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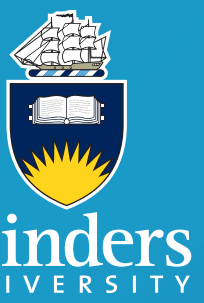
Hospitalisations due to falls by older people, Australia 2008–09



INJURY RESEARCH AND STATISTICS SERIES NUMBER 62

Australian Government
Australian Institute of Health and Welfare

Authoritative information and statistics to promote better health and wellbeing

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Hospitalisations due to falls by older people, Australia

2008–09

Australian Institute of Health and Welfare
Canberra
Cat. no. INJCAT 138

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This publication is part of the Australian Institute of Health and Welfare's Injury research and statistics series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 1444-3791
ISBN 978-1-74249-304-6

Suggested citation
AIHW: Bradley C 2012. Hospitalisations due to falls by older people, Australia 2008–09. Injury research and statistics series no. 62. Cat. no. INJCAT 138. Canberra: AIHW.

Any enquiries about or comments on this publication should be directed to:
Communications, Media and Marketing Unit
Australian Institute of Health and Welfare
GPO Box 570
Canberra ACT 2601
Tel: (02) 6244 1032
Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

Contents

Abbreviations

ABS	Australian Bureau of Statistics
ACHI	Australian Classification of Health Interventions
AIHW	Australian Institute of Health and Welfare
ASGC	Australian Standard Geographical Classification
DoHA	Australian Government Department of Health and Ageing
ICISS	ICD-based injury severity score
NHMD	National Hospital Morbidity Database
NISU	National Injury Surveillance Unit

Symbols

. .	not applicable
n.e.c.	not elsewhere classified
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data
CI	confidence interval
SD	standard deviation
SE	standard error

Summary

This report is the fifth in a series of reports on hospitalisations due to falls by older people in Australia. It focuses on hospitalised falls that occurred in the financial year 2008–09.

Falls in 2008–09

The estimated number of hospitalised injury cases due to falls in people aged 65 and over in 2008–09 was 78,600, more than 4,000 more cases than in 2007–08.

Females accounted for most of the hospitalised fall injury cases and rates of fall cases were higher for females than for males for all age groups. For the first time in this report series, the age-standardised rate of hospitalised fall injuries involving older females exceeded 3,000 per 100,000 population.

About one-third of fall injury cases had injuries to the hip and thigh, and the majority of these were hip fractures. Head injuries accounted for about one in five cases and were more common for males than for females.

Circumstances of falls

As in previous years, a fall on the same level due to slipping, tripping and stumbling was the most common cause of a hospitalised injury while 'other fall on same level' was the second most commonly recorded cause for fall injury cases.

About 70% of hospitalised falls in 2008–09 were recorded as having occurred in either the home or an aged care facility. Most falls in the home were recorded as having occurred in 'other and unspecified' places in the home (52%), although outdoor areas of the home, the bathroom and the bedroom were also common places of occurrence reported for hospitalised falls.

Hospital care

One in every ten days spent in hospital by a person aged 65 and older in 2008–09 was directly attributable to an injurious fall. These episodes of hospital care used 1.2 million patient days over the year and the average total length of stay per fall injury case was estimated to be 15.8 days.

Trends in hospitalised fall-related injury 1999–2009

Age-standardised rates of hospitalised fall-related injury separations have increased over the decade to June 2009, despite a decrease in the rate of hip fractures due to falls.

We estimate that nearly 11,000 more fall injury cases for people aged 65 and older were admitted to hospital in 2008–09 than would have been if the age-standardised rate had remained stable since 1999–00.

Falls resulting in head injuries increased at a particularly high rate over the study period, as did falls described as 'other falls on the same level'. Further, the rate of fall injury transfers and the rate of fall-related follow-up care separations have significantly increased over the study period, as has the rate of patient days used for episodes of fall-related hospital care.

1 Introduction

This report is the fifth in a series of reports on hospitalisations due to falls by people aged 65 and older in Australia. Previous reports have examined hospitalised falls over the period 2003–04 to 2007–08 (Bradley 2012a, 2012b; Bradley & Harrison 2007; Bradley & Pointer 2008). The present report analyses fall-related hospital separations data from the National Hospital Morbidity Database (NHMD) for the financial year 2008–09.

Falls are common among older people and often result in fractures or other serious injuries (Lord et al. 2001; McClure et al. 2005; Sattin 1992; Tinetti et al. 1988). They may have substantial impacts on the older person's health and well-being and may result in loss of independence and admission to residential care (see Chang et al. 2004; Clemson et al. 2008; Hayes et al. 1996; Rubenstein 2006). The Australian Institute of Health and Welfare (AIHW) has estimated that between 21% and 23% of Australians aged 65 and older who separated from hospital due to an injurious fall in 2001–02 (and who left hospital alive) went to residential aged care immediately on leaving hospital. Of these, about 20% were new admissions into permanent care and about 10% were admissions into respite (that is, short-term) residential care (Karmel et al. 2008).

In Australia, an estimated one in three older persons living at home experiences a fall annually (for example, Dolinis et al. 1997; Gill et al. 2005; Lord et al. 1993; NSW Health 2010) and about three in four hospitalised injuries involving older Australians are due to falls (see Bradley & Harrison 2008). Rates of falls increase with age and additional risk factors for falls and fall-related injury include gender, medication use and predisposing medical conditions including Parkinson's disease, osteoporosis, incontinence and vision problems (for example, Chiarelli et al. 2009; Cumming 1998; Lord 2006; Lord et al. 2001; Wood et al. 2002). Social and socio-economic factors can also affect the risk of falls for older people (for example, Dolinis et al. 1997; Gill et al. 2005; West et al. 2004). Further, being admitted to hospital, whether due to either an injurious fall sustained previously or an unrelated condition, also increases an older person's risk of falling (Batchelor et al. 2009; Cameron et al. 2010; Fischer et al. 2005; Foss et al. 2005; Shuto et al. 2010). Importantly, having had one fall is a risk factor for future falls (Pluijm et al. 2006) and developing a fear of falling, which may result in reduced activity levels, can also increase falls risk (for example, Rubenstein 2006).

A substantial proportion of injurious falls involving older people result in hospitalisation (for example, Lord et al. 2001; Tinetti et al. 1988) and the cost to the health system of serious fall-related injuries is considerable (for example, Hall & Hendrie 2003; Tiedemann et al. 2008). Our 2007–08 falls report estimated the total cost of fall-related acute episodes of hospital care for older people at $648.2 million (Bradley 2012b). Further, estimates of the costs associated with injurious falls that include 'lifetime' costs (that is, indirect costs such as lost production due to incapacitation or premature death or costs borne by the family or community) exceed $1 billion per year (Moller 2003; see also Potter-Forbes & Aisbett 2003).

This report

This report examines all NHMD records for people aged 65 and older that included both a community injury diagnosis (S00–T75 or T79) and an external cause code signifying an unintentional fall (W00–W19) in the financial year 2008–09. These codes could appear anywhere within the record (that is, analysis was not restricted to records that had a

principal diagnosis indicating that the injury was the chief reason for the episode of hospital care). This report also includes an analysis of NHMD records for people aged 65 and older that included the diagnosis code R29.6 (tendency to fall, not elsewhere classified).

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

1. the annual incidence of new cases
2. the burden to the hospital system (that is, the additional admitted patient episodes of fall-related care, the health interventions undertaken and the patient days attributed to these separations) and
3. the trends for fall-related hospital care over the period July 1999 to June 2009.

The structure of this report is similar to that of reports for previous years however. Chapter Two presents the estimated annual incidence of fall events resulting in injury and hospitalisation in 2008–09 for people aged 65 and older while Chapter Three describes the characteristics of these fall injury cases, including the mechanism and circumstances (place of occurrence, activity) of the event.

Chapter Four discusses the burden to the hospital system due to fall-related episodes of admitted patient care. The section briefly describes a set of separations omitted from Chapters Two and Three; the hospital records that meet our definition of an incident case, but have been generated through an admitted patient's 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 Four also presents estimates of additional hospital episodes involving fall-related injuries for people aged 65 and older in 2008–09, principally admitted patient care that can be characterised as either 'fall-related follow-up care' or 'other fall-related' hospital separations. Analysis of records containing the R29.6 (tendency to fall) diagnosis is also included in Chapter Four however. The nature of these separations and their relationship to injurious falls are not fully understood and will not be until robust condition onset information or sufficient (that is, national or near to it) person-linked data become available for analysis. Nevertheless, it seems appropriate to include these separations as a component of the fall-related burden to the Australian hospital system.

Continuing our assessment of the burden to the hospital system due to falls by older Australians, Chapter Five provides an overview of the health interventions (procedures) recorded for fall-related episodes of care while Chapter Six presents a short analysis of the length of stay for fall-related episodes of care. Chapter 7 presents a detailed analysis of rates of fall-related hospitalisations since the national use of the ICD-10-AM from July 1999, building on work undertaken in the 2005–06 and 2006–07 editions of this report series (Bradley 2012a; Bradley & Pointer 2008).

Unlike previous reports, the present report does not analyse the costs of fall-related hospital care. Readers are directed to the previous two reports in the series for this information (Bradley 2012a, 2012b).

Confidence intervals around single estimates are provided in some figures to show non-sampling variation. Confidence intervals are also provided for estimated trends in rates, which are also subject to non-sampling variation. In both instances, variation can be large when case numbers are small. Further information is provided in Data Issues.

2 Fall injury incidence

This chapter presents the estimated annual incidence of fall events resulting in injury and hospitalisation in 2008–09 for people aged 65 and older.

During 2008–09, nearly 3 million hospital separations in Australia were generated by people aged 65 and older (AIHW 2010a). Of these, 114,591 (3.7%) had a principal diagnosis in the range S00–T75 or T79, denoting community injury (that is, excluding injuries sustained in the context of surgical and medical care or sequelae of injury). More than three-quarters of these injury separations (76.6%, *n* = 87,818) also had a first external cause code in the range W00–W19, denoting an unintentional fall (Table 2.1).

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 the NHMD by excluding any separation meeting the specified selection criteria that also has a mode of admission denoting 'transfer from another hospital' (see Appendix). This method accounts for transfers between hospitals but not re-admissions, if these are also recorded as injuries due to a fall.

Calculated in this way, the estimated number of hospitalised injury cases due to falls in people aged 65 and over in 2008–09 was 78,606. This was 4,192 (5.6%) more cases than in 2007–08 (see Bradley 2012b). As in previous years, these 78,606 fall injury cases accounted for 2.6% of all hospital separations for the population aged 65 and older in the study period (Table 2.1).

Table 2.1: Key indicators for hospital separations of people aged 65+, Australia 2008–09

Key indicators	Males	Females	Persons[(b)]
All hospital separations 2008–09, aged 65+[(a)]	1,547,527	1,446,747	2,994,282
Principal diagnosis S00–T75 or T79	39,552	75,039	114,591
Principal diagnosis S00–T75 or T79 & external cause W00-W19	26,369	61,449	87,818
Estimated fall injury cases	23,567	55,039	78,606
As percentage of all hospital separations aged 65+	1.5%	3.8%	2.6%
As percentage of all S00–T75 or T79 injuries aged 65+	59.6%	73.3%	68.6%
Mean length of stay for fall injury cases: days (SD)	7.2 (10.2)	7.4 (15.9)	7.4 (14.4)
Total bed-days, fall injury cases	169,874	409,386	579,260
As percentage of all hospital patient days aged 65+	2.9%	6.3%	4.7%

(a) Data source: *Australian hospital statistics 2008–09* (AIHW 2010a).

(b) Persons totals include separations for which sex was not reported.

The age-standardised rate of fall injury cases for people aged 65 and older in 2008–09 was 2,573 per 100,000 population, a slightly higher figure than that estimated for 2007–08 (2,516 per 100,000, see Bradley 2012b). This is a 2.2% increase in the age-standardised rate, consistent with that estimated in the 2006–07 report in this series (Bradley 2012a).

Age and sex

Females aged 65 and older sustained a greater number of hospitalised fall injuries than males, constituting 70.0% of the cases in 2008–09 (n = 55,039). Further, the age-standardised rate of hospitalised falls for older females is now more than 3,000 per 100,000 population (3,055 per 100,000), continuing the steady increase observed since 1999–00. This compares with 1,906 per 100,000 population for fall cases involving males aged 65 and older—a male:female (M:F) rate ratio of 0.6 hospitalised falls for males for every female case, as in 2007–08.

Females aged 65 and older who were hospitalised due to an injurious fall were significantly older than the males similarly hospitalised (Mann Whitney U test, $p < 0.001$): females were aged 82.5 years (± 8.0 SD) on average, and males 80.4 years (± 8.0 SD). Overall, the mean age of all persons aged 65 and older hospitalised due to an injurious fall was 81.9 years (± 8.0 SD).

Age-specific rates of fall injury cases increase markedly with age. In 2008–09 the highest rate observed for hospitalised cases was for persons aged 95 and older; 12,242 cases per 100,000 population. Notably, this the lowest rate observed for this age group since 2003–04 (see Bradley 2012a, 2012b; Bradley & Harrison 2007; Bradley & Pointer 2008). Figure 2.1 describes the age-specific rates of fall injury cases for males and females aged 65 and older. The rate of fall injury cases was markedly higher for females than males in all age groups. This difference was greatest for people aged 75–79, for whom the M:F rate ratio was 0.57 to 1.00 (that is, hospitalised falls involving females were nearly twice as common as those involving males).

