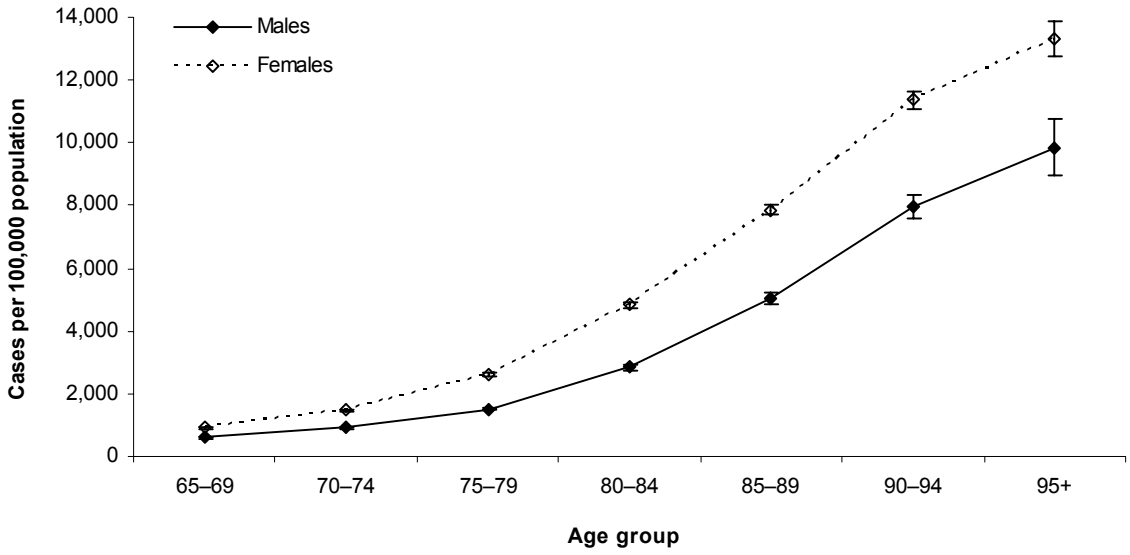


Figure 1: Age-specific rates of fall injury cases (± 95% CI); males and females aged 65+ years, Australia 2005–06

Injury type

The largest proportion of fall injury cases for both males and females resulted in injuries to the hip and thigh (Table 3). A higher proportion of cases involving females resulted in injuries to the hip and thigh (32.0%) than for males (28.8%). The proportion of persons with a principal diagnosis of an injury to the hip and thigh in 2005–06 was slightly lower than that in 2003–04; 31.1% vs. 33.5%, respectively.

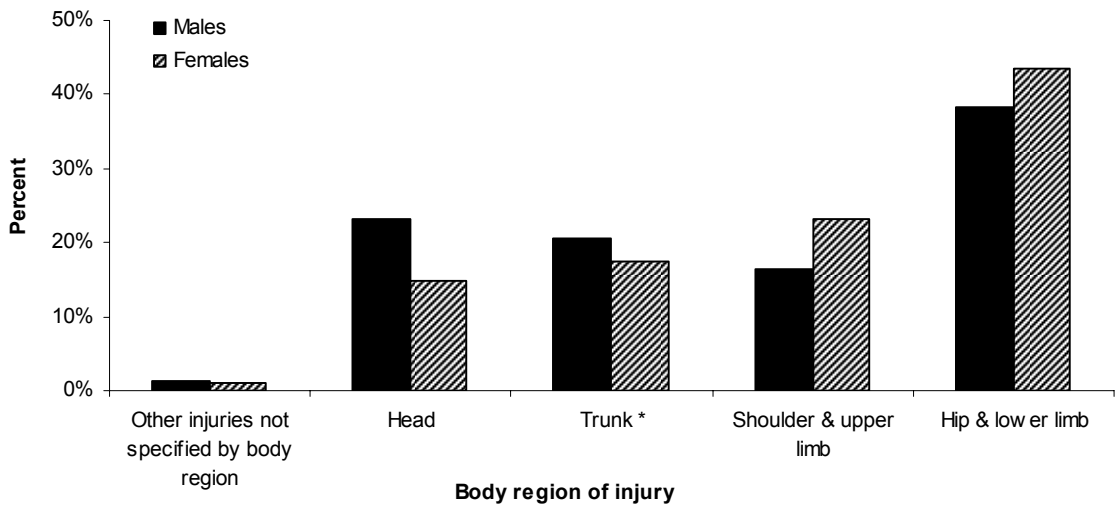
Injuries to the head were the second most common principal diagnosis for both males and females, constituting 17.3% of all fall cases—a slight rise compared to 2003–04 (Bradley & Harrison 2007). As in 2003–04, however, the proportion of males who suffered head injuries was much higher (23.3%) than for females (14.8%). Males also sustained a greater proportion of injuries to the thorax (9.2%), neck (1.6%), and wrist and hand (2.5%).

Figure 2 highlights the differences in the types of injuries sustained by males and females. As in 2003–04 report, males aged 65 years and older experienced higher proportions of injuries to the head and trunk regions while females aged 65 years and older experienced higher proportions of injuries to the shoulder and upper limbs and the hip and lower limbs.

Table 3: Principal diagnosis injury types for fall injury cases; males, females and persons 65+ years, Australia 2005–06

Principal diagnosis	Males	Females	Persons
Injuries to the head	4,541 (23%)	7,019 (15%)	11,560 (17%)
Injuries to the neck	308 (2%)	407(1%)	715 (1%)
Injuries to the thorax	1,787 (9%)	2,483 (5%)	4,270 (6%)
Injuries to the abdomen, lower back, lumbar spine & pelvis	1,931 (10%)	5,396 (11%)	7,327 (11%)
Injuries to the shoulder & upper arm	1,580 (8%)	4,860 (10%)	6,440 (10%)
Injuries to the elbow & forearm	1,118 (6%)	5,411 (11%)	6,529 (10%)
Injuries to the wrist & hand	492 (3%)	728 (2%)	1,220 (2%)
Injuries to the hip & thigh	5,620 (29%)	15,149 (32%)	20,769 (31%)
Injuries to the knee & lower leg	1,589 (8%)	4,778 (10%)	6,367 (10%)
Injuries to the ankle & foot	245 (1%)	625 (1%)	870 (1%)
Injuries involving multiple body regions	34 (0%)	39 (0%)	73 (0%)
Injuries to unspecified parts of trunk, limb or body region	163 (1%)	291 (1%)	454 (1%)
Burns	* (0%)	* (0%)	* (0%)
Poisoning by drugs, medications & biological substances	* (0%)	* (0%)	* (0%)
Toxic effects of subs non-medicinal	* (0%)	* (0%)	* (0%)
Other and unspecified effects of external causes	6 (0%)	19 (0%)	25 (0%)
Certain early complications of trauma	67 (0%)	92 (0%)	159 (0%)
Total	**19,485**	**47,299**	**66,784**

* Small case numbers have been suppressed to prevent patient identification.



* Trunk includes the neck, thorax, abdomen, lower back, lumbar spine & pelvis

Figure 2: Major body region injured according to the principal diagnosis for fall injury cases; males and females 65+ years, Australia 2005–06

Fractures

Two thirds (63.7%, *n* = 42,573) of people aged 65 years and older hospitalised due to an injurious fall sustained at least one fracture, a slight decrease from 2003–04 (66.7%, *n* = 40,357). The number of fractures present in the multiple diagnosis fields of the case separations in 2005–06 ranged from 0 (36.3%, *n* = 24,211) to 10 (*n* = 2). Most people only sustained a single fracture (56.2%, *n* = 37,563).

A higher proportion of females hospitalised due to a fall injury in 2005–06 sustained fractures compared to males (67.2% vs. 55.5%, respectively). This is a slight reduction in the corresponding proportions from 2003–04, when 70.0% of females and 58.2% of males hospitalised due to a fall injury case sustained a fracture.

The proportion of males who sustained one or more fractures in a fall injury case remained similar at all ages. For females, however, the proportion of cases with fractures declined slightly with increasing age (Figure 3). Nonetheless, the rate of fall cases involving one or more fracture diagnoses increased markedly with age for both sexes (Figure 4). Due to the high proportion of fractures present in fall injury cases at all ages, the rates of fracture incidence showed a similar pattern to that for fall injury itself.

Fall cases with a principal diagnosis denoting injuries to the elbow and forearm and injuries to the hip and thigh had the largest proportion of fractures present among the diagnoses; 84.4% (*n* = 5,511) and 84.3% (*n* = 17,510), respectively. Females admitted with elbow and forearm injuries due to a fall were more likely than males to have sustained a fracture (89.7% of females having one or more fracture diagnoses vs. 58.7% of males). Males and females had similar proportions of fractures for cases with a principal diagnosis denoting injuries to the hip and thigh; 82.9% (*n* = 4,659) and 84.8% (*n* = 12,851), respectively.

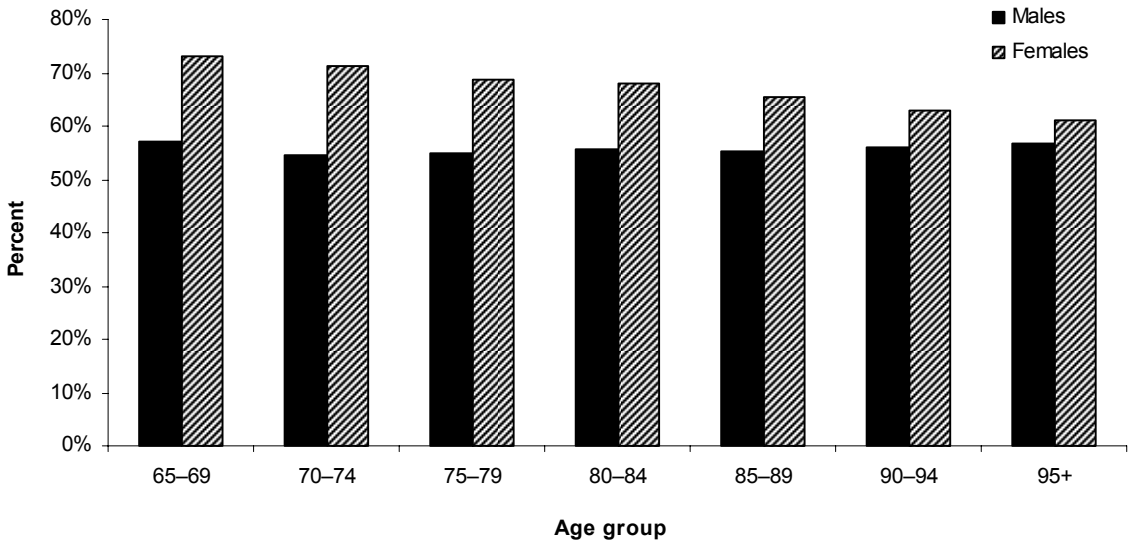


Figure 3: The proportion of hospitalised fall injury cases incurring one or more fracture diagnoses; males and females 65+ years, Australia 2005–06

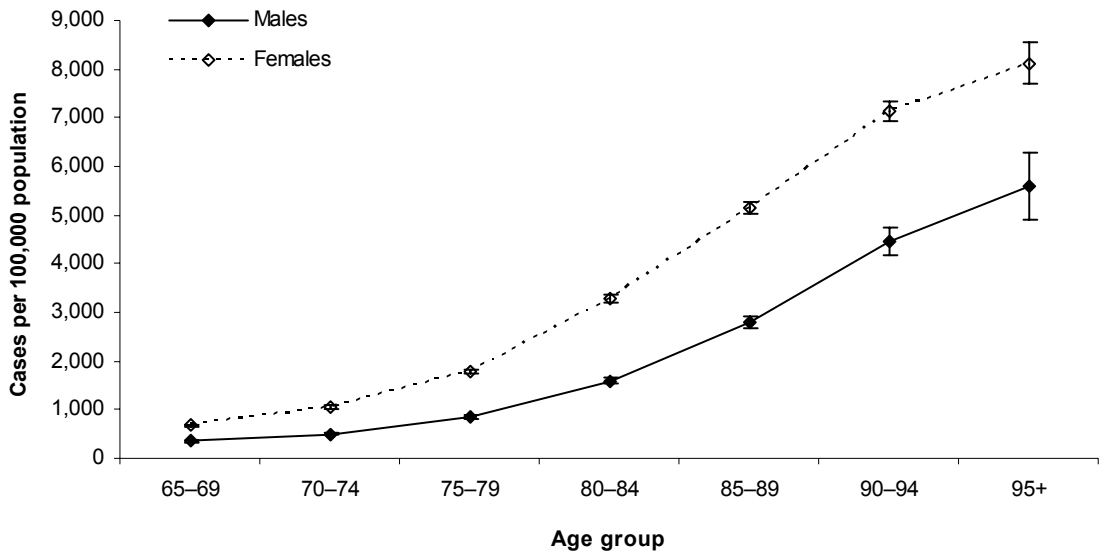
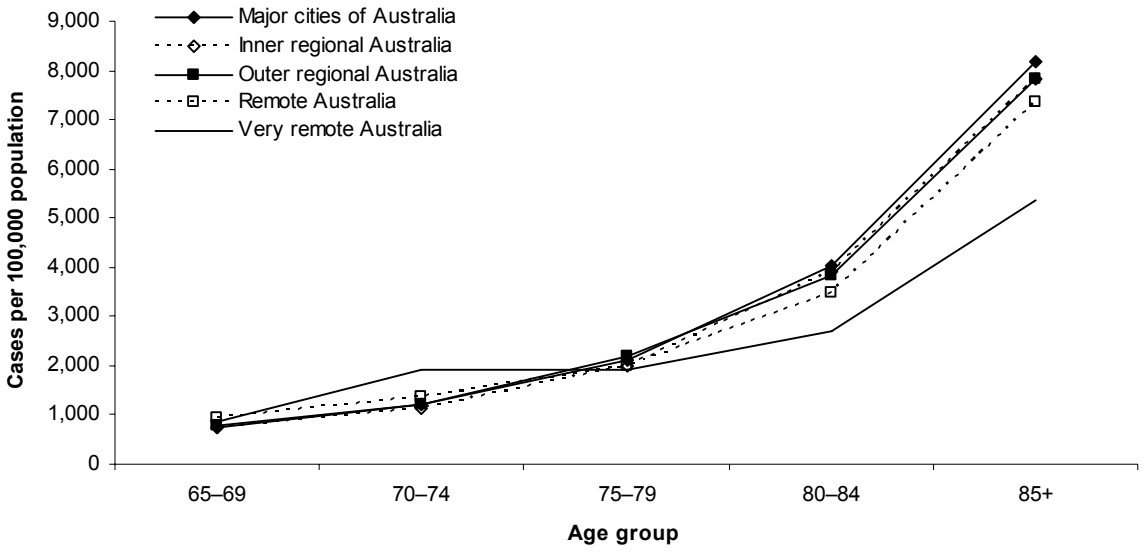


Figure 4: Age-specific rates of one or more fracture diagnoses in fall injury cases (± 95% CI); males and females 65+ years, Australia 2005–06

Geographical distribution

Rates of hospitalised falls involving people aged 65 years and older were calculated according to the Australian Standard Geographical Classification of the remoteness of the place of usual residence (see ABS 2005).

Rates were very similar for all remoteness zones except for people, especially females, whose recorded place of residence was classified as Very remote. Rates of hospitalised falls were lower for this group (persons living in Very remote regions) but higher in comparison to the 2003–04 report (Bradley & Harrison 2007). This finding was associated with particularly low rates of hospitalised falls incidence for persons aged 80 years and older living in Very remote areas (Figure 5).



Note: Age groups to 85+ years only due to population data constraints.

Figure 5: Age-specific rate of hospitalised fall cases by the remoteness of usual residence, persons 65+ years, Australia 2005–06

3 Circumstances of fall injury cases

This chapter provides a description of the circumstances of occurrence of the hospitalised fall injury cases involving people aged 65 years and older in 2005–06 (those included in Chapter 2).

The majority of hospitalised fall injury cases for people aged 65 years and older were recorded as falls on the same level from slipping, tripping and stumbling (W01, 34.1%, *n* = 22,801). This was the highest-ranking fall type for both males and females (Table 4). Females, however, sustained a higher proportion of hospitalised slips, trips and stumbles than males (35.8% vs. 30.1% respectively). There has been little change since 2003–04 (Bradley & Harrison 2007).

The second most common external cause associated with a fall injury case for both males and females aged 65 years and older was W19, 'unspecified fall'. Similarly, the third most common type of fall for both males and females was W18, 'other fall on same level'.

On the whole, little difference was noted in the types of fall sustained by men and women aged 65 years and older except that males sustained a higher proportion of falls from ladders than females (4.7% vs. 0.9%, respectively, see also Bradley 2007). Again, there has been very little change from that reported in 2003–04.

Table 4: Causes of hospitalised falls: first external cause code for males, females and persons aged 65+ years, Australia 2005–06

External cause	Males	Females	Persons
Fall on same level involving ice & snow (W00)	* (0%)	7 (0%)	8 (0%)
Fall on same level from slipping, tripping & stumbling (W01)	5,873 (30%)	16,928 (36%)	22,801 (34%)
Fall involving ice-skates, skis, roller-skates or skateboard (W02)	17 (0%)	13 (0%)	30 (0%)
Other fall on same level due to collision with, or pushing by, another person (W03)	35 (0%)	186 (0%)	221(0%)
Fall while being carried or supported by other persons (W04)	* (0%)	* (0%)	14 (0%)
Fall involving wheelchair (W05)	173 (1%)	295 (1%)	468 (1%)
Fall involving bed (W06)	891 (5%)	2,163 (5%)	3,054 (5%)
Fall involving chair (W07)	625 (3%)	1,333 (3%)	1,958 (3%)
Fall involving other furniture (W08)	67 (0%)	129 (0%)	196 (0%)
Fall involving playground equipment (W09)	* (0%)	* (0%)	* (0%)
Fall on & from stairs & steps (W10)	1,252 (6%)	2,851 (6%)	4,103 (6%)
Fall on & from ladder (W11)	907 (5%)	257 (1%)	1,164 (2%)
Fall on & from scaffolding (W12)	30 (0%)	* (0%)	* (0%)
Fall from, out of or through building or structure (W13)	221 (1%)	76 (0%)	297 (0%)
Fall from tree (W14)	54 (0%)	5 (0%)	59 (0%)
Fall from cliff (W15)	24 (0%)	14 (0%)	38 (0%)
Diving or jumping into water causing injury other than drowning or submersion (W16)	* (0%)	* (0%)	7 (0%)
Other fall from one level to another (W17)	348 (2%)	433 (1%)	781 (1%)
Other fall on same level (W18)	3,772 (19%)	9,410 (20%)	13,182 (20%)
Unspecified fall (W19)	5,186 (27%)	13,180 (28%)	18,366 (28%)
Total fall cases	**19,485**	**47,299**	**66,784**

* Small case numbers have been suppressed to prevent patient identification.

As can been seen in Figure 6, age-specific rates for the three most common unintentional fall external cause codes (slips, trips and stumbles, unspecified falls and other fall on same level) showed the same exponential increase after the age of 75 years as noted for all fall injury cases (described previously).

Notable differences between the 2003–04 report and the present analysis include a steeper increase in falls on same level from slipping, tripping and stumbling, unspecified falls, and other fall on the same level in the 95 years and older age group.

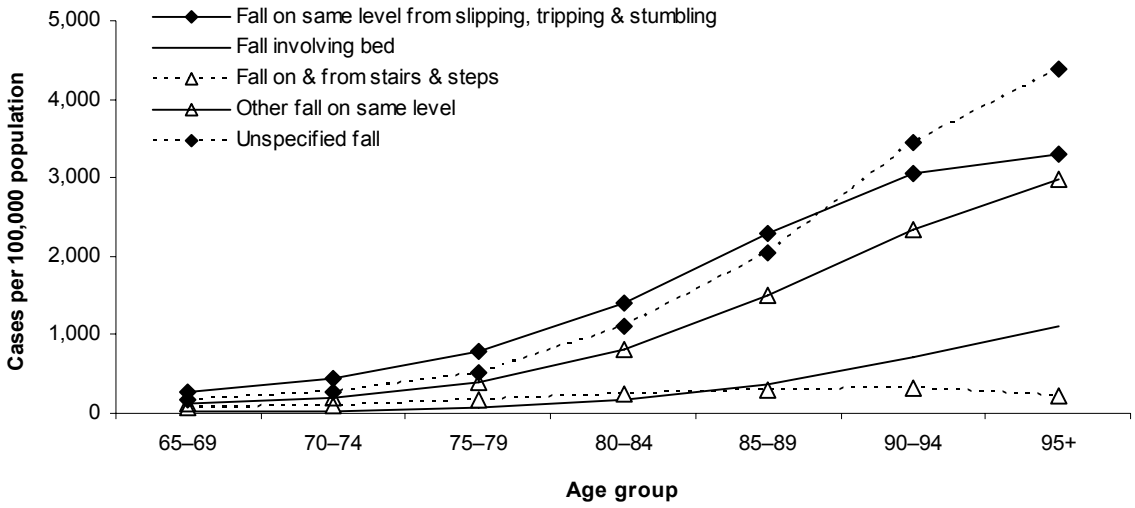


Figure 6: Age-specific rates of fall cases for the five most common external cause codes; persons 65+ years, Australia 2005–06

Place of occurrence

Half of all fall injury cases for people aged 65 years and older in 2005–06 occurred in the home, including the driveway to the home (49.1%, *n* = 32,770. See Table 5).

Table 5: Place of occurrence for fall injury cases; males, females and persons aged 65+ years, Australia 2005–06

Place of occurrence	Males	Females	Persons
Home	9,588 (49%)	23,182 (49%)	32,770 (49%)
Residential institution	3,473 (18%)	11,352 (24%)	14,825 (22%)
School, other institution & public administration area	476 (2%)	1,033 (2%)	1,509 (2%)
Sports & athletics area	126 (1%)	174 (0%)	300 (0%)
Street & highway	985 (5%)	1,912 (4%)	2,897 (4%)
Trade & service area	632 (3%)	1,509 (3%)	2,141 (3%)
Industrial & construction area	31 (0%)	19 (0%)	50 (0%)
Farm	66 (0%)	36 (0%)	102 (0%)
Other specified place	396 (2%)	682 (1%)	1,078 (2%)
Unspecified place of occurrence	3,710 (19%)	7,389 (16%)	11,099 (17%)
Total *	**19,485**	**47,299**	**66,784**

* Totals include 13 cases for which place of occurrence was not reported.

In addition to the home, the most frequent places in which persons aged 65 years and older sustained serious falls in 2005–06 were aged care facilities (21.8%, *n* = 14,571), health service areas (1.6%, *n* = 1,100), streets and highways (which includes footpaths; 4.3%, *n* = 2,897), and trade and service areas (which includes shops and stores; 3.2%, *n* = 2,141).

As can be seen in Figure 7, the peak age for falls in each of these locations is 80–84 years, the exception being for falls in aged care facilities (discussed further below) where the peak age for falls is 85–89 years. Falls in these locations decline dramatically after the peak ages, presumably due to age-related reductions in mobility.

About one in six (16.6%, *n* = 11,099) fall injury cases involving a person aged 65 years and older had an unspecified place of occurrence recorded.

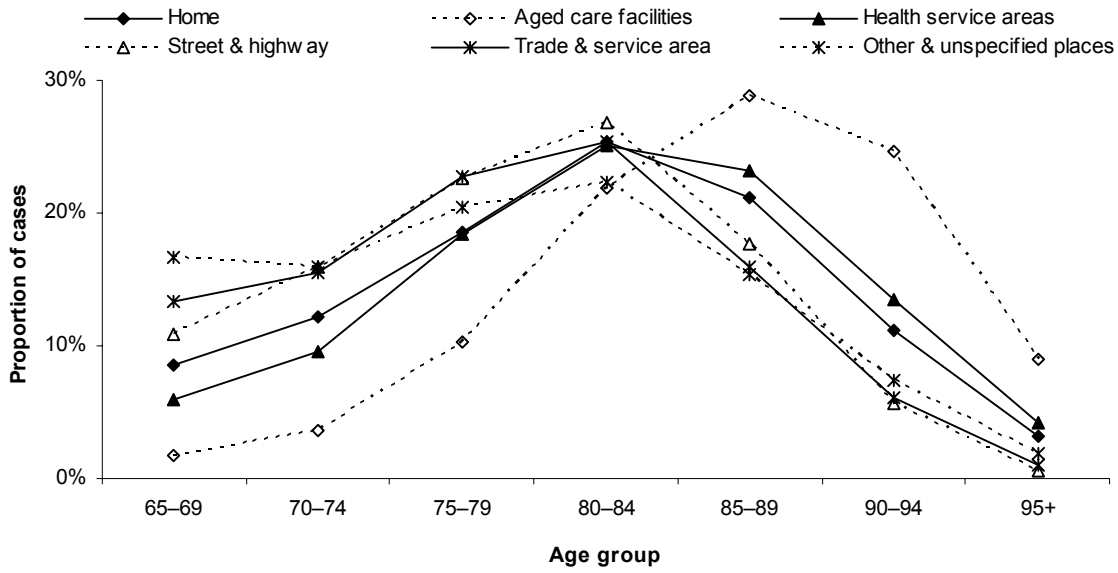


Figure 7: Place of occurrence for fall injury cases; males, females and persons aged 65+ years, Australia 2005–06

Aged care facilities

Aside from the home, the largest proportion (21.8%) of fall injury cases occurred in aged care facilities, more so for women (23.6%, *n* = 11,169) than for men (17.5%, *n* = 3,402). In all, seven out of every ten fall injury cases occurred either in the home or in aged care facilities.

The 2003–04 falls report detailed the method by which the population of people aged 65 and older resident in aged care facilities was used to estimate the rate of falls in aged care facilities (Bradley & Harrison 2007, page 15). The present report similarly estimates of the resident population in aged care facilities for people aged over 65 years using the AIHW report *Residential aged care in Australia 2005–06: a statistical overview* (AIHW 2007b).

The rate of falls in aged care facilities involving people aged 65 and older resident in these facilities was more than five times higher than the rate of falls in the home involving people aged 65 and older resident in the community. The age-standardised rate of fall injury cases in aged care facilities for persons aged 65 years and older living in residential facilities was 7,237.5 per 100,000 population while the age-standardised rate of falls in the home for older persons living at home was 1,394.9 per 100,000 population.

While the rate of falls in the home for persons aged 65 years and older living at home in 2005–06 was similar to that estimated for 2003–04 (1,319.6 per 100,000 population), the rate of falls in aged care facilities for older persons living in residential facilities in 2005–06 was quite a bit higher than that estimated for 2003–04 (6,404.3 per 100,000, see Bradley & Harrison 2007).

The age-specific rate of fall injury cases which occurred in the home or in aged care facilities in 2005–06 are presented in Figure 8. The rates of falls for the two population groups were similar in that the rates increased with age and the rates for females are higher than those for males in all age groups. Unlike falls in the home, however, the rates for males and females who sustained falls in aged care facilities converged for the oldest age group.

Other than in the oldest age group, the rates of fall cases in aged care facilities are higher than rates of falls at home for all ages. In the 95 years and older age group the rate of fall injury cases in the home exceeds that of the rate of fall injury cases in aged care facilities for females. Figure 8 also indicates a steep rise in the rate of fall injury cases for community-dwelling females with increasing age.