Figure 2.1 also demonstrates that the rate of serious falls increases substantially after the age of 75 for both sexes. Convention maintains that fall injury indicators include all people aged 65and older. Following Pointer et al. (2003), however, we also report age-standardised rates of fall injury cases specifically for the population aged 75 and older. In this older aged population, the rate of fall injury cases was almost double that for the population aged 65 and older—4,369 per 100,000 population (females: 5,151 per 100,000; males: 3,199 per 100,000).

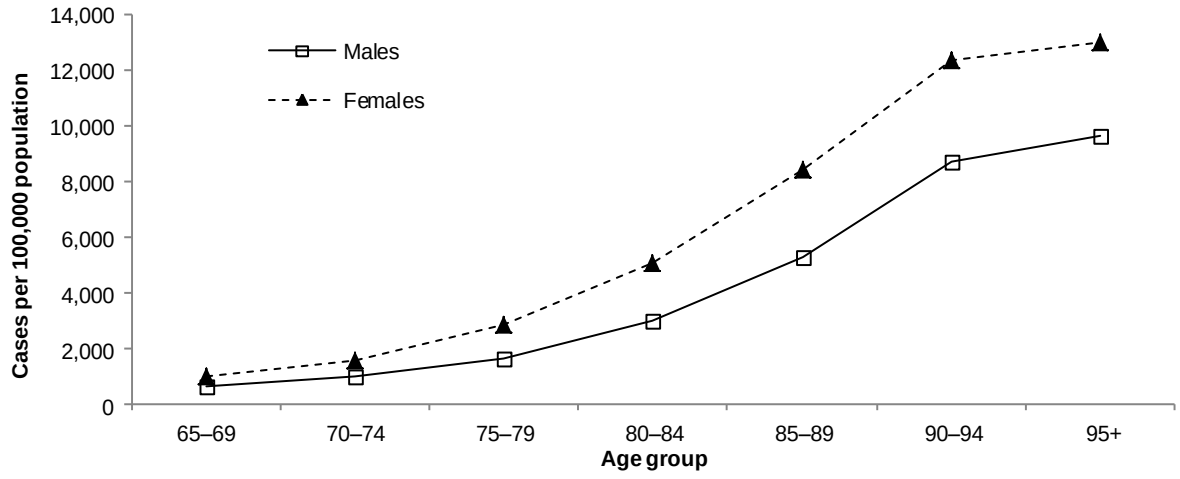


Figure 2.1 Age-specific rates of fall injury cases; males and females aged 65+, Australia 2008–09

Injury type

As in previous years, the largest proportion of fall injury cases for both males and females resulted in injuries to the hip and thigh (Table 2.2). Fractures of the neck of the femur (also commonly called hip fractures; cases with a principal diagnosis of S72.0–S72.2) accounted for the majority of injuries to the hip and thigh (74.0%). Injuries to the hip and thigh, and fractures of the neck of the femur, were proportionately more common for females than males. The proportion of persons with a principal diagnosis of an injury to the hip and thigh in 2008–09 was slightly lower than that in previous years (29.2%, compared with 30.0%–33.5%), continuing the declining trend for rates of hip fracture observed since 1999–00 (Bradley 2012a; see also Cassell & Clapperton 2008; Dowling & Finch 2009).

Injuries to the head were the second most common type of principal diagnosis for both males and females, constituting 19.1% of all fall cases. Again, this is a rise in proportion compared with previous years and is consistent with a significant increasing trend in rates for fall-related head injury cases since 1999–00 (approximately 7% increase annually, see Bradley 2012a). Unlike hip fractures, however, the proportion of males who suffered head injuries due to a fall was much higher (25.2%) than for females (16.5%).

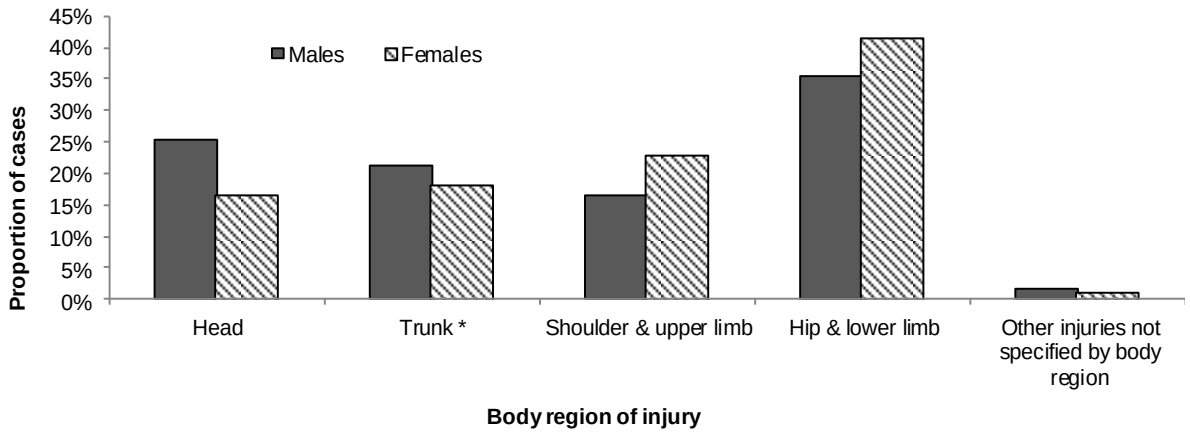
Table 2.2: Principal diagnosis injury types for fall injury cases; males, females and persons aged 65+, Australia 2008–09

Principal diagnosis	Males	Females	Persons
Injuries to the head	5,937 (25.2%)	9,074 (16.5%)	15,011 (19.1%)
Injuries to the neck	471 (2.0%)	595 (1.1%)	1,066 (1.4%)
Injuries to the thorax	2,103 (8.9%)	2,942 (5.3%)	5,045 (6.4%)
Injuries to the abdomen, lower back, lumbar spine & pelvis	2,410 (10.2%)	6,395 (11.6%)	8,805 (11.2%)
Injuries to the shoulder & upper arm	1,944 (8.2%)	5,477 (10.0%)	7,421 (9.4%)
Injuries to the elbow & forearm	1,355 (5.7%)	6,259 (11.4%)	7,614 (9.7%)
Injuries to the wrist & hand	583 (2.5%)	839 (1.5%)	1,422 (1.8%)
Fractured neck of femur	4,527 (19.2%)	12,476 (22.7%)	17,003 (21.6%)
Other hip & thigh injuries	1,714 (7.3%)	4,260 (7.7%)	5,974 (7.6%)
Total injuries to the hip & thigh	*6,241 (26.5%)*	*16,736 (30.4%)*	*22,977 (29.2%)*
Injuries to the knee & lower leg	1,823 (7.7%)	5,317 (9.7%)	7,140 (9.1%)
Injuries to the ankle & foot	282 (1.2%)	784 (1.4%)	1,066 (1.4%)
Injuries involving multiple body regions	38 (0.2%)	41 (0.1%)	79 (0.1%)
Injuries to unspecified parts of trunk, limb or body region	233 (1.0%)	394 (0.7%)	627 (0.8%)
Burns	n.p. (0.0%)	n.p. (0.0%)	n.p. (0.0%)
Poisoning by drugs, medicaments & biological substances	n.p. (0.0%)	n.p.(0.0%)	n.p. (0.0%)
Other & unspecified effects of external causes	32 (0.1%)	51 (0.1%)	83 (0.1%)
Certain early complications of trauma	113 (0.5%)	134 (0.2%)	247 (0.3%)
Total	**23,567 (100%)**	**55,039 (100%)**	**78,606 (100%)**

n.p. Small cell counts have been suppressed to prevent patient identification.

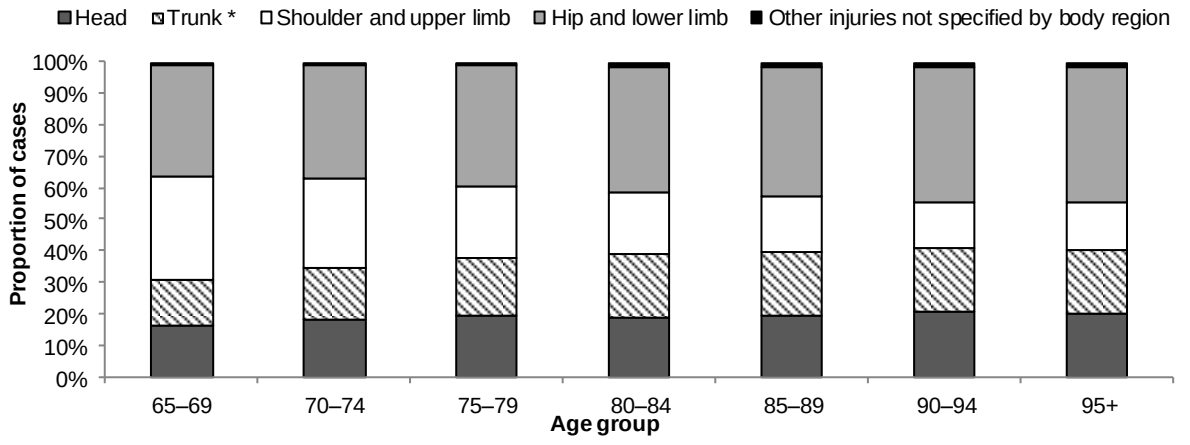
Presenting a similar picture to that observed in previous reports, Figure 2.2 highlights the differences in the types of injury that were sustained by males and females aged 65 and older in 2008–09. Males sustained proportionately more injuries to the head and trunk regions while females sustained proportionately more injuries to the shoulder and upper limbs and to the hip and lower limbs.

Figure 2.3 describes the body region injured for falls injury cases for all people aged 65 and older in 2008–09, according to five-year age groups. Of most interest, the proportion of injuries to the shoulder and upper limbs declined with increasing age while the proportion of injuries to all other body regions increased.



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

Figure 2.2: Major body region injured according to the principal diagnosis for fall injury cases; males and females 65+ years, Australia 2008–09



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

Figure 2.3: Major body region injured according to the principal diagnosis by age; fall injury cases involving people aged 65+, Australia 2008–09

Fractures

Two-thirds (61.5%, *n* = 48,373) of people aged 65 and older who were hospitalised due to an injurious fall in 2008–09 sustained at least one fracture. This was a slight decrease from the proportion observed in previous years. The number of fractures present in the multiple diagnosis fields of the case separations in 2008–09 ranged from 0 (38.5%, *n* = 30,233) to 11 (*n* = 1). Most people hospitalised due to a fall injury sustained a single fracture (53.5%, *n* = 42,059) and a higher proportion of females than males sustained fractures (65.5% versus 52.2%, respectively).

As observed in previous years, 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 in the record; 82.5% (*n* = 6,281) and 81.9% (*n* = 18,829), respectively (see Table 2.3). Injuries to the hip and thigh accounted for the greatest proportion of all fracture-related fall injury cases, about two in every five such injuries (38.9%). The vast majority of these hip and thigh cases (90.3%) had a principal diagnosis of fractured neck of femur.

Fracture-related fall injury cases that had a principal diagnosis of fractured neck of femur (*n* = 17,003) occurred at an age-standardised rate of 546 per 100,000 population in 2008–09, a lower rate than those observed in previous years. Females aged 65 and older in 2008–09 had a higher rate of fall-related fractured neck of femur (665 cases per 100,000) than males (373 per 100,000). Age-specific rates of fall-related fractured neck of femur injuries were highest for people aged 95 and older; 3,338 per 100,000 population, compared with 90 per 100,000 for people aged 65–69.

Table 2.3: Principal diagnosis injury type for fall injury cases involving fractures: males, females and persons aged 65+, Australia 2008–09

Principal diagnosis	Males	Females	Persons	Per cent of case type
Injuries to the head	871 (7.1%)	1,429 (4.0%)	2,300 (4.8%)	15.3%
Injuries to the neck	283 (2.3%)	387 (1.1%)	670 (1.4%)	62.9%
Injuries to the thorax	1,542 (12.5%)	2,171 (6.0%)	3,713 (7.7%)	73.6%
Injuries to the abdomen, lower back, lumbar spine & pelvis	1,453 (11.8%)	4,722 (13.1%)	6,175 (12.8%)	70.1%
Injuries to the shoulder & upper arm	1,122 (9.1%)	4,038 (11.2%)	5,160 (10.7%)	69.5%
Injuries to the elbow & forearm	743 (6.0%)	5,538 (15.4%)	6,281 (13.0%)	82.5%
Injuries to the wrist & hand	237 (1.9%)	431 (1.2%)	668 (1.4%)	47.0%
Fractured neck of femur	4,527 (36.8%)	12,476 (34.6%)	17,003 (35.1%)	100%
Other hip & thigh injuries	416 (3.4%)	1,410 (3.9%)	1,826 (3.8%)	30.6%
Total injuries to the hip & thigh	*4,943 (40.2%)*	*13,886 (38.5%)*	*18,829 (38.9%)*	*81.9%*
Injuries to the knee & lower leg	939 (7.6%)	3,066 (8.5%)	4,005 (8.3%)	56.1%
Injuries to the ankle & foot	150 (1.2%)	379 (1.1%)	529 (1.1%)	49.6%
Other diagnoses	19 (0.2%)	24 (0.1%)	43 (0.1%)	4.2%
Total	**12,302 (100%)**	**36,071 (100%)**	**48,373 (100%)**	

While the rate of hospitalised fall injury cases involving fractures increased with age (Figure 2.4), fracture cases represented a smaller proportion of all fall injury cases at older ages: they accounted for 66.6% of all fall injury cases for those aged 65–69 but only 57.9% of such cases for those aged 95 and older. However, Figure 2.4 also shows that the rate of hip fractures increased as a proportion of all fall-related fracture cases.