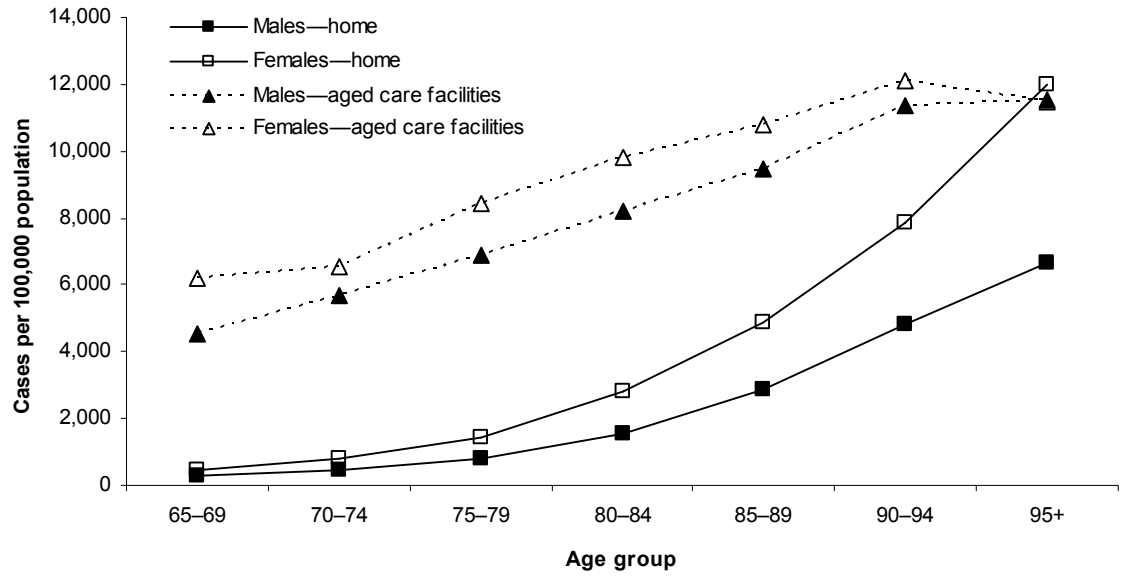


Figure 8: Rates of falls in the home and in aged care facilities calculated using the estimated population of people resident in the general community and residential care, males and females 65+ years, Australia 2005–06

There were differences and similarities in the types of falls experienced by older people in the home compared to aged care facilities. Both groups experienced a high proportion of falls on the same level from slipping, tripping and stumbling (21.6% of falls in aged care facilities and 39.0% of falls at home) and other falls on the same level (23.9% of falls in aged care facilities and 21.3% of falls at home). However, twice the proportion of falls from beds occurred in aged care facilities compared to falls in the home (9.5% vs. 4.5%, respectively). Further, nearly ten times the proportion of falls in the home were attributed to falls on and from stairs and steps (6.9%) than for falls occurring in aged care facilities (0.7%).

Activity

The majority of fall injury cases for people aged 65 years and older were designated a U73.9 activity code—'unspecified activity' (67.2%, *n* = 44,891, see Table 6). The age-standardised rate of 'unspecified activity' fall injury cases for older people was 1,622.4 per 100,000. Compared to 2003–04, both the proportion (61.9%, *n* = 37,435) and rate (1,419.8 per 100,000) of fall injury cases with an unspecified activity code recorded have risen.

Figure 9 presents the age-specific rates of fall injury cases for the four most common *specified* activity groups in 2005–06. Notably, cases reported to have occurred while the person was sleeping, eating or undertaking other vital activities (13.8% of all fall injury cases in 2005–06) or during 'other specified activities' (11.9%) show a marked increase in rate with age.

Table 6: Activity engaged in when injured for fall injury cases; males, females and persons aged 65+ years, Australia 2005–06

Activity	Males	Females	Persons
While engaged in sport or leisure	388 (2%)	591 (1%)	979 (1%)
While working for income	124 (1%)	64 (0%)	188 (0%)
While engaged in other types of work	1,227 (6%)	2,241 (5%)	3,468 (5%)
While resting, sleeping, eating or engaging in other vital activities	2,478 (13%)	6,767 (14%)	9,245 (14%)
Other specified activity	2,316 (12%)	5,644 (12%)	7,960 (12%)
Unspecified activity	12,937 (66%)	31,954 (68%)	44,891 (67%)
Activity not reported/not applicable	15 (0%)	38 (0%)	53 (0%)
Total	**19,485**	**47,299**	**66,784**

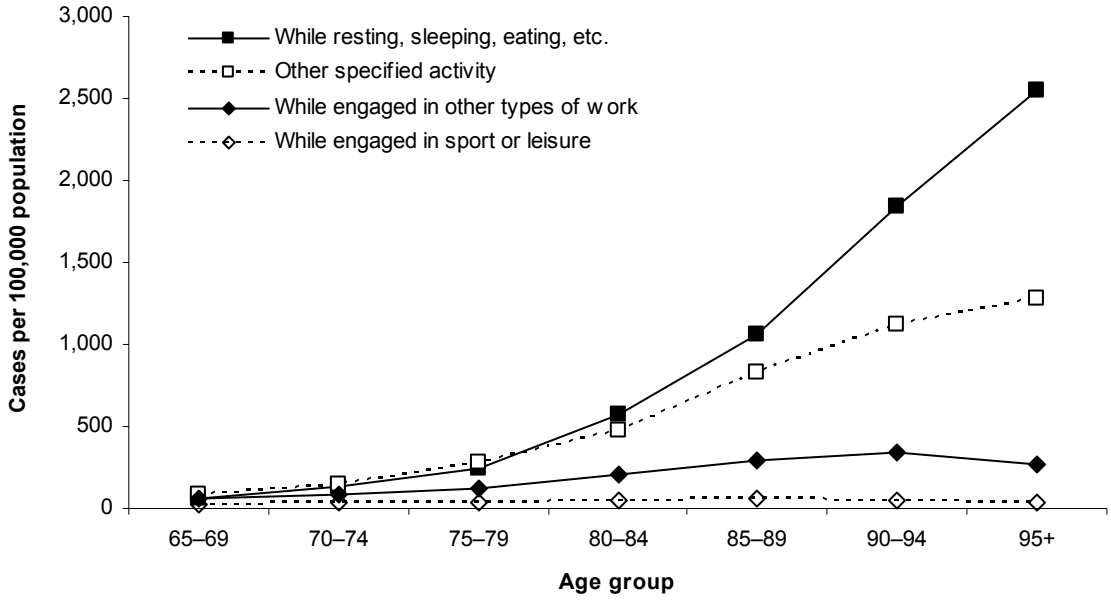


Figure 9: Activity engaged in during a fall injury incident: age-specific rates for selected activity groups, persons aged 65+ years, Australia 2005–06

Fall injury cases occurring while engaged in 'other' (non-income producing) types of work (5.2% of cases in 2005–06) showed some increase in age, but of a lesser magnitude than cases occurring while the person was sleeping, eating or undertaking other vital activities or engaged in 'other specified activities'. As expected, the rate of falls cases for people aged 65 and older sustained while working for income (0.3% of cases), declined markedly with increasing age. A comparison of the rate of hospitalised falls occurring during working for income and while engaged in other types of work can be seen in Figure 10 (note different scales).

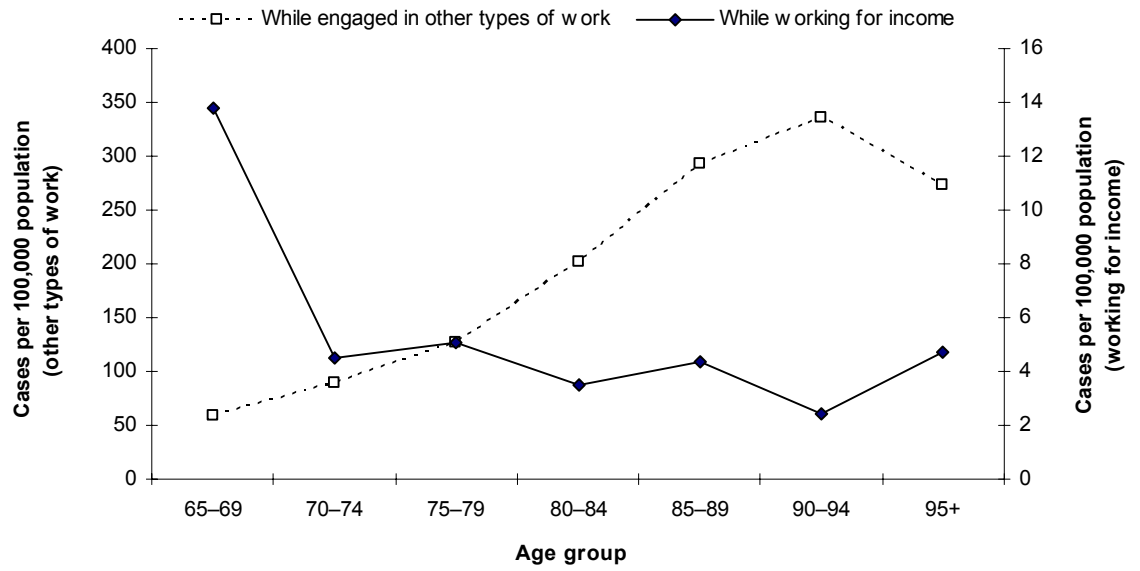


Figure 10: Work-related activity engaged in during a fall injury incident: age-specific rates for people aged 65+ years, Australia 2005–06

Procedures involved in fall cases

National Hospital Morbidity Database separation records contain information regarding the medical procedures involved in a hospitalisation. The National Health Data Dictionary defines a procedure as 'a clinical intervention that: is surgical in nature, and/or carries a procedural risk, and/or carries an anaesthetic risk, and/or requires specialised training, and/or requires special facilities or equipment only available in an acute care setting' (AIHW 2003, page 63). Multiple procedures can be listed in the hospital separation. The fourth edition of the ICD-10-AM groups the very large number of procedures into 1,419 aggregate 'blocks', according to the Australian Classification of Health Interventions (ACHI, see NCCH 2004). These block numbers are included in NHMD separation records for each listed procedure.

The total number of procedures (or blocks) listed in fall injury case separations for people aged 65 years and older in 2005–06 was 191,874. The number of procedures per fall injury case separation ranged from 0 to 44. The mean number of procedures per fall injury case was 2.9 (± 2.7 SD). The most common procedure types listed in fall injury cases for both men and women were 'non-invasive, cognitive and other interventions, not elsewhere classified' (67.0% of all procedures), procedures on the musculoskeletal system (13.8%) and imaging services (12.6%—see Table 7).

Table 7: Total number of procedures listed in fall injury case separations; males, females and persons aged 65+ years, Australia 2005–06

ACHI procedure groups	Males	Females	Persons
Procedures on Nervous System	403 (1%)	547 (0%)	950 (0%)
Procedures on Endocrine System	* (0%)	* (0%)	* (0%)
Procedures on Eye and Adnexa	60 (0%)	90 (0%)	150 (0%)
Procedures on Ear & Mastoid process	63 (0%)	37 (0%)	100 (0%)
Procedures on Nose, Mouth & Pharynx	130 (0%)	178 (0%)	308 (0%)
Dental Services	9 (0%)	25 (0%)	34 (0%)
Procedures on Respiratory System	804 (1%)	661 (0%)	1,465 (1%)
Procedures on Cardiovascular System	610 (1%)	852 (1%)	1,462 (1%)
Procedures on Blood & Blood-Forming Organs	36 (0%)	21 (0%)	57 (0%)
Procedures on Digestive System	309 (1%)	537 (0%)	846 (0%)
Procedures on Urinary System	550 (1%)	543 (0%)	1,093(1%)
Procedures on Male Genital Organs	38 (0%)	NA	38 (0%)
Gynaecological Procedures	0 (0%)	14 (0%)	14 (0%)
Procedures on Musculoskeletal System	6,442 (12%)	20,125 (15%)	26,567 (14%)
Dermatological and Plastic Procedures	2,144 (4%)	3,688 (3%)	5,832 (3%)
Procedures on Breast	* (0%)	* (0%)	* (0%)
Chemotherapeutic and Radiation Oncology Procedures	19 (0%)	16 (0%)	35 (0%)
Non-invasive, Cognitive and Other Interventions, nec	35,565 (64%)	93,071 (68%)	128,636 (67%)
Imaging Services	8,701 (16%)	15,571 (11%)	24,272 (13%)
Total	**55,884**	**135,990**	**191,874**

* Small case numbers have been suppressed to prevent patient identification.

Note: Counts of procedures in this table exceed case numbers as there was a mean of 2.9 procedures listed per fall injury case.

Compared to the 2003–04 report (Bradley & Harrison 2007) there has been a rise in the total number of procedures listed as well as an increase in the average number of procedures per incident case. In 2003–04 there was an average of 2.7 (± 2.6 SD) procedures per case compared to 2.9 (± 2.7 SD) procedures per case in 2005–06. In terms of the types of procedures listed, the largest rise in the proportion of procedures seen was in relation to imaging services; in 2003–04 imaging services represented 9.9% of all procedures listed and in 2005–06 this had risen to 12.7%. The proportions of all other procedure groups showed little change since 2003–04.

'Non-invasive, cognitive and other interventions' procedures include health assessments, diagnostic tests, counselling, therapeutic interventions, anaesthesia and allied health interventions such as physiotherapy. Fall injury case separations coded with at least one 'non-invasive, cognitive and other interventions' procedure had up to 23 such procedures listed in the record. The mean number of 'non-invasive, cognitive and other interventions' procedures listed in these separations was 2.8 (± 1.7 SD). For cases having at least one such procedure, males had significantly more 'non-invasive, cognitive and other interventions' procedures listed per separation than females (2.84 ± 1.7 SD vs. 2.77 ± 1.6 SD respectively, t-test $p<0.04$). Further, the mean number of 'non-invasive, cognitive and other interventions' procedures per case separation increased with age (Figure 11).

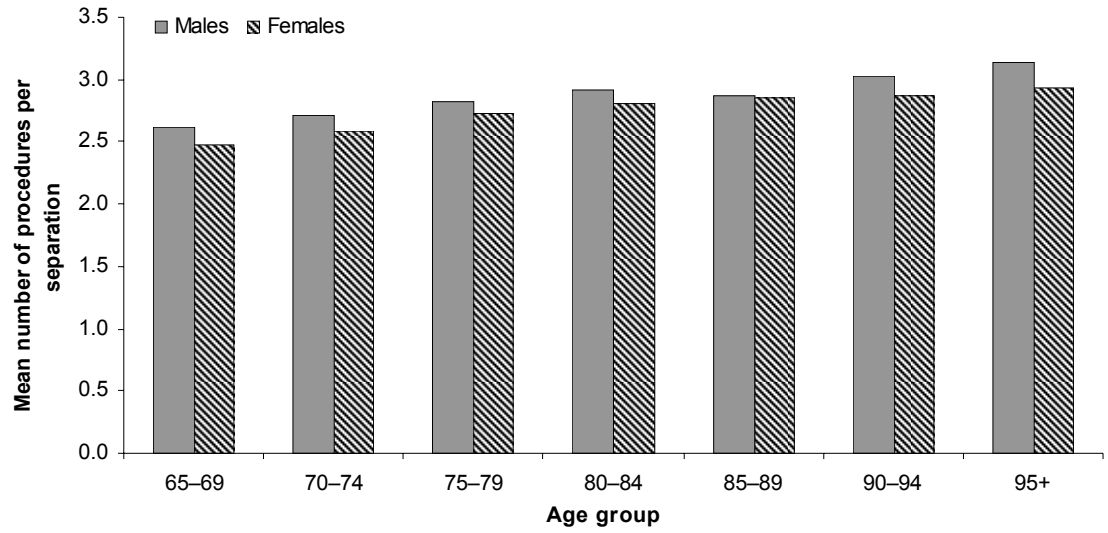


Figure 11: Mean number of 'non-invasive, cognitive and other interventions' procedures per fall injury case separation, given at least one such procedure reported; males and females 65+ years, Australia 2005–06

Fall injury case separations coded with at least one musculoskeletal procedure (e.g. immobilisation, reduction of fractures, arthroplasty) had up to 9 such procedures listed in the record. The mean number of musculoskeletal procedures listed in these separations was 1.2 (± 0.6 SD). There was no significant difference between males and females for cases having at least one such procedure, (1.19 ± 0.6 SD vs. 1.18 ± 0.6 SD respectively, t-test $p = 0.89$). The mean number of musculoskeletal procedures per separation decreased with age (Figure 12).

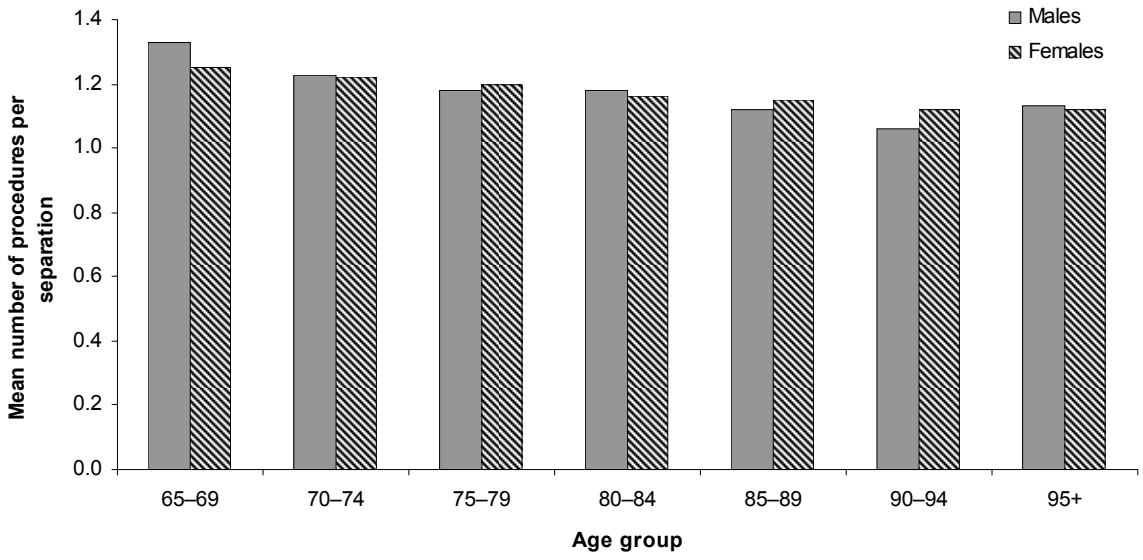


Figure 12: Mean number of musculoskeletal procedures per fall injury case separation, given at least one such procedure reported; males and females 65+ years, Australia 2005–06

A slight change in the ratio of males to females undergoing musculoskeletal procedures can be seen in the two oldest age groups when compared to the 2003–04 report (Bradley & Harrison 2007). In 2003–04, slightly more males than females in the 90–94 year age group underwent musculoskeletal procedures whereas this was reversed in 2005–06. A similar trend was seen in the 95 years and older age group with a higher mean number of musculoskeletal procedures in older females in 2003–04 compared to males being reversed in 2005–06.

4 Fall injury inward transfers

This chapter provides a brief description of the set of hospitalisation records which were omitted from the previous two chapters in order to reduce multiple counting of fall cases of hospitalised fall-related injury due to transfers between hospitals. Hence, the records described here should not be regarded as representing additional fall cases. These separations are likely to have already generated a separation describing the injury event.

7,964 separations had a principal diagnosis in the range S00–T75 or T79 and a first external cause code in the range W00–W19 (i.e. the same as fall injury cases), but also had a mode of admission denoting a transfer from another acute hospital—an increase of 690 transfer separations compared to 2003–04 (Bradley & Harrison 2007). These fall injury inward transfer separations represented 0.3% of the total number of hospitalisations for people aged 65 years and older in 2005–06.

The mean age of fall injury inward transfer separations (81.9 years ± 7.6 SD) was slightly older than the mean age for fall injury cases (81.6 years ± 7.9 SD). Again, males (80.3 years ± 7.6 SD) were slightly younger than females (82.6 years ± 7.5 SD).

The age-standardised rate of fall injury inward transfer separations for persons aged 65 years and older was 287.5 separations per 100,000 population, a slight rise from 2003–04 (275.8 per 100,000 population, Bradley & Harrison 2007). As for fall injury cases, the rate for females (336.7 per 100,000) was substantially higher than for males (214.3 per 100,000). Age-specific rates by sex for fall injury transfer separations showed a similar trend to that observed for fall injury cases (Figure 13), except that rates for females aged 95 years and older were not significantly higher than those for males, as indicated by the 95% confidence intervals.

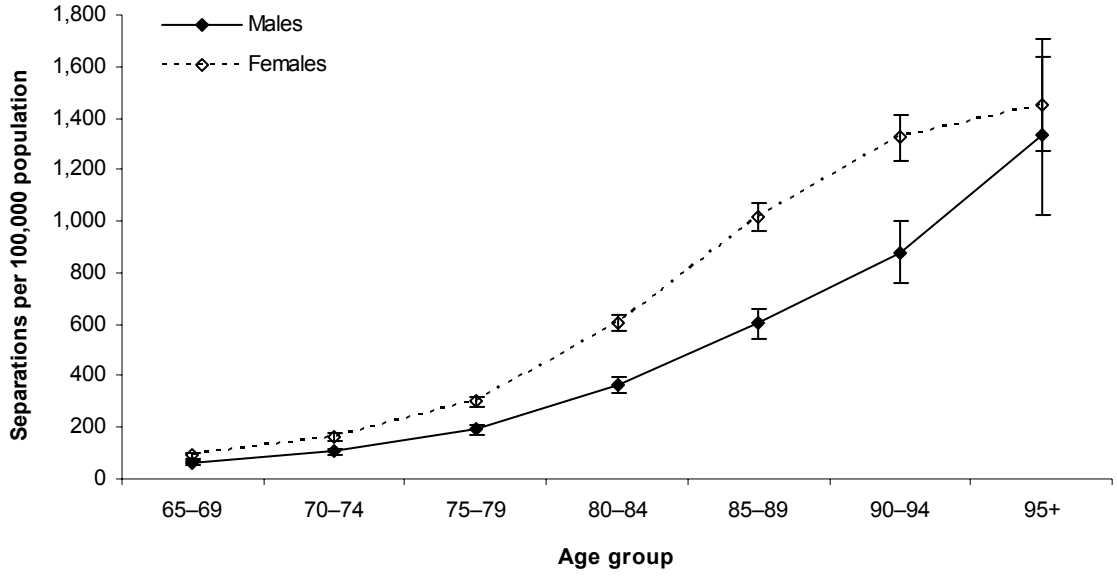


Figure 13: Age-specific rates for fall injury transfer separations (± 95% CI); males and females aged 65+ years, Australia 2005–06

Similar to fall injury cases, most fall injury transfer separations were due to unspecified falls (W19, 38.7%), falls on the same level due to slips, trips and stumbles (W01, 28.3%) and other falls on the same level (W18, 17.2%. Table 8). Unspecified falls accounted for a higher proportion of fall injury inward transfer separations (*n* = 3,081, 39%) than for fall injury cases (*n* = 18,366, 28%). There was very little change from 2003–04.

Table 8: Falls types for fall injury transfer separations, males, females and persons aged 65+ years, Australia 2005–06

External cause	Males	Females	Persons
Fall on same level involving ice and snow	* (0%)	* (0%)	* (0%)
Fall on same level from slipping, tripping & stumbling	587 (25%)	1,663 (30%)	2,250 (28%)
Fall involving ice-skates, skis, roller-skates or skateboards	* (0%)	* (0%)	* (0%)
Other fall on same level due to collision with, or pushing by, another person	* (0%)	* (0%)	23 (0%)
Fall while being carried or supported by other persons	* (0%)	* (0%)	* (0%)
Fall involving wheelchair	17 (1%)	21 (0%)	38 (0%)
Fall involving bed	119 (5%)	215 (4%)	334 (4%)
Fall involving chair	60 (3%)	143 (3%)	203 (3%)
Fall involving other furniture	* (0%)	* (0%)	19 (0%)
Fall involving playground equipment	* (0%)	* (0%)	* (0%)
Fall on & from stairs & steps	128 (5%)	282 (5%)	410 (5%)
Fall on & from ladder	76 (3%)	21 (0%)	97 (1%)
Fall on & from scaffolding	* (0%)	* (0%)	5 (0%)
Fall from, out of or through building or structure	23 (1%)	11 (0%)	34 (0%)
Fall from tree	* (0%)	* (0%)	* (0%)
Fall from cliff	5 (0%)	7 (0%)	12 (0%)
Diving or jumping into water causing injury other than drowning or submersion	* (0%)	* (0%)	* (0%)
Other fall from one level to another	39 (2%)	39 (1%)	78 (1%)
Other fall on same level	413 (18%)	958 (17%)	1,371 (17%)
Unspecified fall	851 (36%)	2,230 (40%)	3,081 (39%)
Total	**2,334**	**5,630**	**7,964**

* Small case numbers have been suppressed to prevent patient identification.

As for fall injury cases, principal diagnoses indicating injuries to the hip and thigh predominated for fall injury inward transfers (44.5%, see Table 9) and the proportion of injuries to the hip and thigh was much larger than for fall injury cases (31.1%, see Table 3 above). Conversely, the proportion of fall injury transfer separations which had a principal diagnosis of injuries to the head (10.4%) was considerably smaller than the proportion of such diagnoses for fall injury cases (17.3%).

The proportion of inward transfers with a principal diagnosis of injuries to the hip and thigh has declined from 49.0% in 2003–04 to 44.5% in 2005–06. In contrast, the proportion of fall injury inward transfers with a principal diagnosis of injuries to the head has increased from 8.4% to 10.4%. This rise for all persons is largely driven by the increase in the proportion of inward transfers with a principal diagnosis of an injury to the head involving older males; rising from 12.6% in 2003–04 to 16.8% in 2005–06.

Table 9: Principal diagnosis groups for fall injury transfer separations, males, females and persons aged 65+ years, Australia 2005–06

Principal diagnosis	Males	Females	Persons
Injuries to the head	392 (17%)	436 (8%)	828 (10%)
Injuries to the neck	89 (4%)	95 (2%)	184 (2%)
Injuries to the thorax	135 (6%)	220 (4%)	355 (4%)
Injuries to the abdomen, lower back, lumbar spine & pelvis	229 (10%)	634 (11%)	863 (11%)
Injuries to the shoulder & upper arm	128 (5%)	556 (10%)	684 (9%)
Injuries to the elbow & forearm	82 (4%)	462 (8%)	544 (7%)
Injuries to the wrist & hand	38 (2%)	51 (1%)	89 (1%)
Injuries to the hip & thigh	1,043 (45%)	2,497 (44%)	3,540 (44%)
Injuries to the knee & lower leg	170 (7%)	606 (11%)	776 (10%)
Injuries to the ankle & foot	12 (1%)	38 (1%)	50 (1%)
Injuries to unspecified parts of trunk, limb or body region	5 (0%)	22 (0%)	27 (0%)
Certain early complications of trauma	9 (0%)	8 (0%)	17 (0%)
Total *	**2,334**	**5,630**	**7,964**

* Totals include 7 separations from principal diagnosis groups too small to publish.

5 The burden of injury due to falls

Chapters 2 and 3 focus on the estimated number of new cases of hospitalised fall-related injury that occurred in the year to 30 June 2006. This chapter focuses on the nature and extent of hospital care provided in that period because of a fall-related injury.

Fall-related follow-up care

Work by the National Injury Surveillance Unit using person-linked data has shown that a large proportion of injury cases are associated with subsequent separations coded with a principal diagnosis from Chapter XXI of the ICD-10-AM; factors influencing health status and contact with health services (Kreisfeld & Newson 2006; Bradley & Harrison unpublished). This pattern is frequently observed for hip fracture injuries in particular.

Commonly, a person admitted to hospital due to a hip fracture has an initial episode of care resembling that defined in this report as a fall injury case; a principal diagnosis in the range S00–T75 or T79, a left-most external cause code describing an unintentional fall (W00–W19) and a mode of admission other than an inward transfer. This episode of care is then followed by a second admission for rehabilitation or other follow-up care. The principal diagnosis of the subsequent episode is often a code for the type of follow-up care provided and the injury for which the follow-up care is required is usually recorded as an additional diagnosis. The most common principal diagnosis codes for records such as these are;

- Z47—other orthopaedic follow-up care,
- Z48—other surgical follow-up care,
- Z50—care involving use of rehabilitation procedures, and
- Z75.1—person awaiting admission to adequate facility elsewhere.

Such records are numerous and must be considered in a valid estimation of the burden of hospitalised fall injury. Since people admitted for follow-up care related to a fall injury have usually been previously admitted for acute care for the injury (the fall injury cases described in previous sections of this report) these separations represent an additional part of the burden due to fall injury rather than additional incidents.

This report has identified fall-related follow-up care separations on the basis of having a principal diagnosis of one of the four types listed above as well as an injury (S00–T75 or T79) and a falls external cause code (W00–W19) anywhere in the record (see also 'Selection criteria'). Note that these fall-related follow-up care separations have *not* been identified on the basis of a 'rehabilitation' type of episode of care (rehabilitation/follow-up care is implied by the principal diagnosis, irrespective of the recorded type of episode of care).

Over 20,000 fall-related follow-up care separations were identified for people aged 65 years and older in 2005–06 (n = 23,411), an increase of 7,586 separations compared to 2003–04 (Bradley & Harrison 2007). Three-quarters of these involved women (72.8%, n = 17,048).