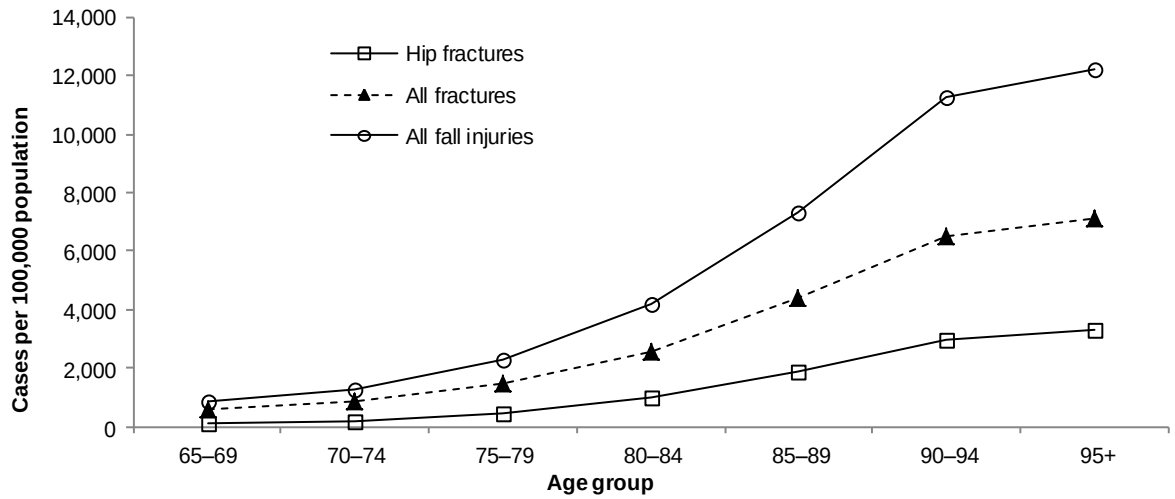


Figure 2.4: Age-specific rates of fall injury cases; hip fractures, all fractures and all fall injuries. Persons aged 65+, Australia 2008–09

The age-related proportionate decrease in fall injury cases involving fractures can be seen to be largely driven by decreases in the proportion of fracture-related falls injuries for females, as the proportion of cases involving fractures remained fairly consistent for males (Figure 2.5).

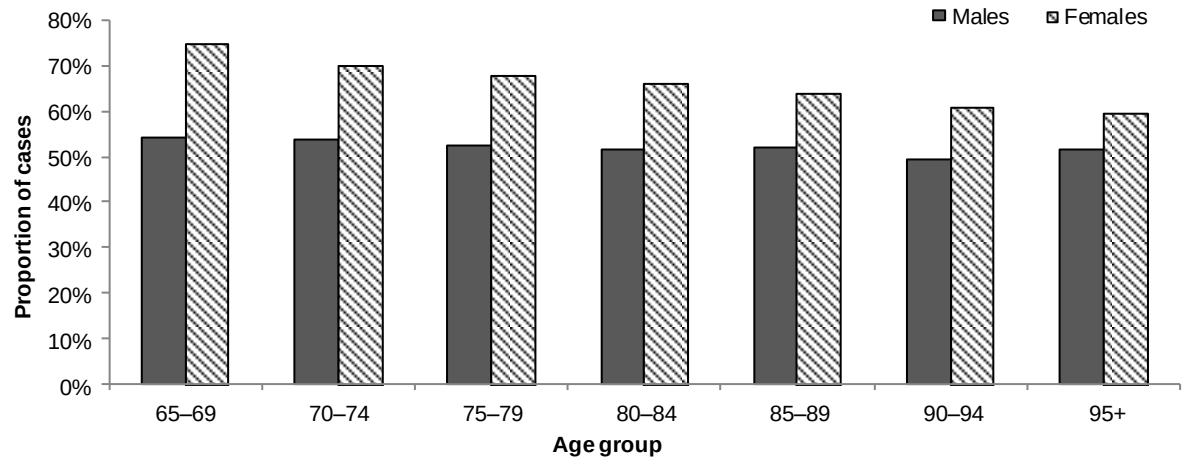


Figure 2.5: Fall injury cases having one or more fracture diagnosis as a proportion of the total number of hospitalised cases; males and females aged 65+, Australia 2008–09

Severity

An ICD-based injury severity score (ICISS) of less than 0.941 is considered to represent a high threat to life (see Henley & Harrison 2009; Stephenson et al. 2003). On the basis of the injury diagnoses contained within the records for all fall injury cases, not just fracture cases, the average ICISS score (multiplicative method) was 0.938 (± 0.080 SD).

Geographical distribution

State or territory of usual residence

Age-standardised rates of hospitalised fall injury cases for people aged 65 and older in 2008–09 varied according to the jurisdiction of the person's usual residence (Figure 2.6). Older residents of Western Australia, South Australia, Tasmania and the Northern Territory all had rates of hospitalised fall injuries significantly lower than that for Australia as a whole. Conversely, older residents of New South Wales, Victoria and the Australian Capital Territory had rates of hospitalised fall injuries significantly higher than that for Australia as a whole. This is largely similar to the patterns observed in previous years (for example, Bradley 2012a, 2012b).

Rates of hospitalised fall injuries involving females aged 65 and older in 2008–09 were significantly higher than those for males in all jurisdictions. The highest age-standardised rate for females was observed for residents of the Australian Capital Territory (3,434 per 100,000 population) and the lowest for Tasmanians (2,304 per 100,000). Similarly, the highest rate observed for males was for residents of the Australian Capital Territory (2,314 per 100,000) and the lowest for Tasmanians (1,444 per 100,000).

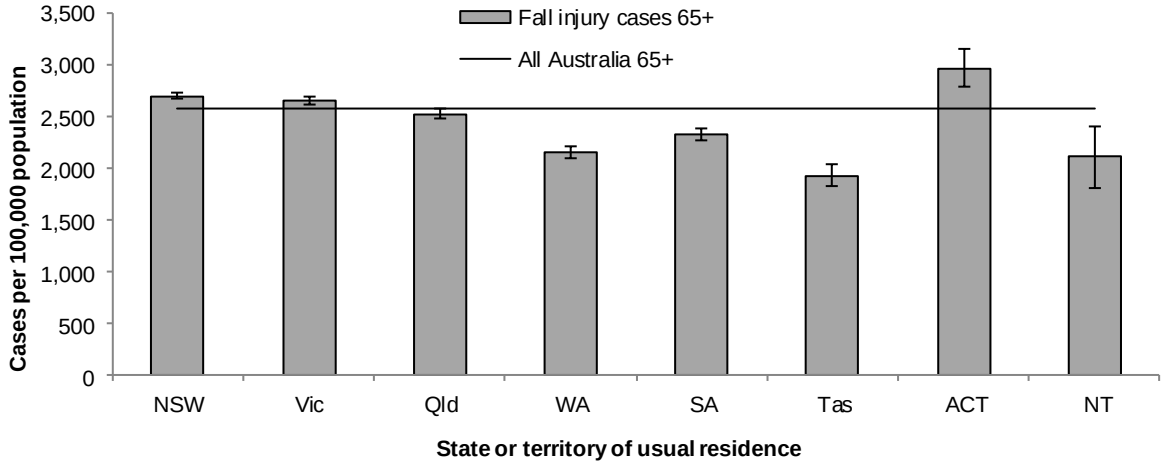


Figure 2.6: Age-standardised rates of fall injury cases (± 95% CI) by state or territory of usual residence, persons aged 65+ 2008–09

Age-standardised rates of hip fracture (principal diagnoses S72.0– S72.2) varied to a lesser degree by jurisdiction of residence than all fall injury cases (Figure 2.7). For most jurisdictions, 95% confidence intervals for the rates crossed, or approached, the national rate,

suggesting that there is not a substantial difference between these rates of hospitalised hip fractures. The exception to this was the hip fracture rate for Western Australia, which was significantly lower than the national rate. The pattern of rates of hip fracture across the jurisdictions does not closely reflect that for all hospitalised falls (that is, Figure 2.6).

Similar to all fall cases, rates of hospitalised hip fractures for females aged 65 and older in 2008–09 were higher than those for males in all jurisdictions except the Northern Territory (largely due to small case numbers).

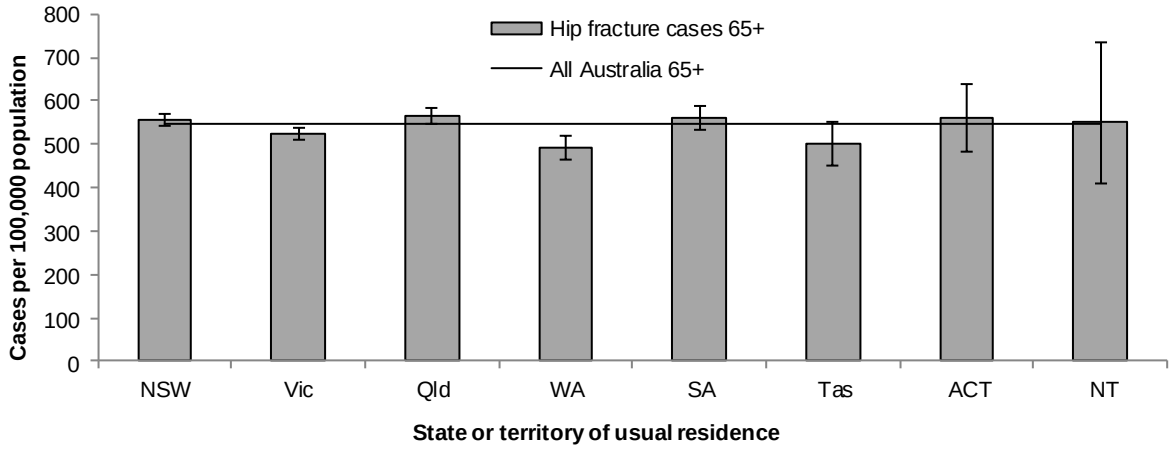


Figure 2.7: Age-standardised rates of hip fracture cases (± 95% CI) by state or territory of usual residence, persons aged 65+ 2008–09

Remoteness of usual residence

Age-standardised rates of hospitalised falls involving people aged 65 and older in 2008–09 were calculated according to the Australian Standard Geographical Classification (ASGC) of the remoteness of the place of usual residence (ABS 2009b). Rates were similar for all remoteness zones, although rates for *Inner regional* (2,432 per 100,000 population) and *Very remote* (2,200 per 100,000) regions were lower than the national rate (Figure 2.8). As in 2007–08, however, the rate of fall injury cases for *Very remote* regions was not substantially lower than the rates in most other regions (as indicated by the confidence intervals).

Figure 2.9 presents rates of hip fracture due to falls in older people by remoteness of residence for 2008–09. It shows a relatively low rate (455 per 100,000 population) for residents of *Very remote* areas and a relatively high rate (617 per 100,000) for residents of *Remote* areas. This is unlike the pattern observed in 2007–08 but more like that of previous years (for example, Bradley 2012a, 2012b). Nevertheless, the confidence intervals surrounding these rates suggest that there are not any significant differences between the five regions.

The observation of low rates of hospitalised falls (and hip fractures) for residents of *Very remote* areas is of interest for two reasons; firstly, injury rates are usually much higher for residents of the more remote regions of Australia (see Bradley & Harrison 2008) and, secondly, a similar pattern has been observed for rates of osteoporosis diagnoses in the Australian population (see AIHW 2011b). The drivers of these observations are unknown. As previously, we propose that the lower rates of hospitalised fall injuries for older residents of

Very remote areas may be due to such factors as the proximity to health services (for example, maybe only the most serious fall injuries are admitted to hospital if the person lives some distance from health services), a 'survivor effect' (for example, it is possible that only the most healthy, robust individuals remain living in *Very remote* regions in older age), or a 'non-survivor effect' (whereby serious falls in older people in *Very remote* locations may result in the person's death before they can reach hospital). Further exploration of the relationship between remoteness of residence, osteoporosis diagnoses and serious fall injury would be of interest.