The mean age of the person for a fall-related follow-up care separation was 82.3 years (± 7.3 SD), slightly older than the average for both fall injury cases and inward transfers. Females hospitalised for fall-related follow-up care had a mean age of 82.8 years (± 7.2 SD) and, as for fall injury cases (and inward transfers), were significantly older than males (mean 81.0 years ± 7.3 SD, Mann Whitney U, p<0.001).

The age-standardised rate of fall-related follow-up care separations for all people aged 65 years and older was 842.1 separations per 100,000 population. The age-standardised rate for females (1,015.2 per 100,000) was much higher than for males (588.5 per 100,000). Age-specific rates of fall-related follow-up care separations increased considerably for both males and females until very old age, when rates levelled off somewhat (Figure 14). As for fall injury cases, the age-specific rates of fall-related follow-up care separations for females were significantly higher than those for males for every age group.

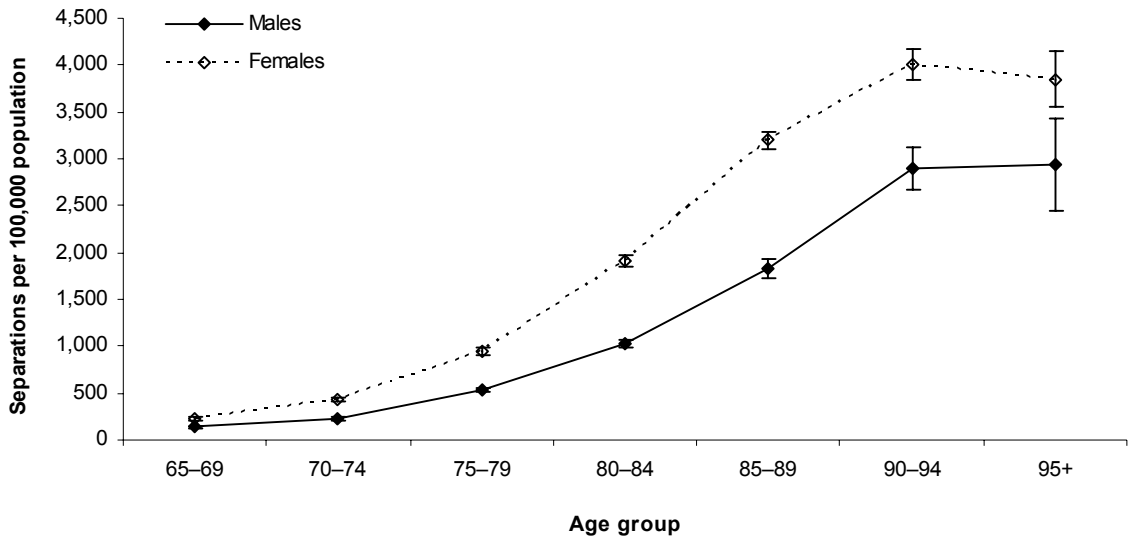


Figure 14: Age-specific rates of fall-related follow-up care separations (± 95% CI); males and females aged 65+ years, Australia 2005–06

The overall age-standardised rate of fall-related follow-up care separations for all people aged 65 years and older in 2005–06 has risen substantially from the 598.5 separations per 100,000 population observed in 2003–04 (Bradley & Harrison 2007). Rates of fall-related follow-up care separations increased between 2003–04 and 2005–06 for both males and females; from 400.4 per 100,000 population to 588.5 per 100,000 for males and from 727.9 per 100,000 to 1,015.2 per 100,000 for females. While the increase in rate in the two year period was numerically largest for females (287.3 separations per 100,000), the 188.1 per 100,000 additional separations for males in 2005–06 represents an increase of 47.0% on the 2003–04 rate.

Diagnosis types

Table 10 describes the principal diagnosis for fall-related follow-up separations involving people aged 65 and older in 2005–06. More than three quarters (85.0%, *n* = 19,888) of these separations had a principal diagnosis of Z50 (care involving use of rehabilitation procedures), a rise in both number and proportion compared to 2003–04 (79.4%, *n* = 12,565. Bradley & Harrison 2007). In particular, a higher proportion of fall-related follow-up care separations in 2005–06 (79.6%, *n* = 18,634) had a principal diagnosis of Z50.9 (care involving use of rehabilitation procedure, unspecified) than in 2003–04 (71.8%, *n* = 11,370).

Another common principal diagnosis for fall-related follow-up care separations indicated that the person was awaiting admission to another care facility (Z75.1x: 7.7%, *n* = 1,802), a decrease in proportion since 2003–04 (11.1%). Of these Z75.1 separations in 2005–06, the majority (92.9%, *n* = 1,674) were coded as Z75.11—person awaiting admission to residential aged care service. A higher proportion of fall-related follow-up care separations for men (8.5%) had this principal diagnosis than separations for women (6.7%).

Table 10: Principal diagnosis for fall-related follow-up care separations; males, females and persons aged 65+ years, Australia 2005–06

Principal diagnosis		Males	Females	Persons
Z47.0	Follow-up care involving removal of fracture plate & other internal fixation device	* (0%)	* (0%)	12 (0%)
Z47.8	Other specified orthopaedic follow-up care	57 (1%)	212 (1%)	269 (1%)
Z47.9	Orthopaedic follow-up care, unspecified	152 (2%)	418 (2%)	570 (2%)
Z48.0	Attention to surgical dressings & sutures	* (0%)	* (0%)	11 (0%)
Z48.8	Other specified surgical follow-up care	240 (4%)	605 (4%)	845 (4%)
Z48.9	Surgical follow-up care, unspecified	8 (0%)	6 (0%)	14 (0%)
Z50.0	Cardiac rehabilitation	8 (0%)	8 (0%)	16 (0%)
Z50.1	Other physical therapy	163 (3%)	506 (3%)	669 (3%)
Z50.4	Psychotherapy, not elsewhere classified	* (0%)	* (0%)	* (0%)
Z50.5	Speech therapy	* (0%)	* (0%)	26 (0%)
Z50.7	Occupational therapy & vocational rehabilitation, nec	22 (0%)	19 (0%)	41 (0%)
Z50.8	Care involving use of other rehabilitation procedures	136 (2%)	365 (2%)	501 (2%)
Z50.9	Care involving use of rehabilitation procedure, unspecified	4,967 (78%)	13,667 (80%)	18,634 (80%)
Z75.10	Person awaiting admission to acute hospital	7 (0%)	5 (0%)	12 (0%)
Z75.11	Person awaiting admission to residential aged care service	540 (8%)	1,134 (7%)	1,674 (7%)
Z75.12	Person awaiting admission to psychiatric facility/unit	* (0%)	* (0%)	* (0%)
Z75.13	Person awaiting admission to rehabilitation facility/unit	12 (0%)	37 (0%)	49 (0%)
Z75.14	Person awaiting admission to palliative care facility/unit	* (0%)	* (0%)	* (0%)
Z75.18	Person awaiting admission to other health care facility	16 (0%)	31 (0%)	47 (0%)
Z75.19	Person awaiting admission to adequate facility elsewhere, unspecified	5 (0%)	7 (0%)	12 (0%)
Total		**6,363**	**17,048**	**23,411**

* Small case numbers have been suppressed to prevent patient identification.

The first-listed injury diagnosis recorded in these fall-related follow-up care separations was identified for further analysis. As for fall injury cases, the most common injury category was an injury to the hip or thigh (49.1%, *n* = 11,496).

Fractures of the femur (S72) was the leading injury type for both males (45.3%, *n* = 2,883) and females (47.8%, *n* = 8,145) for all fall-related follow-up care separations. The next most frequent injury types were S32—fracture of lumbar spine and pelvis (11.8%, *n* = 2,763). Head injuries (S00–S09), while the second-most common injury category for fall injury cases, were the fifth most common injury category for fall-related follow-up care separations (6.8%, *n* = 1,585). As for fall injury cases, however, injuries to the head constituted a higher proportion of fall-related follow-up care separations for males (11.5%, *n* = 729) than for females (5.0%, *n* = 856).

Length of stay

Fall injury case separations

Fall injury case separations for people aged 65 years and older accounted for 514,382 bed-days in 2005–06, an increase of 26,981 bed-days since 2003–04. This represents 4.4% of all bed-days for hospitalisations for this age group.

The length of stay per fall injury case separation ranged from 1 day (33.7% *n* = 22,511) to more than 1,400 days (*n* = 1). The mean length of stay for fall injury cases was 7.7 days (± 13.1 SD). The mean length of stay for males (7.6 days ± 14.1 SD) did not significantly differ from that of females (7.8 days ± 12.7 SD t-test, p = 0.08). There was a slight decline in the mean length of stay compared to 2003–04, down from 8.1 days (± 11.2 SD).

Similar to 2003–04 (Bradley & Harrison 2007), the mean length of stay for fall injury case separations differed significantly by age (ANOVA, p<0.001). Mean lengths of stay increased with age for both males and females (Figure 15).

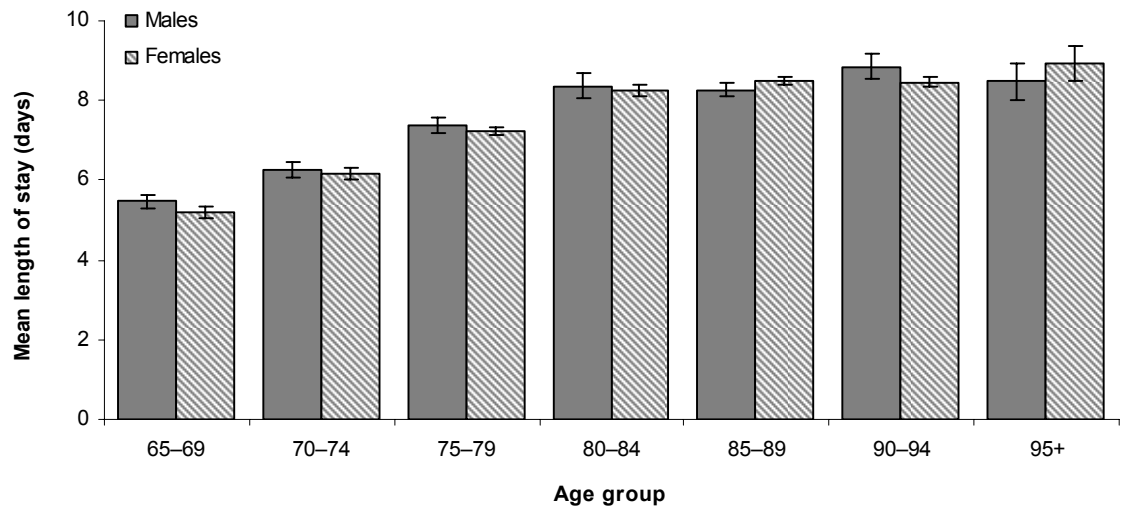


Figure 15: Mean length of stay (days ± SE) for fall injury cases; males and females aged 65+ years, Australia 2005–06

Fall injury inward transfer separations

Fall injury inward transfers had a longer mean length of stay than fall injury case separations (13.3 days ± 14.8 SD), probably due to higher injury severity in transferred cases. The mean length of stay for fall injury inward transfers involving males was 13.6 days (± 16.0 SD) while the mean length of stay for females was 13.2 days (± 14.2 SD).

Mean lengths of stay increased until ages 90–94 years and then decreased slightly in the 95 years and older years age group (Figure 16). Mean lengths of stay differed significantly by age (ANOVA; $p<0.001$). This pattern was similar for both males and females although in the younger age groups, mean lengths of stay for females were significantly lower than those of males.

In total, falls injury inward transfers involving people aged 65 years and older contributed 106,135 hospital bed-days in 2005–06, 0.9% of all bed-days occupied by this population in this year. There was little change compared to the 2003–04 findings (Bradley & Harrison 2007).

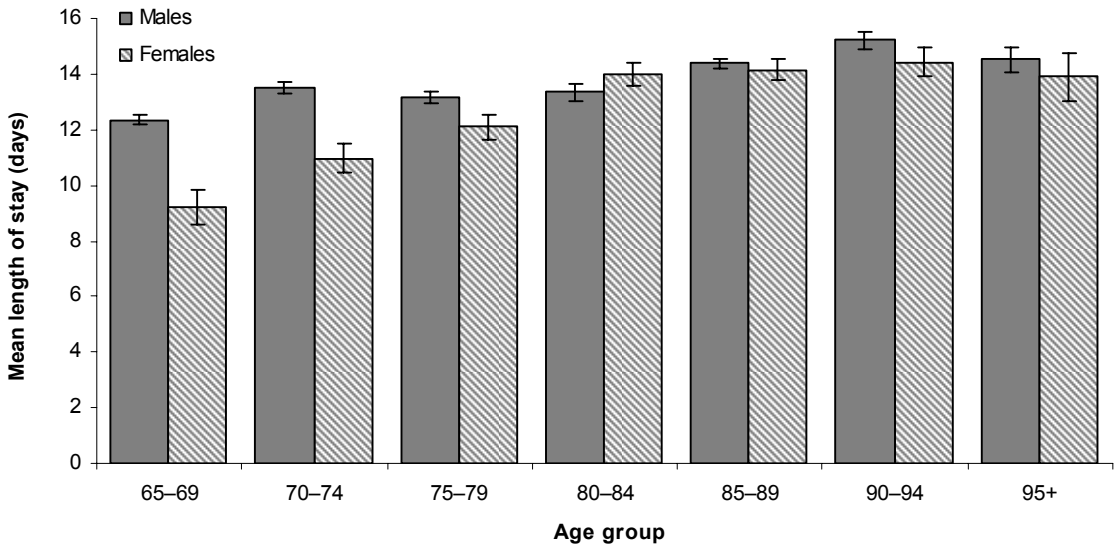


Figure 16: Mean length of stay (days ± SE) for fall injury inward transfers; males and females aged 65+ years, Australia 2005–06

Fall-related follow-up care separations

Fall-related follow-up care separations for people aged 65 years and older accounted for 466,301 bed-days in 2005–06, an increase of 125,355 bed-days compared to 2003–04 (Bradley & Harrison 2007). This represents 4.0% of all bed-days for hospitalisations for this age group.

The length of stay per follow-up care separation ranged from 1 day (14.6% n = 3,428) to more than 1,900 days (n = 1). The mean length of stay for fall-related follow-up care separations was much longer than for fall injury cases or inward transfers (19.9 days ± 28.2 SD). The mean length of stay for males (20.9 days ± 33.7 SD) was significantly higher than the mean length of stay for females (19.5 days ± 25.9 SD, t-test $p<0.01$). Mean lengths of stay also differed by age (ANOVA; $p<0.001$, see Figure 17).