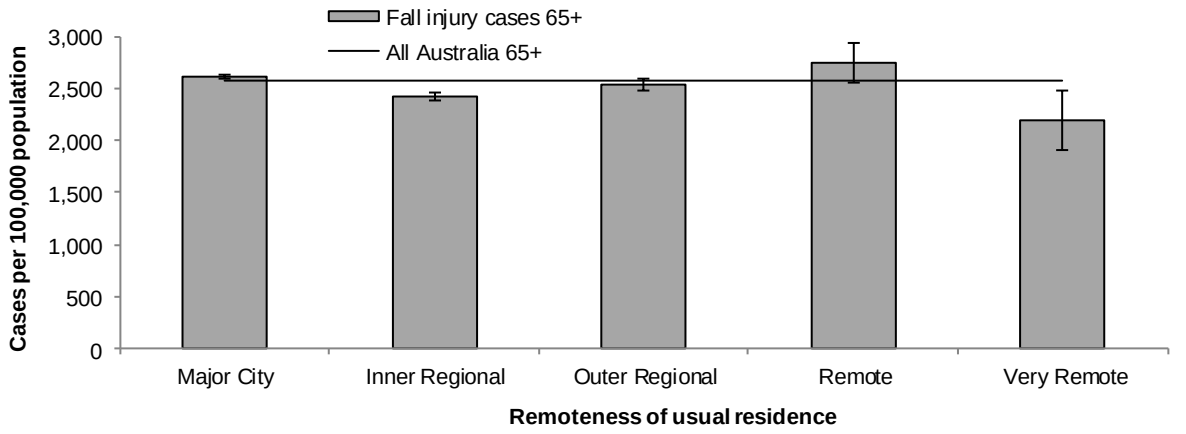


Figure 2.8: Age-standardised rates of fall injury cases (± 95% CI) by remoteness of usual residence, persons aged 65+ 2008–09

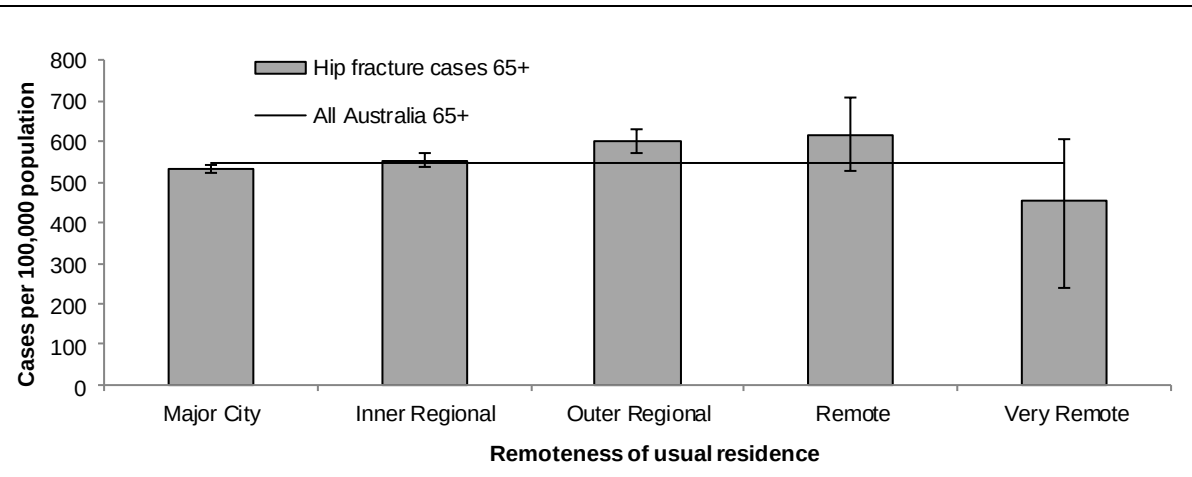


Figure 2.9: Age-standardised rates of hip fracture cases (± 95% CI) by remoteness of usual residence, persons aged 65+ 2008–09

3 Circumstances of fall injury cases

This chapter describes the circumstances of occurrence of the hospitalised fall injury cases for people aged 65 and older in 2008–09 (those included in Chapter 2).

The 2008–09 data-year was the first to be coded to the sixth edition of the ICD-10-AM. In this edition, a number of subcategories were added to the place of occurrence coding describing specific areas of the home (the bathroom, for example, or the bedroom. See NCCH 2008). The subcategory coding for fall external causes remains as it was in the previous edition, when several falls categories were substantially expanded (NCCH 2006, 2008).

As in previous years, the most common cause of hospitalised fall injury cases for people aged 65 and older in 2008–09 were falls on the same level from slipping, tripping and stumbling (32.2%, see Table 3.1). Slips, trips and stumbles were proportionately more common for females than for males and, for both sexes, most of these types of fall (63.7%) were explicitly attributed to tripping. Similarly, 'unspecified falls' (accounting for 28.9% of cases) and 'other falls on same level' (20.0%) remained the second- and third-most common types of injurious fall resulting in the hospitalisation of people aged 65 and over in 2008–09. Most 'other falls on same level' were coded to the other or unspecified categories (93.7% of the 15,737 cases) and relatively few cases were coded as falls due to bumping into objects, on or from toilets or falls in or into bathtubs or showers (not resulting in drowning).

Table 3.1: Causes of hospitalised fall injury cases: first external cause code[(a)] for males, females and persons aged 65+, Australia 2008–09

External cause	Males	Females	Persons
Fall on same level involving ice & snow (W00)	8 (0.0%)	7 (0.0%)	15 (0.0%)
Fall on same level from slipping (W01.0)	1,702 (7.2%)	4,993 (9.1%)	6,695 (8.5%)
Fall on same level from tripping (W01.1)	4,164 (17.7%)	11,989 (21.8%)	16,153 (20.5%)
Fall on same level from stumbling (W01.2)	778 (3.3%)	1,720 (3.1%)	2,498 (3.2%)
Total fall on same level from slipping, tripping & stumbling (W01)	*6,644 (28.2%)*	*18,702 (34.0%)*	*25,346 (32.2%)*
Fall involving roller-skates, skateboards etc.	15 (0.1%)	15 (0.0%)	30 (0.0%)
Fall involving other & unspecified pedestrian conveyance (W02.9)	160 (0.7%)	165 (0.3%)	325 (0.4%)
Total fall involving pedestrian conveyances (W02)	*175 (0.7%)*	*180 (0.3%)*	*355 (0.5%)*
Other fall on same level due to collision with another person (W03)	46 (0.2%)	169 (0.3%)	215 (0.3%)
Fall while being carried or supported by other persons (W04)	4 (0.0%)	22 (0.0%)	26 (0.0%)
Fall involving wheelchair (W05)	219 (0.9%)	343 (0.6%)	562 (0.7%)
Fall involving special purpose bed (W06.1)	117 (0.5%)	245 (0.4%)	362 (0.5%)
Fall involving conventional bed (W06.6)	131 (0.6%)	380 (0.7%)	511 (0.7%)
Fall involving unspecified bed (W06.9)	766 (3.3%)	1,783 (3.2%)	2,549 (3.2%)
Fall involving other types of beds	23 (0.1%)	53 (0.1%)	76 (0.1%)
Total fall involving bed (W06)	*1,037 (4.4%)*	*2,461 (4.5%)*	*3,498 (4.5%)*

(continued)

Table 3.1: (continued): Causes of hospitalised fall injury cases: first external cause code[(a)] for males, females and persons aged 65+, Australia 2008–09

External cause	Males	Females	Persons
Fall involving stool (W07.3)	76 (0.3%)	188 (0.3%)	264 (0.3%)
Fall involving bath chair (W07.5)	24 (0.1%)	46 (0.1%)	70 (0.1%)
Fall involving commode chair (W07.6)	11 (0.0%)	125 (0.2%)	136 (0.2%)
Fall involving lift assistance chair (W07.7)	7 (0.0%)	18 (0.0%)	25 (0.0%)
Fall involving unspecified chair (W07.9)	438 (1.9%)	1,030 (1.9%)	1,468 (1.9%)
Fall involving other types of chairs	179 (0.8%)	400 (0.7%)	579 (0.7%)
Total fall involving chair (W07)	*735 (3.1%)*	*1,807 (3.3%)*	*2,542 (3.2%)*
Fall involving other furniture (W08)	69 (0.3%)	142 (0.3%)	211 (0.3%)
Fall involving playground equipment (W09)	n.p. (0.0%)	n.p. (0.0%)	10 (0.0%)
Fall on & from stairs & steps (W10)	1,515 (6.4%)	3,343 (6.1%)	4,858 (6.2%)
Fall on & from ladder (W11)	996 (4.2%)	281 (0.5%)	1,277 (1.6%)
Fall on & from scaffolding (W12)	n.p. (0.1%)	n.p. (0.0%)	30 (0.0%)
Fall from or through balcony or verandah (W13.0)	47 (0.2%)	37 (0.1%)	84 (0.1%)
Other & unspecified falls from … building or structure	242 (1.0%)	82 (0.1%)	324 (0.4%)
Total fall from, out of or through building or structure (W13)	*289 (1.2%)*	*119 (0.2%)*	*408 (0.5%)*
Fall from tree (W14)	41 (0.2%)	7 (0.0%)	48 (0.1%)
Fall from cliff (W15)	43 (0.2%)	28 (0.1%)	71 (0.1%)
Diving or jumping into water … other than drowning (W16)	n.p. (0.1%)	n.p. (0.0%)	15 (0.0%)
Other fall from one level to another (W17)	336 (1.4%)	348 (0.6%)	684 (0.9%)
Fall from bumping against object (W18.0)	50 (0.2%)	97 (0.2%)	147 (0.2%)
Fall from or off toilet (W18.1)	122 (0.5%)	480 (0.9%)	602 (0.8%)
Fall in or into bathtub or shower (W18.2)	77 (0.3%)	173 (0.3%)	250 (0.3%)
Other specified fall on same level (W18.8)	1,201 (5.1%)	2,859 (5.2%)	4,060 (5.2%)
Unspecified fall on same level (W18.9)	3,073 (13.0%)	7,605 (13.8%)	10,678 (13.6%)
Total other fall on same level (W18)	*4,523 (19.2%)*	*11,214 (20.4%)*	*15,737 (20.0%)*
Unspecified fall (W19)	6,842 (29.0%)	15,856 (28.8%)	22,698 (28.9%)
Total	**23,567 (100%)**	**55,039 (100%)**	**78,606 (100%)**

n.p. Small cell counts have been suppressed to prevent patient identification.

(a) Some (fourth-character) categories have been combined due to small case counts.

Place of occurrence

As in previous years, half of all hospitalised fall injury cases involving people aged 65 and older in 2008–09 occurred in the home, including the driveway to the home (48.7%, see Table 3.2). Unlike previous years, however, the latest edition of the ICD-10-AM provided subcategory coding to describe the specific location of falls in the home, in addition to the driveway subcategory introduced in previous editions. As observed for other expansions of ICD-10-AM coding (for example, falls external cause coding in the fifth edition ICD-10-AM, see Bradley 2012a), the majority of cases were coded to 'other and unspecified' place in the home category (51.8%, *n* = 19,848). Even so, 13.6% of falls recorded as occurring in the home were reported to have occurred in outdoor areas of the home (*n* = 5,207) and 10.7% were

reported to have occurred in the bathroom of the home (n = 4,111). A further 9.1% of falls in the home were reported to have occurred in the bedroom (n = 3,481).

Figure 3.1 shows that cases involving males were proportionately more common in areas outside of the home (the driveway, garage and outdoor areas) while falls involving females were proportionately more common in areas within the home itself (the bathroom, kitchen, laundry etc.).

Aged care facilities were the reported place of occurrence for a further 22.2% of hospitalised fall injury cases in 2008–09. A greater proportion of cases involving females were reported to have occurred in aged care facilities (24.0%, n = 13,189) than for males (18.0%, n = 4,231).

Place of occurrence was not specified in 16.6% of records for fall injury cases in 2008–09 (n = 13,063) and not reported for a further 16. Omitting these separations from the analysis, five in every six fall injury cases with a *specified* place of occurrence (85.0%) were reported to have happened in either the home or an aged care facility (58.5% and 26.6%, respectively).

Table 3.2: Place of occurrence for fall injury cases; males, females and persons aged 65+, Australia 2008–09

Place of occurrence	Males	Females	Persons	Per cent specified
Driveway to home	289 (1.2%)	483 (0.9%)	772 (1.0%)	1.2%
Outdoor areas	1,820 (7.7%)	3,387 (6.2%)	5,207 (6.6%)	7.9%
Garage	193 (0.8%)	169 (0.3%)	362 (0.5%)	0.6%
Bathroom	1,158 (4.9%)	2,953 (5.4%)	4,111 (5.2%)	6.3%
Kitchen	589 (2.5%)	1,907 (3.5%)	2,496 (3.2%)	3.8%
Bedroom	904 (3.8%)	2,577 (4.7%)	3,481 (4.4%)	5.3%
Laundry	36 (0.2%)	176 (0.3%)	212 (0.3%)	0.3%
Indoor living areas, n.e.c.	502 (2.1%)	1,314 (2.4%)	1,816 (2.3%)	2.8%
Other & unspecified place in home	5,977 (25.4%)	13,871 (25.2%)	19,848 (25.2%)	30.3%
Total home & driveway	*11,468 (48.7%)*	*26,837 (48.8%)*	*38,305 (48.7%)*	58.5%
Aged care facilities	4,231 (18.0%)	13,189 (24.0%)	17,420 (22.2%)	26.6%
Other & unspecified residential institutions	93 (0.4%)	223 (0.4%)	316 (0.4%)	0.5%
Total residential institutions	*4,324 (18.3%)*	*13,412 (24.4%)*	*17,736 (22.6%)*	27.1%
School	9 (0.0%)	31 (0.1%)	40 (0.1%)	0.1%
Health service area	418 (1.8%)	752 (1.4%)	1,170 (1.5%)	1.8%
Other specified institution & public administrative area	103 (0.4%)	299 (0.5%)	402 (0.5%)	0.6%
Total specified institution & public administrative area	*530 (2.2%)*	*1,082 (2.0%)*	*1,612 (2.1%)*	2.5%
Sports & athletic areas	142 (0.6%)	225 (0.4%)	367 (0.5%)	0.6%
Roadway	325 (1.4%)	539 (1.0%)	864 (1.1%)	1.3%
Footpath	778 (3.3%)	1,588 (2.9%)	2,366 (3.0%)	3.6%
Other & unspecified public highway, street or road	59 (0.3%)	106 (0.2%)	165 (0.2%)	0.3%
Total public highway, street or road	*1,162 (4.9%)*	*2,233 (4.1%)*	*3,395 (4.3%)*	5.2%

(continued)

Table 3.2 (continued): Place of occurrence for fall injury cases; males, females and persons aged 65+, Australia 2008–09

Place of occurrence	Males	Females	Persons	Per cent specified
Shop & store	342 (1.5%)	1,164 (2.1%)	1,506 (1.9%)	2.3%
Cafe, hotel & restaurant	280 (1.2%)	451 (0.8%)	731 (0.9%)	1.1%
Other & unspecified trade & service area	166 (0.7%)	275 (0.5%)	441 (0.6%)	0.7%
Total trade & service area	*788 (3.3%)*	*1,890 (3.4%)*	*2,678 (3.4%)*	4.1%
Industrial & construction area	48 (0.2%)	13 (0.0%)	61 (0.1%)	0.1%
Farm	74 (0.3%)	34 (0.1%)	108 (0.1%)	0.2%
Areas of water	25 (0.1%)	20 (0.0%)	45 (0.1%)	0.1%
Beach	67 (0.3%)	72 (0.1%)	139 (0.2%)	0.2%
Forest	26 (0.1%)	37 (0.1%)	63 (0.1%)	0.1%
Other specified countryside	12 (0.1%)	24 (0.0%)	36 (0.0%)	0.1%
Parking lot	86 (0.4%)	201 (0.4%)	287 (0.4%)	0.4%
Other specified places	249 (1.1%)	446 (0.8%)	695 (0.9%)	1.1%
Total other specified place of occurrence	*465 (2.0%)*	*800 (1.5%)*	*1,265 (1.6%)*	1.9%
Unspecified place of occurrence	4,561 (19.4%)	8,502 (15.4%)	13,063 (16.6%)	. .
Total*	**23,567 (100%)**	**55,039 (100%)**	**78,606 (100%)**	

*Totals include 16 cases for which a place of occurrence was not reported.

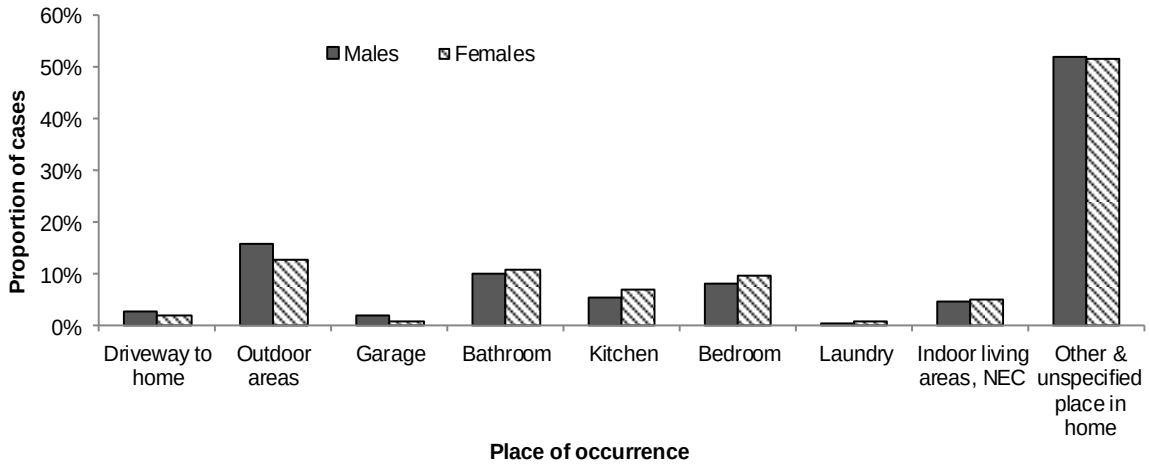


Figure 3.1: Fall injury cases where place of occurrence was the home; males and females aged 65+, Australia 2008–09

Aged care facilities

Nearly one-quarter of injurious falls involving a person aged 65 or older that resulted in hospitalisation in 2008–09 was reported to have occurred in an aged care facility (*n* = 17,420, see Table 3.2).

As in previous years, we have calculated the age-standardised rate of falls in aged care facilities involving people aged 65 and older resident in such facilities using population estimates derived from the AIHW's *Residential aged care in Australia* report series (AIHW 2009, 2010c; see also Appendix). We have also calculated the rate of falls occurring in the home for people aged 65 and older and resident in the community (that is, the number of people who were not residents of aged care facilities). The annual rate of falls occurring in residential aged care facilities is a Council of Australian Governments National Healthcare Agreement Performance Indicator (PI 52, see AIHW 2011a). However, the way in which the indicator is calculated differs somewhat from that presented here, PI 52 counting all hospital separations of this type, not estimated cases.

The age-standardised rate of fall injury cases occurring in aged care facilities in 2008–09 was nearly six times as high as the rate of falls in the home involving people aged 65 and older resident in the community. This is somewhat higher than the ratio observed in previous analyses (Bradley 2012a, 2012b). The rate of fall injury cases in aged care facilities for persons aged 65 and older living in residential facilities in 2008–09 was 8,100 per 100,000 population, an increase of 3.0% (232 per 100,000) from the 2007–08 rate. The age-standardised rate of falls in the home for older persons living in the community was 1,451 per 100,000 population, an increase of 1.1% (16 per 100,000) from the 2007–08 rate. It appears, then, that as observed in our analysis of trends over time in the 2006–07 report (Bradley 2012a), the incidence of falls occurring in aged care facilities is still increasing at a faster rate than falls in the home.

Similar to previous analyses, the age-standardised rates of falls by female residents of aged care facilities (8,717 per 100,000 population) were somewhat higher than that for males (7,243 per 100,000); however, this difference is not of the same magnitude as that observed for all falls (a M:F rate ratio of 0.8 compared with 0.6 for all falls; see also Figure 3.2).

The age-specific rates of fall injury cases that occurred in the home or in aged care facilities in 2008–09 are presented in Figure 3.2. As in previous years, the rate of hospitalised falls for the oldest males resident in aged care facilities was higher than the equivalent rate for females. The highest age-specific fall injury rate observed for residents of aged care facilities was 13,956 per 100,000 population for males aged 95 and older (compared with 5,609 per 100,000 for males of that age resident in the community and falling in the home). For females, the highest rate observed was 13,846 per 100,000 for those aged 90–94 (compared with 8,394 per 100,000 for females of that age resident in the community and falling in the home). In total, 5,935 injuries due to falls in aged care facilities involving people aged 90 and older required hospitalisation in 2008–09 compared with 5,742 falls in the home for people of the same age resident in the community.

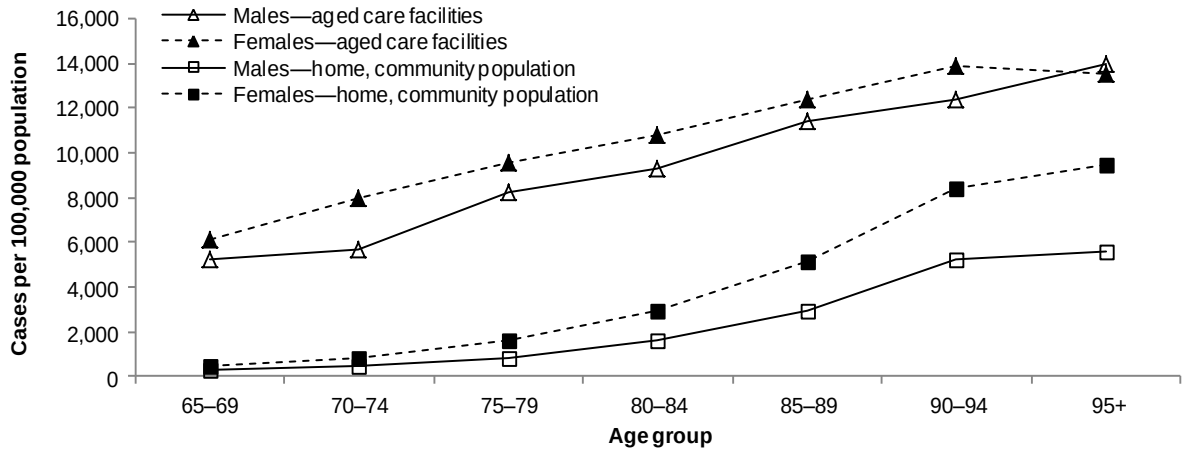


Figure 3.2: Age-specific rates of falls in the home and in aged care facilities calculated using the estimated population of people resident in the general community and residential care, males and females aged 65+, Australia 2008–09

Activity when fall occurred

As in previous years, about two-thirds of the hospitalised fall injury cases for people aged 65 and older in 2008–09 were assigned a U73.9 activity code—'unspecified activity' (67.8%, see Table 3.3).

Of the 25,270 (32.1%) fall injury cases with a specified activity code, the most common activity engaged in at the time of the injurious fall was 'resting, sleeping, eating or engaging in other vital activities' (45.0% of cases with a specified activity, *n* = 11,383). The reported activity for a further 7,769 cases (30.7% of cases with a specified activity) was 'other specified activity'. These proportions are comparable to those observed in previous years (for example, Bradley 2012a, 2012b). Similarly, little difference between males and females was noted for the reported activity engaged in at the time of the injurious fall.

Unlike coding for sports-related or income-producing work activities, there are no subcategories for the activity codes most commonly recorded for hospitalised fall cases involving people aged 65 and older (NCCH 2008). Accordingly, specific (and useful) information about the types of activity during which injurious falls by older people were sustained in 2008–09 was available for less than 2% cent of cases (that is, the 1.2% of cases coded to 'while engaged in sports' or 'while working for income').

Table 3.3: Reported activity for fall injury cases; males, females and persons aged 65+, Australia 2008–09

Activity	Males	Females	Persons	Per cent specified
Walking	48 (0.2%)	116 (0.2%)	164 (0.2%)	0.6%
Dancing	11 (0.0%)	54 (0.1%)	65 (0.1%)	0.3%
Tennis	18 (0.1%)	54 (0.1%)	72 (0.1%)	0.3%
Bowling	25 (0.1%)	56 (0.1%)	81 (0.1%)	0.3%
Golf	29 (0.1%)	29 (0.1%)	58 (0.1%)	0.2%
Other while engaged in sports	138 (0.6%)	161 (0.3%)	299 (0.4%)	1.2%
Total while engaged in sports	*269 (1.1%)*	*470 (0.9%)*	*739 (0.9%)*	*2.9%*
While engaged in leisure	246 (1.0%)	498 (0.9%)	744 (0.9%)	2.9%
While working for income	161 (0.7%)	78 (0.1%)	239 (0.3%)	0.9%
While engaged in other types of work	1,527 (6.5%)	2,869 (5.2%)	4,396 (5.6%)	17.4%
While resting, sleeping, eating, etc.	3,089 (13.1%)	8,294 (15.1%)	11,383 (14.5%)	45.0%
Other specified activity	2,308 (9.8%)	5,461 (9.9%)	7,769 (9.9%)	30.7%
Unspecified activity	15,946 (67.7%)	37,336 (67.8%)	53,282 (67.8%)	. .
Total*	**23,567 (100%)**	**55,039 (100%)**	**78,606 (100%)**	

*Totals include 54 cases for which activity was not reported.

4 The burden of injury due to falls

Chapters Two and Three focused on the estimated number of new cases of hospitalised fall-related injury that occurred in the year to 30 June 2009. This chapter focuses on the nature and extent of hospital care provided in that period because of a fall-related injury. This includes analysis of the fall injury records omitted from the estimation of cases (having a mode of admission of transfer from another hospital) as well as records that describe episodes of admitted patient fall-related follow-up care, other separations including both an injury diagnosis and a fall external cause ('other fall-related' separations), and separations containing the R29.6 code describing a 'tendency to fall, not elsewhere classified'.

Fall injury inward transfer separations

To reduce multiple counting of fall cases in our de-identified data-set, a number of records were omitted from the analyses presented in the previous chapters. These records had a principal diagnosis in the range S00–T75 or T79 and a first external cause code in the range W00–W19 (that is, the same as fall injury cases), as well as a mode of admission describing a transfer from another hospital. These records should not be regarded as representing additional fall cases as they are likely to have already generated a (pre-transfer) separation record describing the injury event.

A total of 9,212 fall injury inward transfer separations were identified for the 2008–09 study period and, as in previous years, inward transfer separations represented 0.3% of the total number of hospitalisations for people aged 65 and older in this year. These separations occurred at an age-standardised rate of 301 per 100,000 population, about the same as that for 2007–08. As for fall injury cases, inward transfers occurred at a higher rate for females (354 per 100,000) than for males (226 per 100,000). Females accounted for 69.6% (n = 6,410) of all fall injury inward transfer separations.

Like fall injury cases, inward transfers most commonly had an injury to the hip and thigh as the principal diagnosis. Injuries to the hip and thigh made up a greater proportion of transfer separations, however; 40.6% of inward transfers compared with 29.2% of fall cases. Most of this increase was due to hip fractures rather than other types of injuries to the hip and thigh (33.3% of transfer separations versus 21.6% of fall cases). As in 2007–08, injuries to the head was the second most common principal diagnosis for inward transfer separations in 2008–09 (n = 1,106) and almost as many inward transfers had a principal diagnosis describing an injury to the abdomen, lower back, lumbar spine or pelvis (n = 1,093). Head injuries were proportionately less common for inward transfers than for fall cases; 12.0% compared with 19.1%, respectively.

The external causes reported for inward transfer separations were similar to those for fall injury cases in that falls due to tripping, slipping and stumbling, 'other specified' falls and unspecified falls were the three most common mechanisms of falls. However, proportionately fewer inward transfers were attributed to falls due to tripping, slipping and stumbling (27.5% versus 32.2%, respectively) or 'other specified' falls (16.0% versus 20.0%) than for fall cases. Conversely, 'unspecified fall' was a far more common external cause ascribed to inward transfer separations than for fall injury cases (39.8% versus 28.9%, respectively), suggesting that a level of specificity regarding the case is lost as the patient moves through the hospital system.