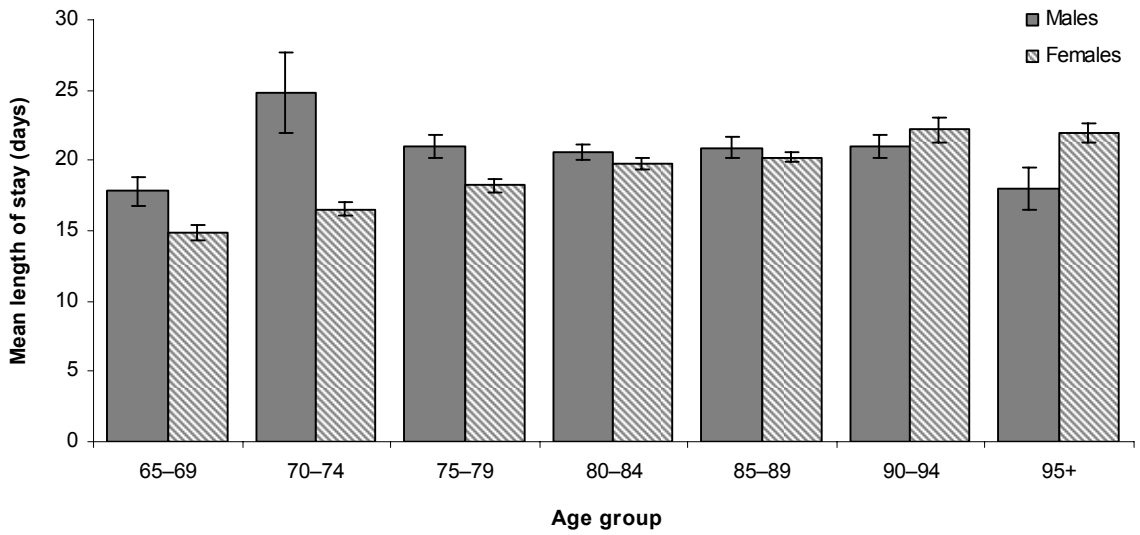


Figure 17: Mean length of stay (days ± SE) for fall-related follow-up care separations; males and females aged 65+ years, Australia 2005–06

As in 2003–04, there was an obvious association between mean lengths of stay and principal diagnosis type for fall-related follow-up care separations in 2005–06 (Figure 18). Z75.1 diagnoses (person awaiting admission to adequate facility elsewhere) had much longer lengths of stay than other types of diagnoses for fall-related follow-up care separations, for both males and females.

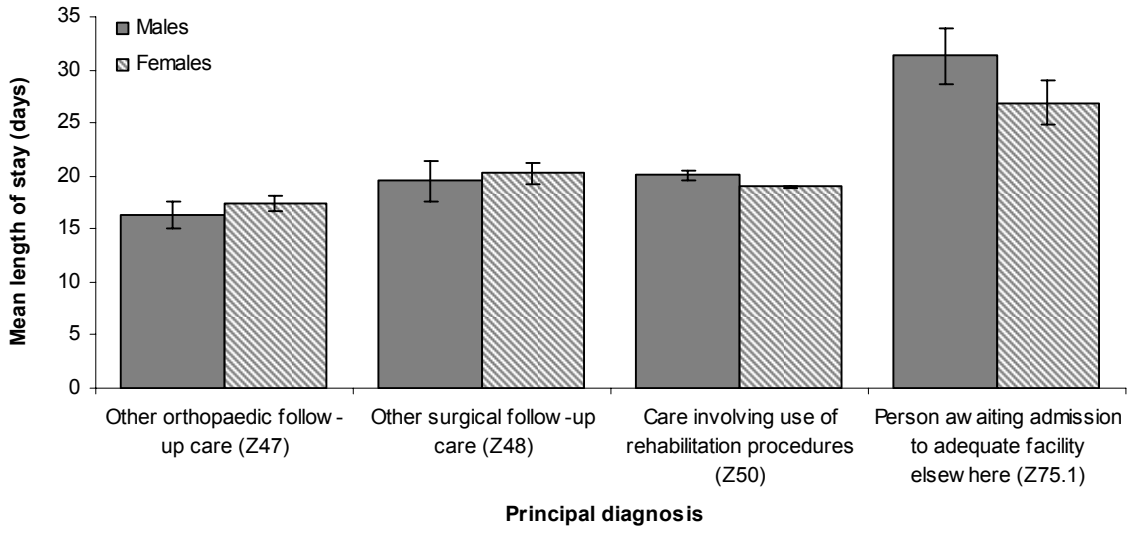


Figure 18: Mean length of stay (days ± SE) for fall-related follow-up care separations—principal diagnosis types; males and females aged 65+ years, Australia 2005–06

A comparison with the 2003–04 mean lengths of stay for fall-related care separations by principal diagnosis is shown in Table 11. There has been a rise in the mean length of stay for other orthopaedic follow-up care (Z47) and other surgical follow-up care (Z48) since 2003–04, but a decrease in mean length of stay for care involving the use of rehabilitation procedures (Z50) and the waiting time for admission to an adequate facility elsewhere (Z75.1) in 2005–06. As Z50 and Z75.1 were the most common principal diagnosis types for fall-related follow-up up care separations, these decreases resulted in an overall decrease in the mean length of stay for all fall-related follow-up care separations in 2005–06 compared to 2003–04.

Table 11: Mean length of stay for fall-related follow-up care separations; principal diagnosis types persons aged 65+ years, Australia 2003–04 and 2005–06

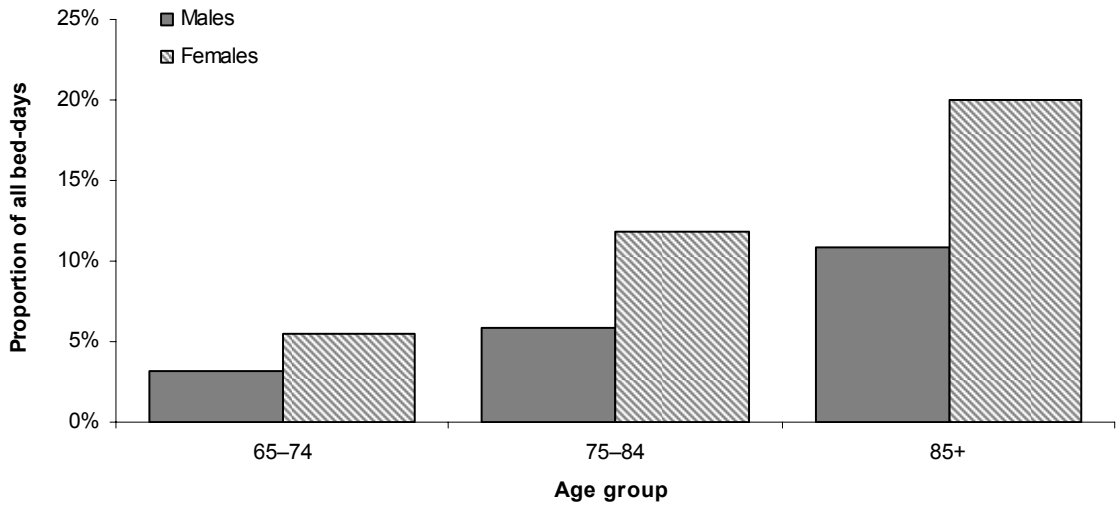
	2003–04	2005–06
Principal diagnosis	**MLOS (SD)**	**MLOS (SD)**
Other orthopaedic follow-up care (Z47)	15.1 (16.0)	17.1 (18.4)
Other surgical follow-up care (Z48)	19.2 (49.2)	20.0 (26.3)
Care involving use of rehabilitation procedures (Z50)	20.5 (18.6)	19.3 (21.0)
Person awaiting admission to adequate facility elsewhere (Z75.1)	32.4 (66.8)	28.3 (70.0)
All fall-related follow-up care separations	**21.5 (30.7)**	**19.9 (28.2)**

The total number of bed-days utilised by fall-related separations by people aged 65 years and older in 2005–06 was 1,086,818 (Table 12), 9.3% of all hospital bed days for this population. Hospitalisations related to falls by males accounted for 5.8% of all bed-days for males aged 65 years and older while hospitalisations related to falls by females accounted for a much higher proportion of all bed-days for females aged 65 years and older—12.4%.

Table 12: Total bed days of fall-related hospitalisations, males, females and persons aged 65+ years, Australia 2005–06

	Males	Females	Persons
Type of fall injury separation	**Sum of bed-days**	**Sum of bed-days**	**Sum of bed-days**
Case separations	147,425	366,957	514,382
Inward transfer separations	31,791	74,344	106,135
Follow-up care separations	133,285	333,016	466,301
Total	**312,501**	**774,317**	**1,086,818**

As in 2003–04, the bed-days occupied by all fall-related separations in 2005–06 as a proportion of all bed-days for any cause increased with age for both males and females (Figure 19). The difference in proportion between males and females also increased with age.



Note: All-causes hospitalisation (denominator) data sourced from *Australian hospital statistics 2005–06* (AIHW 2007a).

Figure 19: Total burden of fall-related hospitalisations as a proportion of all bed days for the population aged 65+ years, males and females, Australia 2005–06

The length of stay analysis presented above considers three groups of fall-related separation records separately. Fall injury inward transfers (Chapter 4) and fall-related follow-up care episodes (Chapter 5) are typically preceded by an initial episode for acute care (Chapter 2). Hence, a valid estimate of the average total duration of hospital care for admitted incidents of fall-related injury should include the bed-days for all phases of care. On this basis, the estimated total mean length of stay for fall cases (n = 66,784) is 16.3 days if bed-days for case separations, inward transfers and fall-related follow-up care are included (n = 1,086,818). This estimate is slightly longer than the 15.3 days total mean length of stay for fall-related cases in 2003–04 (Bradley & Harrison 2007).

‘Other fall-related’ separations

In the 2003–04 report a fourth class of fall-related separations were identified for people aged 65 years and older, additional to those types already discussed above (Bradley & Harrison 2007). These ‘other fall-related’ separations did not meet the criteria specified for fall injury cases, fall injury inward transfers or fall-related follow-up care separations, but did contain both a relevant injury code (S00–T75 or T79) and external cause code (W00–W19) within the record.

As discussed in the 2003–04 report, the exact nature of these ‘other fall-related’ separations is not known (Bradley & Harrison 2007). The principal diagnosis (i.e. the main reason for the hospital episode) was generally not an injury or follow-up care diagnosis, but an injury, due to a fall, was also included among the additional diagnoses. Some possible circumstances for such cases include: chance (i.e. a person admitted for a non-injury condition happened to have an injury condition); co-morbid injury (e.g. a person admitted due to a neoplasm had a pathological fracture); complication of care (e.g. a person in hospital for treatment of a non-injury condition slipped and fell); and, injury during the onset of another condition (e.g. a person fell and was injured during an acute myocardial infarction).

We still do not fully understand the role of fall injury in these cases and it continues to be difficult to assess the degree to which they impact on the total burden of hospitalised fall-related injury. In the present report we have briefly examined these separations and provide limited results here to enable comparisons with the 2003–04 findings.

A further 20,345 hospital separations for people aged 65 years and older were identified as being fall-related in 2005–06, in addition to those already discussed. These separations represent 0.8% of the total number of hospital separations for people 65 years and older in this year.

The age-standardised rate of ‘other fall-related’ separations was 737.3 per 100,000 population and age-specific rates of ‘other fall-related’ separations showed a similar increasing trend to that observed previously in the main analysis (Figure 20). However, unlike the fall injury classes analysed to this point, the age-specific rates for males were higher than those for females in every age group. The age-standardised rate of ‘other fall-related’ separations for males aged 65 years and older was 821.0 per 100,000 while the rate for females was 683.0 per 100,000. The rate-ratio was 1.2 ‘other fall-related’ separations for males for every 1.0 ‘other fall-related’ separation for females.

The majority of ‘other fall-related’ separations did not have an injury code of any type as the principal diagnosis (96.5% of ‘other fall-related’ separations, see Table 13). One in five ‘other fall-related’ separations (21.5%, *n* = 4,373) had a principal diagnosis from Chapter IX of the ICD-10-AM—diseases of the circulatory system. The second most common principal diagnosis type was those from Chapter XVIII—symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (16.0%, *n* = 3,259). Interestingly, the two most common principal diagnoses for ‘other fall-related’ separations in the Chapter XVIII group were R55 (syncope and collapse, 46.1% of these Chapter XVIII separations) and R29.81 (other and unspecified symptoms and signs involving the nervous and musculoskeletal systems: falls, 16.3%).