Fall-related follow-up care separations

As in previous reports, we present analysis of a number of fall-related hospital separations we call 'fall-related follow-up care' separations. Work by the NISU using Western Australian person-linked data has shown that a large proportion of injury cases was associated with subsequent separations coded with a principal diagnosis from Chapter XXI of the ICD-10-AM (see Bradley & Harrison 2007; also Kreisfeld & Newson 2006). Such records are numerous and must be considered in a valid estimation of the burden of hospitalised fall injury. On the basis of the information currently available, we consider these separations to represent an additional part of the burden due to fall injury rather than additional cases.

'Fall-related follow-up care' separations have a principal diagnosis code from Chapter XXI of the ICD-10-AM (*Factors influencing health status and contact with health services*), specifically:

- 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.

They also have both an injury (S00–T75 or T79) and a falls external cause code (W00–W19) elsewhere in the record (see also the section 'Selection criteria' in the Appendix).

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). It is also possible that these separations describe an injurious fall in hospital while receiving care for another condition rather than post-acute care. More may be known about this when condition onset flag data become available for analysis (see AIHW 2010a).

Nearly 30,000 fall-related follow-up care separations were identified for people aged 65 and older in 2008–09 (n = 29,634), an increase of 21.3% on that for 2007–08 (n = 24,429). These 29,634 fall-related follow-up care separations represent 1.0% of all hospital separations for the older population in 2008–09 and, as in previous years, nearly three-quarters involved women (71.2%, n = 21,092).

The mean age of the person hospitalised in a fall-related follow-up care separation was 82.3 (± 7.3 SD), the same as that in both 2006–07 and 2007–08 and slightly older than the average for fall injury cases. Males hospitalised for a follow-up care separation were aged 81.1 (± 7.3 SD) on average while the mean age of females was slightly older; 82.8 (± 7.2 SD).

The age-standardised rate of fall-related follow-up care separations for all people aged 65 and older in 2008–09 was 968 separations per 100,000 population, more like that observed in 2006–07 (933 per 100,000, see Bradley 2012a) than the 822 per 100,000 observed in 2007–08 (see Bradley 2012b). As in previous years, however, the age-standardised rate for females (1,167per 100,000) was much higher than that for males (691 per 100,000).

Rates of fall-related follow-up care separations in 2008–09 increased considerably with age for both males and females until very old age, when rates decreased somewhat (Figure 4.1). As for fall injury cases, age-specific rates of fall-related follow-up care separations were higher for females than for males in every age group.

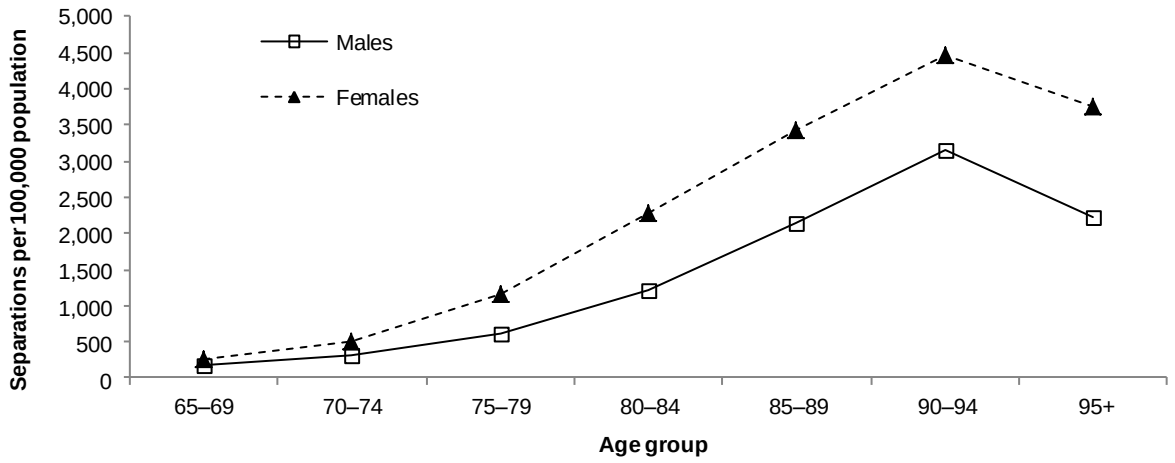


Figure 4.1: Age-specific rates of fall-related follow-up care separations; males and females aged 65+, Australia 2008–09

Diagnoses for fall-related follow-up care separations

More than three-quarters (87.2%, *n* = 25,850) of fall-related follow-up care separations had a principal diagnosis of Z50 (care involving use of rehabilitation procedures). While Z50 accounts for the majority of separations in every age group (Figure 4.2), there were increasing proportions of follow-up care separations with Z75.1 (person awaiting admission to adequate facility elsewhere) as the principal diagnosis for the older age groups.

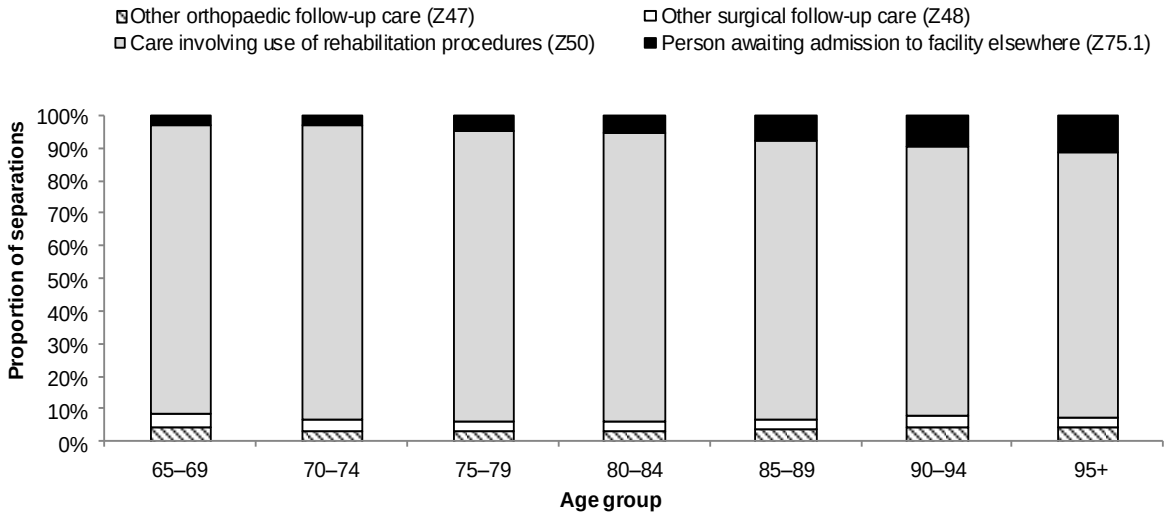


Figure 4.2: Principal diagnosis group for fall-related follow-up care separations by age, persons aged 65+, Australia 2008–09

Table 4.1 describes the specific principal diagnoses for fall-related follow-up care separations for people aged 65 and older in 2008–09. Most of these separations (82.8%, *n* = 24,533) had a principal diagnosis of Z50.9 (care involving use of rehabilitation procedures, unspecified). This was 5,247 (27.2%) more Z50.9 separations than in 2007–08, which accounted for most of the increase observed for fall-related follow-up care separations overall.

The next most common principal diagnosis for fall-related follow-up care separations was Z75.11 (person awaiting admission to a residential aged care service). These 1,768 records accounted for 6.0% of fall-related follow-up care separations in 2008–09. This was a similar number as observed in 2007–08 (*n* = 1,767), these Z75.11 separations represented a lower proportion of all fall-related follow-up care separations due to the increase in this type of separation overall.

As observed in previous years (for example, Bradley 2012a, 2012b), separations of this type were proportionately more common for males (7.0%) than for females (5.5%).

Table 4.1: Principal diagnosis for fall-related follow-up care separations; males, females and persons aged 65+, Australia 2008–09

Principal diagnosis	Males	Females	Persons
Follow-up care involving removal of fracture plate and other internal fixation device (Z47.0)	n.p. (0.0%)	n.p. (0.0%)	5 (0.0%)
Other specified orthopaedic follow-up care (Z47.8)	91 (1.1%)	395 (1.9%)	486 (1.6%)
Orthopaedic follow-up care, unspecified (Z47.9)	109 (1.3%)	387 (1.8%)	496 (1.7%)
Total other orthopaedic follow-up care (Z47)	*201 (2.4%)*	*786 (3.7%)*	*987 (3.3%)*
Attention to surgical dressings and sutures (Z48.0)	n.p. (0.0%)	n.p. (0.1%)	31 (0.1%)
Other specified surgical follow-up care (Z48.8)	264 (3.1%)	575 (2.7%)	839 (2.8%)
Surgical follow-up care, unspecified (Z48.9)	5 (0.1%)	8 (0.0%)	13 (0.0%)
Total other surgical follow-up care (Z48)	*273 (3.2%)*	*610 (2.9%)*	*883 (3.0%)*
Cardiac rehabilitation (Z50.0)	n.p. (0.0%)	n.p. (0.0%)	11 (0.0%)
Other physical therapy (Z50.1)	149 (1.7%)	346 (1.6%)	495 (1.7%)
Occupational therapy and vocational rehabilitation, not elsewhere classified (Z50.7)	11 (0.1%)	19 (0.1%)	30 (0.1%)
Care involving use of other rehabilitation procedures (Z50.8)	216 (2.5%)	565 (2.7%)	781 (2.6%)
Care involving use of rehabilitation procedure, unspecified (Z50.9)	7,042 (82.4%)	17,491 (82.9%)	24,533 (82.8%)
Total care involving use of rehabilitation procedures (Z50)	*7,422 (86.9%)*	*18,428 (87.4%)*	*25,850 (87.2%)*
Person awaiting admission to acute hospital (Z75.10)	n.p. (0.0%)	n.p. (0.0%)	n.p. (0.0%)
Person awaiting admission to residential aged care service (Z75.11)	599 (7.0%)	1,169 (5.5%)	1,768 (6.0%)
Person awaiting admission to rehabilitation facility/unit (Z75.13)	18 (0.2%)	33 (0.2%)	51 (0.2%)
Person awaiting admission to palliative care facility/unit (Z75.14)	n.p. (0.0%)	n.p. (0.0%)	n.p. (0.0%)
Person awaiting admission to other health care facility (Z75.18)	20 (0.2%)	40 (0.2%)	60 (0.2%)
Person awaiting admission to adequate facility elsewhere, unspecified (Z75.19)	6 (0.1%)	16 (0.1%)	22 (0.1%)
Total person awaiting admission to adequate facility elsewhere (Z75.1)	*646 (7.6%)*	*1,268 (6.0%)*	*1,914 (6.5%)*
Total	**8,542 (100%)**	**21,092 (100%)**	**29,634 (100%)**

n.p. Small cell counts have been suppressed to prevent patient identification.

The first-listed community injury diagnosis (S00–T75, T79) for fall-related follow-up care separation records in 2008–09 was also identified for analysis (Table 4.2). As for fall injury cases, the most common injury category was an injury to the hip or thigh (47.5%, *n* = 14,070) and most of these injuries were fractures of the neck of the femur (40.5% of all fall-related follow-up care separations). As observed for fall injury inward transfers, injuries to the hip and thigh (and fractures of the femoral neck, more specifically) accounted for a greater proportion of follow-up care separations than they did for fall injury cases.

Head injuries, which were the second most common type of principal diagnosis for both fall cases and inward transfers, were proportionately less common diagnoses for fall-related follow-up care separations (7.5% of follow-up separations versus 19.1% of fall cases and 12.0% of inward transfers). Instead, and as in 2007–08, abdominal injuries were the second most common injury for fall-related follow-up care separations, accounting for about one in eight such records (13.5%, *n* = 4,000).

Table 4.2: First-listed injury diagnosis for fall-related follow-up care separations; males, females and persons aged 65+, Australia 2008–09

Diagnosis	Males	Females	Persons
Injuries to the head	1,098 (12.9%)	1,129 (5.4%)	2,227 (7.5%)
Injuries to the neck	185 (2.2%)	185 (0.9%)	370 (1.2%)
Injuries to the thorax	502 (5.9%)	793 (3.8%)	1,295 (4.4%)
Injuries to the abdomen, lower back, lumbar spine & pelvis	912 (10.7%)	3,088 (14.6%)	4,000 (13.5%)
Injuries to the shoulder & upper arm	659 (7.7%)	2,007 (9.5%)	2,666 (9.0%)
Injuries to the elbow & forearm	358 (4.2%)	949 (4.5%)	1,307 (4.4%)
Injuries to the wrist & hand	106 (1.2%)	174 (0.8%)	280 (0.9%)
Fractured neck of femur	3,138 (36.7%)	8,864 (42.0%)	12,002 (40.5%)
Other hip & thigh injuries	602 (7.0%)	1,466 (7.0%)	2,068 (7.0%)
Total injuries to the hip & thigh	*3,740 (43.8%)*	*10,330 (49.0%)*	*14,070 (47.5%)*
Injuries to the knee & lower leg	738 (8.6%)	1,990 (9.4%)	2,728 (9.2%)
Injuries to the ankle & foot	92 (1.1%)	224 (1.1%)	316 (1.1%)
Injuries involving multiple body regions	16 (0.2%)	14 (0.1%)	30 (0.1%)
Injuries to unspecified parts of trunk, limb or body region	71 (0.8%)	141 (0.7%)	212 (0.7%)
Certain early complications of trauma	52 (0.6%)	41 (0.2%)	93 (0.3%)
Other diagnoses	13 (0.2%)	27 (0.1%)	40 (0.1%)
Total	**8,542 (100%)**	**21,092 (100%)**	**29,634 (100%)**

External cause for fall-related follow-up care

As for fall injury cases and inward transfers, the most common fall external causes attributed to fall-related follow-up care separations were falls due to slipping, tripping and stumbling, 'other falls on the same level' and unspecified falls (Table 4.3). Similar to fall injury transfer separations, however, the most common external cause for fall-related follow-up care separations was 'unspecified fall' (W19, 43.1% of separations). As noted previously, these observations suggest that some detail regarding the circumstances of an injurious fall is lost from records after the original hospitalisation for the injury event. This compounds the difficulty of accurately attributing the burden of disease due to particular types of fall.

Table 4.3: First-listed fall external cause for fall-related follow-up care separations; males, females and persons aged 65+, Australia 2008–09

External cause	Males	Females	Persons
Fall on same level involving ice & snow	n.p. (0.0%)	n.p. (0.0%)	12 (0.0%)
Fall on same level from slipping	527 (6.2%)	1,595 (7.6%)	2,122 (7.2%)
Fall on same level from tripping	1,109 (13.0%)	3,646 (17.3%)	4,755 (16.0%)
Fall on same level from stumbling	296 (3.5%)	673 (3.2%)	969 (3.3%)
Total fall on same level from slipping, tripping & stumbling	*1,932 (22.6%)*	*5,914 (28.0%)*	*7,846 (26.5%)*
Fall involving pedestrian conveyance	86 (1.0%)	60 (0.3%)	146 (0.5%)
Other fall on same level due to collision with another person	14 (0.2%)	58 (0.3%)	72 (0.2%)
Fall while being carried or supported by other persons	n.p. (0.0%)	n.p. (0.0%)	5 (0.0%)
Fall involving wheelchair	71 (0.8%)	63 (0.3%)	134 (0.5%)
Fall involving bed	294 (3.4%)	687 (3.3%)	981 (3.3%)
Fall involving chair	231 (2.7%)	544 (2.6%)	775 (2.6%)
Fall involving other furniture	13 (0.2%)	52 (0.2%)	65 (0.2%)
Fall involving playground equipment	n.p. (0.0%)	n.p. (0.0%)	n.p. (0.0%)
Fall on & from stairs & steps	437 (5.1%)	1,073 (5.1%)	1,510 (5.1%)
Fall on & from ladder	246 (2.9%)	99 (0.5%)	345 (1.2%)
Fall on & from scaffolding	12 (0.1%)	0 (0.0%)	12 (0.0%)
Fall from, out of or through building or structure	94 (1.1%)	50 (0.2%)	144 (0.5%)
Fall from tree	n.p. (0.0%)	n.p. (0.0%)	7 (0.0%)
Fall from cliff	26 (0.3%)	19 (0.1%)	45 (0.2%)
Diving or jumping into water causing injury other than drowning	n.p. (0.0%)	n.p. (0.0%)	n.p. (0.0%)
Other fall from one level to another	108 (1.3%)	94 (0.4%)	202 (0.7%)
Other fall on same level	1,280 (15.0%)	3,286 (15.6%)	4,566 (15.4%)
Unspecified fall	3,687 (43.2%)	9,074 (43.0%)	12,761 (43.1%)
Total	**8,542 (100%)**	**21,092 (100%)**	**29,634 (100%)**

n.p. Small cell counts have been suppressed to prevent patient identification.

Place of occurrence for fall-related follow-up care

The first place of occurrence code in each record was selected for analysis (Table 4.4). This place of occurrence is most likely to be associated with the first-listed injury diagnosis discussed above. Although likely, it is not necessarily associated with the first-listed fall external cause code outlined in Table 4.3, as other external cause codes (for example, complications of surgical and medical care) may precede the fall in the record.

As for fall injury cases, the home was the most common place of occurrence code for about half of the fall-related follow-up care separations in 2008–09 (46.6%, *n* = 13,819). A smaller proportion of follow-up separations was recorded as having occurred in aged care facilities (7.9%, compared with 22.2% of fall injury cases). Of interest, a larger proportion of fall-related follow-up care separations was recorded as having occurred in a health service area (9.6%, compared with 1.5% of fall injury cases). It is possible, then, that the fall injuries noted in these separations were (new) in-hospital falls rather than existing community injury falls for which further post-acute hospital care was required (that is, the type of fall injuries we

count as cases). More may be known about this when condition onset flag data (items flagging whether the condition was present on admission to hospital or not) become available for analysis (see AIHW 2010a).

A larger proportion of fall-related follow-up care separations was ascribed an 'unspecified place of occurrence' than for fall injury cases (28.5% versus 16.6%, respectively). This further highlights the lack/loss of detail in hospital separations generated later in a series for the same injury event. Omitting these records, and those for which no place was recorded at all (n = 31), finds that a total of 76.0% of fall-related follow-up care separation injuries with a *specified* place of occurrence in 2008–09 happened in either the home or an aged care facility, while 13.5% occurred in a health service area.

Table 4.4: First place of occurrence for fall-related follow-up care separations; males, females and persons aged 65+, Australia 2008–09

Place of occurrence	Males	Females	Persons	Per cent specified
Home	3,628 (42.5%)	10,191 (48.3%)	13,819 (46.6%)	65.3%
Aged care facilities	440 (5.2%)	1,821 (8.6%)	2,261 (7.6%)	10.7%
Other & unspecified residential institutions	26 (0.3%)	42 (0.2%)	68 (0.2%)	0.3%
Total residential institution	*466 (5.5%)*	*1,863 (8.8%)*	*2,329 (7.9%)*	*11.0%*
Health service area	1,298 (15.2%)	1,555 (7.4%)	2,853 (9.6%)	13.5%
Other school, institution & public administrative area	33 (0.4%)	143 (0.7%)	176 (0.6%)	0.8%
Total school, institution & public administrative area	*1,331 (15.6%)*	*1,698 (8.1%)*	*3,029 (10.2%)*	*14.3%*
Sports & athletics area	31 (0.4%)	38 (0.2%)	69 (0.2%)	0.3%
Street & highway	227 (2.7%)	532 (2.5%)	759 (2.6%)	3.6%
Trade & service area	199 (2.3%)	598 (2.8%)	797 (2.7%)	3.8%
Industrial & construction area	n.p. (0.1%)	n.p. (0.0%)	8 (0.0%)	0.0%
Farm	22 (0.3%)	11 (0.1%)	33 (0.1%)	0.2%
Other specified place of occurrence	101 (1.2%)	227 (1.1%)	328 (1.1%)	1.5%
Unspecified place of occurrence	2,514 (29.4%)	5,918 (28.1%)	8,432 (28.5%)	. .
Total*	**8,542 (100%)**	**21,092 (100%)**	**29,634 (100%)**	

n.p. Small cell counts have been suppressed to prevent patient identification.

*Totals include 31 records for which place of occurrence was not reported.

‘Other fall-related’ separations

In previous reports, a fourth class of fall-related separations was identified for people aged 65 and older, additional to those types already discussed above (for example, Bradley 2012b). 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 community injury code and a fall external cause code within the record.

The exact nature of these ‘other fall-related’ separations is not known. Some possible circumstances for such cases include: chance (that is, a person admitted for a non-injury condition happened to have an injury condition); co-morbid injury (for example, a person admitted due to a neoplasm had a pathological fracture); complication of care (for example, a person in hospital for treatment of a non-injury condition slipped and fell); and, injury during the onset of another condition (for example, a person fell and was injured during an acute myocardial infarction). As discussed with reference to fall-related follow-up care separations, when comprehensive national condition onset data become available for analysis we may be better able to understand these fall-related injuries (see AIHW 2010a).

An additional 24,024 episodes of hospital care involving people aged 65 and older were identified as ‘other fall-related’ separations in 2008–09—1,358 more separations than identified in 2007–08 (Bradley 2012b). These separations represent 0.8% of the total number of hospital separations for people aged 65 and older in 2008–09. As in previous years, females accounted for a lower proportion of ‘other fall-related’ separations than observed for the classes of fall injury separations considered thus far (54.2%, *n* = 13,010).

The age-standardised rate of ‘other fall-related’ separations was 792 per 100,000 population in 2008–09. Unlike the separations directly attributable to falls in this report (that is, fall injury cases, inward transfers and follow-up care separations), the age-standardised rate of ‘other fall-related’ for males was higher than that for females: 888 per 100,000 compared with 728 per 100,000, respectively. The rate-ratio was 1.2 ‘other fall-related’ separations for males for every such separation for females, the same as noted in 2007–08. Further, the age-specific rates for males were higher than those for females for every age group (Figure 4.3).

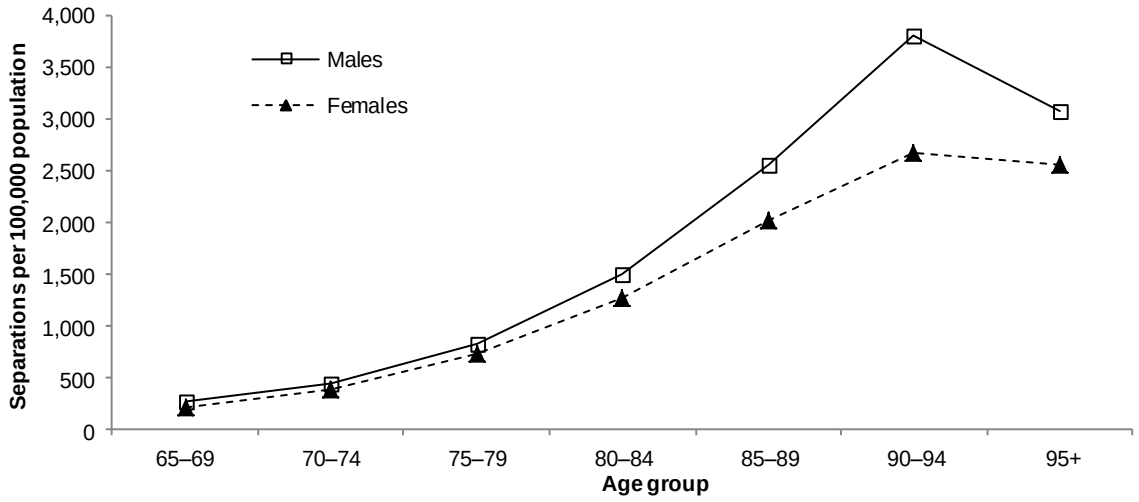


Figure 4.3: Age-specific rates of ‘other fall-related’ separations; males and females aged 65+, Australia 2008–09

The majority of 'other fall-related' separations did not have an injury code of any type as the principal diagnosis (96.6% of 'other fall-related' separations, see Table 4.5). One in five 'other fall-related' separations (21.1%) had a principal diagnosis from Chapter IX of the ICD-10-AM (*Diseases of the circulatory system*).

A further 16.4% of 'other fall-related' separations had a principal diagnosis from Chapter XVIII (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*). As in previous years, the two most common principal diagnoses for 'other fall-related' separations in this *Symptoms, signs* group were R55 (syncope and collapse; 47.8% of these separations, *n* = 1,885) and R29.6 (tendency to fall, not elsewhere classified; 12.5%, *n* = 493). Separations containing the 'tendency to fall' code are discussed further in the following section.

Of the 3.4% 'other fall-related' separations that did have an injury code as the principal diagnosis, half (49.8% *n* = 401) were 'complications of surgical and medical care'. For these, the two most common diagnoses were T81.41 (wound infection following a procedure, 15.0%) and T84.0 (mechanical complication of internal joint prosthesis, 12.2%).

These observations are very similar to those made for 2007–08 data (Bradley 2012b).

Table 4.5: ICD-10-AM chapter of principal diagnosis for 'other fall-related' separations; males, females and persons aged 65+, Australia 2008–09

ICD-10-AM chapter	Males	Females	Persons
Certain infectious & parasitic diseases	340 (3.1%)	394 (3.0%)	734 (3.1%)
Neoplasms	1,042 (9.5%)	687 (5.3%)	1,729 (7.2%)
Diseases of the blood, blood-forming organs, etc.	135 (1.2%)	172 (1.3%)	307 (1.3%)
Endocrine, nutritional & metabolic diseases	506 (4.6%)	586 (4.5%)	1,092 (4.5%)
Mental & behavioural disorders	689 (6.3%)	777 (6.0%)	1,466 (6.1%)
Diseases of the nervous system	541 (4.9%)	493 (3.8%)	1,034 (4.3%)
Diseases of the eye & adnexa	22 (0.2%)	24 (0.2%)	46 (0.2%)
Diseases of the ear & mastoid process	15 (0.1%)	46 (0.4%)	61 (0.3%)
Diseases of the circulatory system	2,400 (21.8%)	2,659 (20.4%)	5,059 (21.1%)
Diseases of the respiratory system	1,252 (11.4%)	1,136 (8.7%)	2,388 (9.9%)
Diseases of the digestive system	470 (4.3%)	581 (4.5%)	1,051 (4.4%)
Diseases of the skin & subcutaneous tissue	308 (2.8%)	439 (3.4%)	747 (3.1%)
Diseases of the musculoskeletal system & connective tissue	448 (4.1%)	765 (5.9%)	1,213 (5.0%)
Diseases of the genitourinary system	432 (3.9%)	968 (7.4%)	1,400 (5.8%)
Symptoms, signs, abnormalities n.e.c.	1,713 (15.6%)	2,231 (17.1%)	3,944 (16.4%)
Injury, poisoning & consequences of external causes	352 (3.2%)	454 (3.5%)	806 (3.4%)
Factors influencing health status	349 (3.2%)	597 (4.6%)	946 (3.9%)
Total*	**11,014 (100%)**	**13,010 (100%)**	**24,024 (100%)**

*Totals include one separation from a chapter with a case count too small to publish.