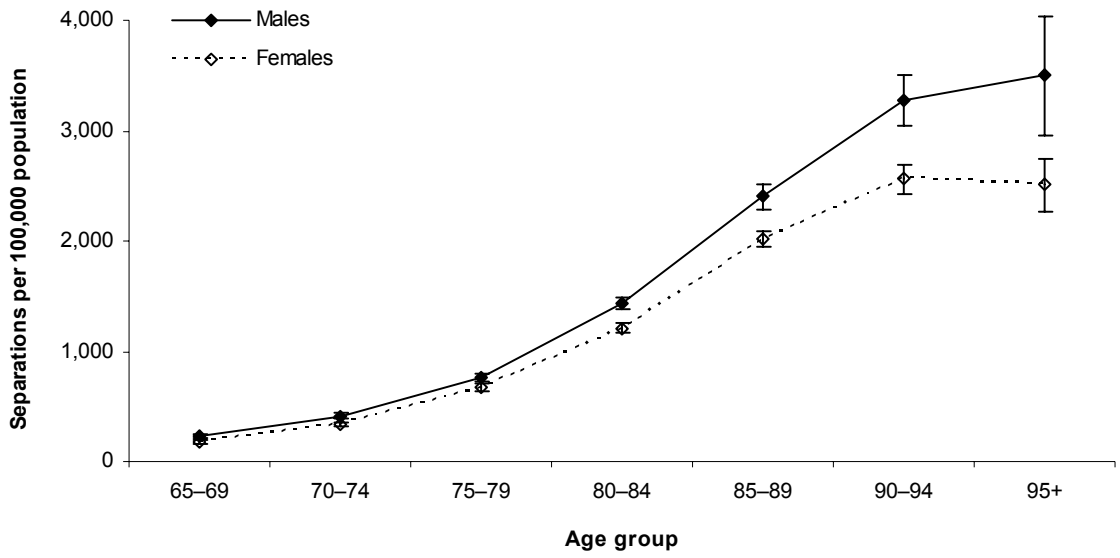


Figure 20: Age-specific rates for 'other fall-related' separations, males and females aged 65+ years, Australia 2005–06

Table 13: ICD-10-AM chapter of principal diagnosis for 'other fall-related' separations; males, females and persons aged 65+ years, Australia 2005–06

ICD-10-AM chapter	Males	Females	Persons
Certain infectious & parasitic diseases	195 (2%)	215 (2%)	410 (2%)
Neoplasms	862 (10%)	647 (6%)	1,509 (7%)
Diseases of the blood, blood-forming organs, etc	126 (1%)	195 (2%)	321 (2%)
Endocrine, nutritional & metabolic diseases	354 (4%)	475 (4%)	829 (4%)
Mental & behavioural disorders	524 (6%)	624 (6%)	1,148 (6%)
Diseases of the nervous system	501 (6%)	526 (5%)	1,027 (5%)
Diseases of the eye & adnexa	14 (0%)	22 (0%)	36 (0%)
Diseases of the ear & mastoid process	14 (0%)	51 (0%)	65 (0%)
Diseases of the circulatory system	1,947 (22%)	2,426 (21%)	4,373 (21%)
Diseases of the respiratory system	1,039 (12%)	949 (8%)	1,988 (10%)
Diseases of the digestive system	439 (5%)	516 (5%)	955 (5%)
Diseases of the skin & subcutaneous tissue	229 (3%)	361 (3%)	590 (3%)
Diseases of the musculoskeletal system & connective tissue	436 (5%)	763 (7%)	1,199 (6%)
Diseases of the genitourinary system	383 (4%)	762 (7%)	1,145 (6%)
Symptoms, signs, abnormalities not elsewhere classified	1,388 (15%)	1,871 (16%)	3,259 (16%)
Injury, poisoning & consequences of external causes	300 (3%)	403 (4%)	703 (3%)
Factors influencing health status	251 (3%)	534 (5%)	785 (4%)
Total *	**9,003**	**11,342**	**20,345**

* Totals include 3 separations from categories too small to publish.

6 Trends in fall hospitalisations

The 2005–06 data year marks the completion of seven years' of national hospital data coded to the ICD-10-AM, allowing trends over time in fall-related hospitalisations to be analysed.

Age-standardised rates of hospitalised fall injury cases for both males and females aged 65 years and older have been increasing since 1999–00 (Figure 21). Negative binomial regression analyses suggest that these increases in rate are in the order of 2.5% (males) and 1.1% (females) per year.

In contrast, the rates of hospitalised cases of femur fracture (principal diagnosis S72) due to falls in people aged 65 years and older have been decreasing since 1999–00 (also presented in Figure 21). While the rate of all hospitalised falls injury cases may be affected by changes in admission practices over time, it is thought that femur fractures are serious enough to be admitted to hospital in nearly every instance, so rates of admission should provide a relatively reliable indicator of rates of occurrence.

For males, the decrease in the rate of femur fractures due to falls is estimated to be -1.3% per year since 1999–00, while for females this decrease is estimated to be -2.2%.

Similar findings for hospitalised femur fractures have been presented for the resident population of New South Wales (Boufous et al. 2004) and may indicate the success of falls prevention interventions. The increase in hospitalised falls injury cases overall, however, is puzzling. As these rates have been age-standardised, it is not likely that changes in the age composition of the older Australian population have influenced these findings. Moreover, age- and sex- standardisation (to account for the much higher proportion of females in the older population) only emphasises the increase in the rates.

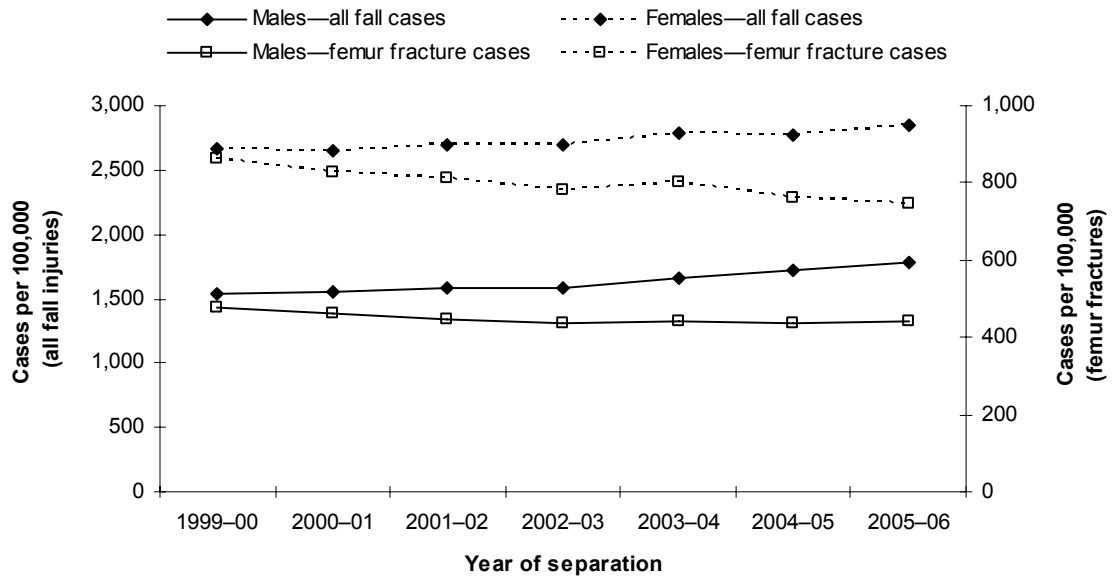


Figure 21: Age-standardised rates for fall injury cases and cases with femur fracture as the principal diagnosis (S72); males and females aged 65+ years, Australia 1999–2006

Further, the increase in rates of fall injury cases between 1999–00 and 2005–06 has not been balanced by a decrease in the inward transfer separations excluded from the estimation of case numbers or fall-related follow-up care separations. Figure 22 shows that the age-standardised rate of both fall injury inward transfer separations and fall-related follow-up care separations have also increased since 1999–00, rather markedly in later years for fall-related follow-up care separations.

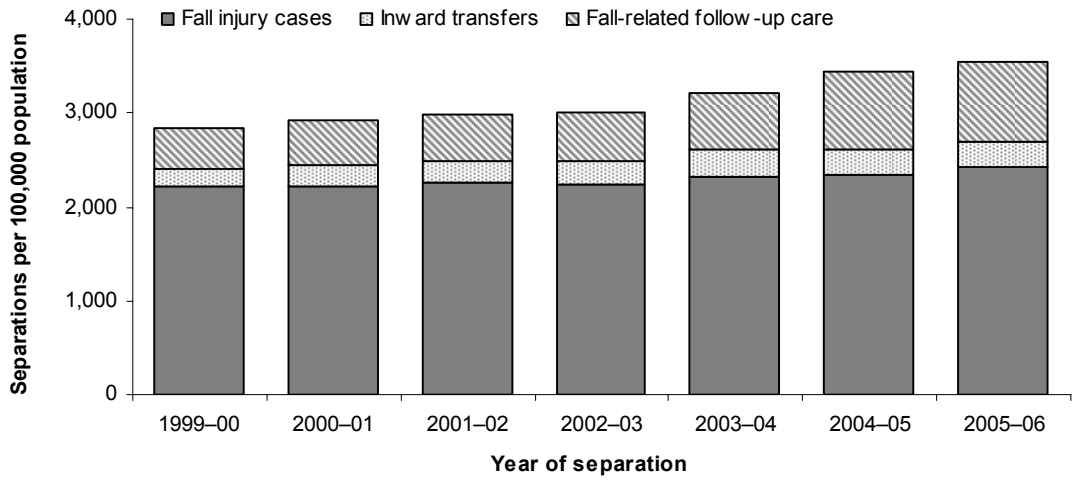


Figure 22: Age-standardised rates of fall injury cases, fall-related inward transfers and fall-related follow-up care separations; persons aged 65+ years, Australia 1999–2006

However, the increase in rates of estimated fall injury cases, inward transfers and follow-up care separations between 1999–00 and 2005–06 occurs in conjunction with a decrease in the mean length of stay per separation in this period (Figure 23).

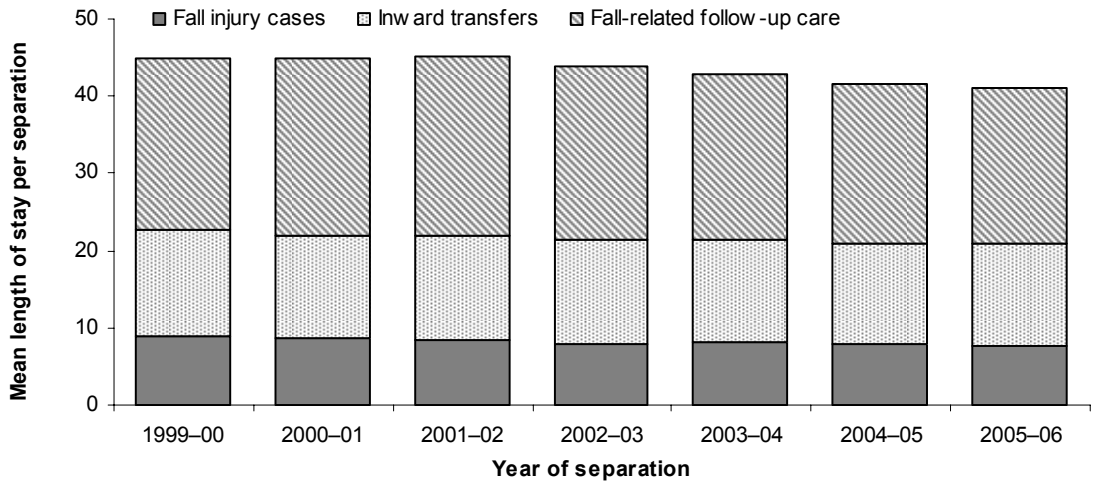


Figure 23: Mean length of stay per separation (days) for fall injury cases, fall-related inward transfers and fall-related follow-up care separations; persons aged 65+ years, Australia 1999–2006

Substantial reductions in mean lengths of stay per separation were observed for fall injury cases (from 8.9 days per separation in 1999–00 to 7.7 days in 2005–06) and fall-related follow-up care separations (from 22.2 days to 19.9 days in the same period). Mean lengths of stay for fall injury inward transfers also decreased between 1999–00 and 2005–06 (13.7 days to 13.3 days), but by a smaller degree.

Nonetheless, the estimated *total* mean length of stay per fall injury case (the sum of bed-days for case, transfer and follow-up care separations divided by the estimated number of cases, as described in the previous section), increased over time from 14.4 days per case in 1999–00 to 16.3 days in 2005–06. A sharp rise in the total mean length of stay per fall injury case was observed in the last two years of the series, matching the larger increases in the rate of fall-related follow-up care separations in this period.

Figure 24 presents bed-days due to falls as age-standardised rates per 100,000 population. It can be seen that despite the apparent increase in the rate of falls injury cases, the rate of the bed-days utilised by these separations has decreased over time (as would be expected from the reduction in mean length of stay for case separations). Rates of bed-days utilised by inward transfers and fall-related follow-up care separations have increased over time however. As for the rates of the separations themselves, the largest increase in the rate of bed-days is observed for fall-related follow-up case separations in the last two years of the series. This is despite the reduction in mean lengths of stay for this particular type of fall-related hospital care.

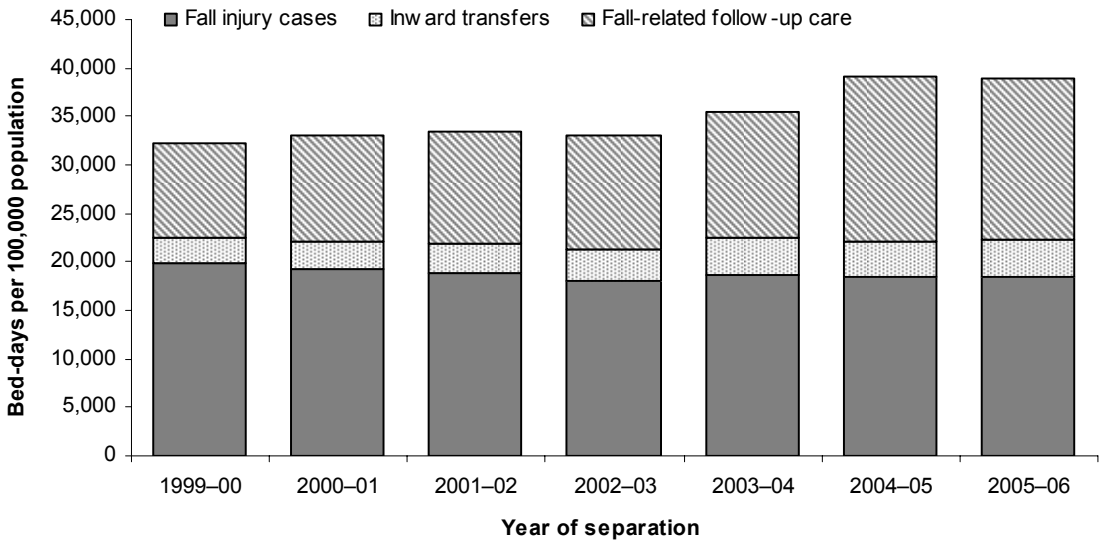


Figure 24: Age-standardised rate of bed-days for fall injury cases, fall-related inward transfers and fall-related follow-up care separations; persons aged 65+ years, Australia 1999–2006

These findings may be due to changes in admission and/or coding practices over time; lengths of stay per separation may be reducing but the number of separations per injurious fall incident may be increasing. For example, there may be an increasing tendency to end a fall injury case episode of care (where the principal reason for hospitalisation is an injury) earlier and class further rehabilitation-type care as a separate episode (statistical type change to Z-code principal diagnosis), even if the person doesn't actually leave hospital between these two episodes of care. Similarly, one long episode of care may be more likely to be split into multiple episodes of care in more recent years, with the person going home for a period between treatments. This scenario, in particular, may be the driver behind the increase in rates of, and rates of bed-days utilised by, fall-related follow-up care separations.

Closer analysis of mode of admission and mode of separation data over time may be revealing, but is likely to be limited given the resolution available at national level. Ideally, the apparent increase in rates of fall-related hospital care should be analysed further using person-linked data; not only would the natural history of hospitalised falls (in terms of the number, type and length of separations generated per case) be better understood, but the assumptions underpinning our estimate of case numbers could also be validated.

7 Discussion

Falls are common among older people and often result in fractures or other serious injuries. This report confirms that the rate of hospitalised falls for people aged 65 years and older has continued to rise since 2003–04 and that hospitalisations for injuries due to falls and other fall-related conditions continue to constitute a substantial proportion of the burden of disease and health expenditure for this population.

In total, 98,159 separations were identified as being related to injuries due to falls involving people aged 65 years and older in 2005–06 (including case separations, inward transfer separations and follow-up care separations). This represents 3.8% of all hospital separations for any cause for this population. Further, fall-related hospitalisations accounted for 1,086,818 bed-days for people aged 65 years and older in 2005–06, representing 9.3% of all hospital bed-days for this population in this age group.

Falls injuries and circumstances

The estimated number of fall injury cases in people aged 65 years and over resulting in hospitalisation in 2005–06 was 66,784. The age-standardised rate of fall injury cases was 2,414.6 per 100,000 population compared with 2,295.3 per 100,000 population in 2003–04. As in 2003–04, and reflective of the general population aged 65 years and older, females made up a higher proportion of fall-related hospitalisations in 2005–06. In addition, age-specific rates of hospitalised fall injury cases suggest that older females continue to have a much higher risk of serious falls than males.

While injuries to the hip and thigh were the most common type of injury sustained in a serious fall case for both males and females, a high proportion of hospitalised falls, particularly for males, resulted in head injuries. In the case of fall injury inward transfers, injuries to the head has increased overall from 8% (2003–04) to 10% (2005–06) the proportion of older males with a principal diagnosis of an injury to the head rose from 13% in 2003–04 to 17% in 2005–06. These findings confirm similar results by other researchers (e.g. Peel et al. 2002) and continues to support the suggestion that falls prevention interventions should be designed to target head injuries in addition to hip fractures.

As in 2003–04, the most common type of fall for fall injury cases, for both males and females, in 2005–06 was a fall on the same level due to slipping, tripping and stumbling (W01). The second most common type of fall injury case was an 'unspecified fall' (W19) and the third most common type of fall injury case was an 'other fall on same level' (W18). Similarly, W01, W18 and W19 were also the most commonly-listed external causes for other types of fall-related hospitalisations. However, for fall-related separations other than injury cases (i.e. inward transfers, and follow-up care separations), unspecified falls (W19) were the most frequently listed external cause rather than slips, trips and stumbles (W01). This suggests that some information regarding the circumstances of a fall is lost from records after the original hospitalisation for the injury event, compounding difficulties for strategically targeting falls prevention programs and accurately attributing the burden of disease due to particular types of falls.

Seven out of ten fall injury cases were recorded as having occurred in the home or in aged care facilities (place was recorded as 'unspecified' for another 17% of fall cases, the same proportion reported in 2003–04). As in 2003–04, rates of fall injury cases in aged care facilities were markedly higher than the corresponding rates of fall injury cases in the home for people resident in the general community. Moreover, the rate of falls in aged care facilities has increased since 2003–04 (from 6,404.3 fall injury cases per 100,000 population to 7,237.5 per 100,000 population in 2005–06).

Activity coding continued to be plagued by high proportions of 'unspecified activity' codes in the records (67% of fall injury case separations in 2005–06 and 62% of fall injury case separations in 2003–04). As discussed in the 2003–04 report (Bradley & Harrison 2007), the current suite of ICD-10-AM activity codes does not adequately describe activities typical of older people. There are over 250 activity codes for use in the fourth edition of the ICD-10-AM but these are predominantly related to sports and leisure activities. Almost half of fall cases in older people occur in and around the home, and yet comparatively few fall cases are coded as U72 (leisure activity not elsewhere classified), U73.1 (while engaged in other types of work) or U73.2 (while resting, sleeping, eating or engaging in other vital activities).

Prevention programs would greatly benefit from more detailed information on the activity older fallers were engaged in when they fell so they can better target their resources. Ladder-related falls, in particular, appear to be strongly related to unpaid work in and around the home (Bradley 2007). Future revisions of the ICD-10-AM activity codes should explicitly address activities such as housework, home maintenance and/or DIY, gardening and volunteer work in fourth- or fifth-character subcategories and/or provide more specific information regarding the activities included in extant codes.

The burden of fall-related injury

The additional types of separations identified in this report as being fall-related significantly increase the already-substantial burden of hospitalised fall injury cases among people aged 65 years and older in 2005–06. Fall-related follow-up care separations contributed almost as many bed-days as those occupied due to initial episodes due to fall injury (cases) and inward transfers due to falls and brought the total number of fall-related hospital bed-days for people aged 65 years and older in 2005–06 to over 1 million.

Previous work by NISU using person-linked data suggests that, in Western Australia, a large proportion of fall injury cases resulting in injuries to the hip and thigh were associated with subsequent separations coded to four specific principal diagnoses from Chapter XXI of the ICD-10-AM—factors influencing health status and contact with health services (Kreisfeld & Newson 2006; Bradley & Harrison unpublished). This report provides further confirmation that a large number of additional fall-related separations can be identified using this criterion in the national (de-identified) hospital data collection. The principal diagnosis Z50.9 (care involving use of rehabilitation procedure, unspecified), in conjunction with a falls external cause, was found to be a particularly common type of follow-up care separation as it was in 2003–04. Four in five falls-related follow-up care separations had this principal diagnosis.

The number and proportion of fall-related follow-up care separations coded with Z75.1 principal diagnoses, indicating that the person was awaiting admission to a residential aged care service, evidenced a small decline from 2003–04 (Bradley & Harrison 2007). In addition, the mean length of stay for fall-related care separations with a Z75.1 principal diagnosis also declined in this period.

Trends in falls hospitalisations

The rate of fall-related hospital care appears to have increased between 1999–00 and 2005–06 but the reasons for this are unclear. Age-standardised rates of fall injury cases, inward transfers and fall-related follow-up care separations have increased over the seven year study period but mean lengths of stay for each type of fall hospitalisation have decreased in this time. The estimated total length of stay per fall injury case, however, has increased between 1999–00 and 2005–06, apparently influenced by the increase in the rate of fall-related follow-up care separations and the bed-days utilised by these episodes of care.

As the rate of fall cases that have a principal diagnosis of femur fracture (i.e. a severe injury most likely resulting in admission in every case) appears to have decreased between 1999–00 and 2005–06 (as would be expected from increasing falls prevention efforts), these findings suggest that there has been a change in the natural history of a hospitalised falls case in recent years and/or our current method of estimating case numbers is inexact. Both possibilities raise concerns regarding the development of valid falls indicators and highlight the necessity of using person-linked data in the future analysis of fall-related hospital care.

Data issues

Data sources

Hospital separations data were provided by the Australian Institute of Health and Welfare (AIHW 2007a). Less than 1% of injury and poisoning separations are thought to be missing from the data reported, representing minimal risk of sampling error.

Estimated resident population data by age, sex and place of usual residence was also obtained from the AIHW. Population estimates of residents of aged care facilities were obtained from the AIHW report *Residential aged care in Australia 2005–06: a statistical overview* (AIHW 2007b). The number of people aged 65 years and older resident in the community (i.e. home) were then estimated by subtracting the number of residents of aged care facilities from the general population.

ICD-10-AM

This report is based on hospital separations data coded according to the fourth edition of the Australian clinical modification of ICD-10, ICD-10-AM (NCCH 2004).

Selection criteria

Fall cases and inward transfer separations (groups 1 and 2)

Fall cases were defined as all separations which met the following specifications:

- The patient was aged 65 years or older;
- The principal diagnosis was in the range S00–T75 or T79;
- The left-most external cause code was in the range W00–W19; and,
- The mode of admission was not a transfer from another acute hospital.

Diagnoses S00–T75 or T79 have been used to specify 'community injury' in recent NISU reports (e.g. Berry & Harrison 2006). Selection has been based on principal diagnosis because this refers to the condition chiefly accounting for the episode in hospital. The left-most (first-listed) external cause code was chosen as a selection criterion as this is considered to be most highly correlated with principal diagnosis.

Inward transfers from other acute hospitals were omitted from incidence estimates as this reduces multiple counting of cases that generate more than one separation record. This specification is based on recent validation work by NISU (Bradley & Harrison unpublished). The National Hospital Morbidity Database unit records are de-identified and do not contain information relating to a separation's place in a sequence of hospital episodes. As such, a sequence of separations in which an individual is admitted to hospital and then transferred to another hospital results in two (un-linked) unit records. Further, readmissions relating to the same case are not flagged, again generating multiple entries in the database. As such, the number of hospital separations

meeting our definition of injury overestimates the number of injury cases which led to hospitalisation.

Separations with a principal diagnosis S00–T75 or T79, a left-most external cause code W00–W19 and a mode of admission indicating a transfer from another acute hospital, omitted from injury incidence enumeration, were analysed separately as 'falls injury inward transfers' (group 2).

Follow-up care separations due to falls (group 3)

NISU's analysis of person-linked data also suggests that many separations following an episode of care for an injury, particularly for older people with falls injuries, are coded with a principal diagnosis from Chapter XXI of the ICD-10-AM—factors influencing health status and contact with health services. More specifically, most such cases are coded as Z50—care involving use of rehabilitation procedures (see Kreisfeld & Newson 2006). These cases contribute to a non-negligible proportion of the burden of injury due to falls by older people.

In this report, follow-up care separations due to falls were defined as separations which met the following specifications:

- The patient was aged 65 years or older;
- The principal diagnosis was either:
    - Z47 (Other orthopaedic follow-up care),
    - Z48 (Other surgical follow-up care),
    - Z50 (Care involving use of rehabilitation procedures), or
    - Z75.1 (Person awaiting admission to adequate facility elsewhere);
- Any diagnosis variable contained a code in the range S00–T75 or T79; and,
- Any external cause code variable (1–31) contained a code in the range W00–W19.

The principal diagnoses specified above accounted for over 95% of the total number of Z-coded separations containing a W00–W19 code for people 65 years and over.

Other separations related to falls (group 4)

A final group was specified, which includes all separation records containing a diagnosis code for injury (S00–T75 or T79) and an external cause code for an unintentional fall (W00–W19) and which are not included in any of the groups above. This group includes separations where:

- The patient was aged 65 years or older;
- Any diagnosis variable contained a code in the range S00–T75 or T79;
- Any external cause code variable (1–31) contained a code in the range W00–W19;
- The separation was not classed as a fall injury incident case (group 1) or inward transfer (group 2); and,
- The separation was not classed as a fall-related follow-up care separation (group 3).

Most of these 'other fall-related' separations had a principal diagnosis for a non-injury condition. This category also included separations with a principal diagnosis in the range S00–T75 or T79 that had a fall code W00–W19 but not as the left-most external cause and injury separations which had a principal diagnosis from Chapter XXI (factors influencing health status and contact with health services) other than those designated as fall-related follow-up care separations. Some of these additional cases had first external cause codes denoting complications of medical and surgical care.

Table 14: Case selection criteria for fall-related separations for people aged 65 years and older, Australia 2005–06

	Males	Females	Persons
Fall cases (group 1):			
• Principal diagnosis is S00–T75 or T79,			
• First external cause is W00–W19, and			
• Mode of admission is not a transfer from another acute hospital.	19,485	47,299	66,784
Inward transfer separations (group 2):			
• Principal diagnosis is S00–T75 or T79,			
• First external cause is W00–W19, and			
• Mode of admission is a transfer from another acute hospital.	2,334	5,630	7,964
Fall-related follow-up care separations (group 3):			
• Principal diagnosis is Z47, Z48, Z50 or Z75.1, and			
• Any external cause is W00–W19.	6,363	17,048	23,411
'Other fall-related' separations (group 4):			
• Any diagnosis S00–T75 or T79,			
• Any external cause W00–W19,			
• Not an incident case or inward transfer, and			
• Not a rehabilitation separation.	9,003	11,342	20,345
Total number of fall-related separations in 2005–06	**37,185**	**81,319**	**118,504**

Calculation of rates

Age-specific rates were calculated for age groups (five-year bands up to 90–94 years, and a group for ages 95 years and older) using final population estimates as at 31 December 2005 (the mid-point of the financial year). This data was obtained from the AIHW and similar to data presented in the Australian Demographic Statistics series (ABS 2006a).

Population estimates according to Australian Standard Geographical Classification of remoteness are only available from the ABS for the year ending 30 June. Values for 31 December were calculated using the mean of the population estimates for 2005 and 2006 and these were used to compute age-specific rates by remoteness of usual residence for hospitalisation in 2005–06.

The rates of falls occurring in the home and in aged care facilities were calculated using denominator data reflecting the estimated place of residence for the population. Population estimates of residents of aged care facilities were obtained from the AIHW report *Residential aged care in Australia 2005–06: a statistical overview* (AIHW 2007b). The number of people aged 65 years and older resident in the community (i.e. home) were then estimated by subtracting the number of residents of aged care facilities from the general population.

The age distribution of the population aged 65 years and older differs between jurisdictions, remoteness zones and genders, and is changing over time. In this report most rates for the whole age range 65 years and older have been adjusted using the direct method, in order to allow comparisons after accounting for differences in age-composition. The Australian population at 30 June 2001 has been used as the standard.

Small case count issues

Cell counts in Tables that are five cases or fewer have been suppressed to protect patient confidentiality. In the instances where only one cell in a row or column has a count of five or less, all other cells in the same row or column have also been suppressed. Age-based rates have not been calculated using such data.

Errors, inconsistencies and uncertainties

This report uses data collected from state and territory hospitals. After coding and collection from the states and territories, the data are further processed by the AIHW and NISU. The geographical spread of the data and the large number of people involved in its processing increases the risk of inconsistencies across time and place in the data. Variations in reporting and coding continue to exist across jurisdictions, although National Minimum Data Sets have been in place for some considerable amount of time.

As outlined above, incidence is not equivalent to number of hospital separations. Methods to extract actual cases of incidence produce estimates only.

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