Place of occurrence for 'other fall-related' separations

As for fall-related follow-up care separations, the first-listed place of occurrence code in each 'other fall-related' record was selected for analysis (Table 4.6).

Unlike the fall-related separations considered thus far, 'health service area', not the home, was the most common place of occurrence code for 'other fall-related' separations. 'Health service area' was the recorded place of occurrence for 38.8% of 'other fall-related' separations (n = 9,321), rising to 45.5% when only the 'other fall-related' separations with a *specified* place of occurrence were considered. It is likely, then, that many of the fall injuries noted in these separations were in-hospital falls. Analysis of national condition onset flag data will prove essential to understand more about the incidence and circumstances of these falls (AIHW 2010a). Of interest, a greater proportion of 'other fall-related' separations involving males were ascribed the 'health service area' as the place of occurrence than females (43.2% versus 35.4%, respectively).

Additionally, a much smaller proportion of 'other fall-related' separations were ascribed an 'unspecified place of occurrence' than fall-related follow-up care separations (14.6%, compared with 28.5%), a proportion more like that for fall injury cases (16.6%).

Table 4.6: First-listed place of occurrence for 'other fall-related' separations; males, females and persons aged 65+, Australia 2008–09

Place of occurrence	Males	Females	Persons	Per cent specified
Home	3,306 (30.0%)	4,458 (34.3%)	7,764 (32.3%)	37.9%
Aged care facilities	747 (6.8%)	1,528 (11.7%)	2,275 (9.5%)	11.1%
Other & unspecified residential institutions	31 (0.3%)	26 (0.2%)	57 (0.2%)	0.3%
Total residential institution	*778 (7.1%)*	*1,554 (11.9%)*	*2,332 (9.7%)*	*11.4%*
Health service area	4,753 (43.2%)	4,568 (35.1%)	9,321 (38.8%)	45.5%
Other school, institution & public administrative area	23 (0.2%)	37 (0.3%)	60 (0.2%)	0.3%
Total school, institution & public administrative area	*4,776 (43.4%)*	*4,605 (35.4%)*	*9,381 (39.0%)*	*45.7%*
Sports & athletics area	25 (0.2%)	7 (0.1%)	32 (0.1%)	0.2%
Street & highway	222 (2.0%)	208 (1.6%)	430 (1.8%)	2.1%
Trade & service area	183 (1.7%)	205 (1.6%)	388 (1.6%)	1.9%
Industrial & construction area	n.p. (0.1%)	n.p. (0.0%)	7 (0.0%)	0.0%
Farm	n.p. (0.2%)	n.p. (0.0%)	24 (0.1%)	0.1%
Other specified place of occurrence	89 (0.8%)	59 (0.5%)	148 (0.6%)	0.7%
Unspecified place of occurrence	1,604 (14.6%)	1,906 (14.7%)	3,510 (14.6%)	. .
Total	**11,014 (100%)**	**13,010 (100%)**	**24,024 (100%)**	

n.p. Small cell counts have been suppressed to prevent patient identification.

‘Tendency to fall’ separations

The sixth edition of the ICD-10-AM includes the diagnosis code R29.6 (tendency to fall, not elsewhere classified). This diagnosis is appropriate for situations where the patient has the “tendency to fall because of old age or other unclear health problems” but not for falls due to accidents, difficulty in walking, dizziness and giddiness, syncope and collapse or falls that cause injury. That is, R29.6 should not be used in cases of known trauma associated with a fall or with a known medical condition that is found to be the cause of the fall (for example, Parkinson’s disease, see NCCH 2008).

A total of 24,790 hospital separations for people aged 65 and older in 2008–09 included the ‘tendency to fall’ diagnosis code R29.6. Small numbers of these records have already been discussed in this report as fall injury cases, inward transfers, follow-up care or ‘other fall-related’ separations (see Table 4.7). Omitting these separations left 19,256 separations containing a ‘tendency to fall’ diagnosis in the analysis. Some of these records, contrary to the coding instructions outlined above, also contained either (but not both) a community injury diagnosis (S00–T75 or T79, *n* = 590) or an external cause signifying a fall (W00–W19, *n* = 263).

Table 4.7: Records containing a diagnosis of ‘tendency to fall’ (R29.6) by separation type; males, females and persons aged 65+, Australia 2008–09

Separation type	Males	Females	Persons	Per cent of type
Fall injury case (with R29.6 additional diagnosis)	678	1,460	2,138	2.7%
Fall injury inward transfer (with R29.6 additional diagnosis)	94	205	299	3.2%
Fall-related follow-up care (with R29.6 additional diagnosis)	534	1,037	1,571	5.3%
Other fall-related separation (with R29.6 additional diagnosis)	693	833	1,526	6.4%
‘Tendency to fall’ diagnosis in record (without community injury diagnosis and fall external cause)	8,620	10,636	19,256	100%
Total	**10,619**	**14,171**	**24,790**	**. .**

Of the 19,256 ‘tendency to fall’ separations for people aged 65 and older in 2008–09, the majority (55.2%, *n* = 10,636) involved females. This is a lower proportion than that noted for all other types of fall-related separation in this report. Further, the age-standardised rate of R29.6 separations was higher for males (700 per 100,000 population) than for females (578 per 100,000). The age-standardised rate of ‘tendency to fall’ separations for all people aged 65 and older was 662 per 100,000. As for ‘other fall-related separations’, age-specific rates of ‘tendency to fall’ separations for males were significantly higher than those for females for most age groups, particularly for the oldest old (Figure 4.4).

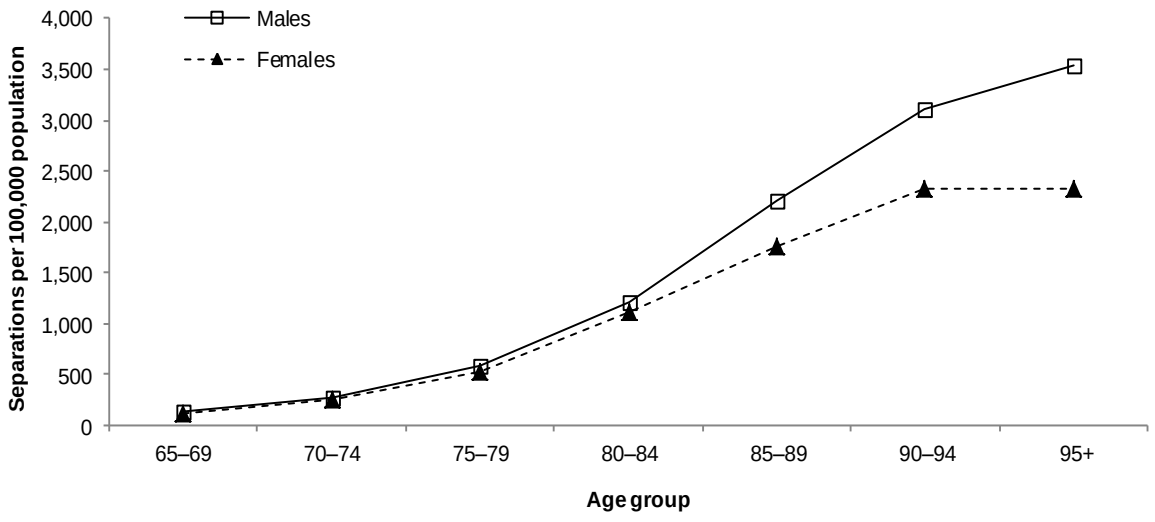
These observations may be related to injury risk. Older females with a ‘tendency to fall’ may be more likely to be injured than older males, due to osteoporosis or other factors, and thus appear in our data-set as a fall injury case (or other fall-related separation) rather than in this set of records.

A little under one-third of ‘tendency to fall’ separations (30.9%, *n* = 5,956) had a principal diagnosis from Chapter XXI of the ICD-10-AM (*Factors influencing health status and contact with health services*, see Table 4.8). This is the same chapter from which ‘fall-related follow-up care separations’ were drawn if they had a principal diagnosis of Z47, Z48, Z50 or Z75.1 plus both an additional diagnosis of injury (S00–T75 or T79) and an external cause signifying a fall

(W00–W19). The Chapter XXI separations here, then, lacked any of the selected principal diagnosis codes, an injury code or a falls code (or all three). Similar to fall-related follow-up care separations, however, most of this group had Z50.9 (care involving use of rehabilitation procedure, unspecified) as the principal diagnosis (72.5%, *n* = 4,319). The code Z75.11 (person awaiting admission to residential aged care service) was also a frequent principal diagnosis for this group (12.4%, *n* = 741).

Principal diagnoses from Chapter XVIII (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*) of the ICD-10-AM were also common for 'tendency to fall' separations, accounting for a further quarter of these records (24.6%, *n* = 4,741). Of these records, most (69.4%, *n* = 3,289) had R29.6 (tendency to fall) as the principal diagnosis.

A very large proportion of 'tendency to fall' separations in 2008–09 did not have any place of occurrence recorded (87.9%, *n* = 16,928). This was expected, however, given the low number of injury and/or external cause codes in these records. (Few other codes require place of occurrence or activity coding, see NCCH 2008). Of interest, however, was the observation that 'health service area' was the first-occurring place of occurrence code for 1,522 of the 1,990 (76.5%) 'tendency to fall' separations having a *specified* place of occurrence. Again, analysis of national condition onset flag data will be necessary to learn more about these episodes of hospital care (AIHW 2010a).



*Includes only those 'tendency to fall' separations not already classified as fall injury cases, inward transfers, follow-up care or 'other fall-related separations'.

Figure 4.4: Age-specific rates of 'tendency to fall' separations*; males and females aged 65+, Australia 2008–09

Table 4.8: ICD-10-AM chapter of principal diagnosis for 'tendency to fall' separations*; males, females and persons aged 65+, Australia 2008–09

ICD-10-AM chapter	Males	Females	Persons
Certain infectious and parasitic diseases	147 (1.7%)	150 (1.4%)	297 (1.5%)
Neoplasms	434 (5.0%)	282 (2.7%)	716 (3.7%)
Diseases of the blood, blood-forming organs, etc.	52 (0.6%)	71 (0.7%)	123 (0.6%)
Endocrine, nutritional and metabolic diseases	241 (2.8%)	281 (2.6%)	522 (2.7%)
Mental and behavioural disorders	414 (4.8%)	499 (4.7%)	913 (4.7%)
Diseases of the nervous system	389 (4.5%)	275 (2.6%)	664 (3.4%)
Diseases of the eye and adnexa	11 (0.1%)	12 (0.1%)	23 (0.1%)
Diseases of the ear and mastoid process	11 (0.1%)	21 (0.2%)	32 (0.2%)
Diseases of the circulatory system	711 (8.2%)	826 (7.8%)	1,537 (8.0%)
Diseases of the respiratory system	586 (6.8%)	516 (4.9%)	1,102 (5.7%)
Diseases of the digestive system	171 (2.0%)	214 (2.0%)	385 (2.0%)
Diseases of the skin and subcutaneous tissue	87 (1.0%)	157 (1.5%)	244 (1.3%)
Diseases of the musculoskeletal system and connective tissue	329 (3.8%)	553 (5.2%)	882 (4.6%)
Diseases of the genitourinary system	280 (3.2%)	621 (5.8%)	901 (4.7%)
Symptoms, signs, abnormalities not elsewhere classified	2,032 (23.6%)	2,709 (25.5%)	4,741 (24.6%)
Injury, poisoning & consequences of external causes	97 (1.1%)	120 (1.1%)	217 (1.1%)
Factors influencing health status	2,627 (30.5%)	3,329 (31.3%)	5,956 (30.9%)
Total**	**8,620 (100%)**	**10,636 (100%)**	**19,256 (100%)**

*Includes only 'tendency to fall' separations not already classified as fall injury cases, inward transfers, follow-up care or 'other fall-related separations'.

**Totals include one separation from a chapter with a case count too small to publish.

5 Procedures

NHMD unit records contain information regarding the medical procedures involved in an episode of hospital care. 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 2010b). The coding for most procedures is based on the Medical Benefits Scheme fee schedule and arranged anatomically (NCCH 2008) and multiple procedure codes can be listed for the hospital separation.

The Australian Classification of Health Interventions (ACHI), published as part of the ICD-10-AM, groups the very large number of procedures into about 1,400 aggregate 'blocks' (see NCCH 2008). The relevant block numbers are also included in NHMD separations for each listed procedure.

Procedures listed in fall injury case separations

There were 243,410 procedures listed in fall injury case separations for people aged 65 and older in 2008–09. The number of procedures per fall injury case separation ranged from 0 (18.1%, *n* = 14,237) to 49 (*n* = 1). The mean number of procedures per fall injury case was 3.1 (± 2.7 SD). There was little difference in the number of procedures recorded for males and females or for the different age groups (data not shown). The most common procedure types listed in fall injury cases for both males and females were 'non-invasive, cognitive and other interventions, not elsewhere classified' (66.5% of all procedures), imaging services (15.6%) and procedures on the musculoskeletal system (12.1%—see Table 5.1).

These results are similar to those observed for 2003–04 and 2005–06 falls data (Bradley & Harrison 2007; Bradley & Pointer 2008). Of note, increases in the number and proportion of imaging services procedures observed between 2003–04 and 2005–06 continue with this analysis of 2008–09 records. Imaging services represented 9.9% of all procedures in 2003–04, 12.7% in 2005–06 and now 15.6% in 2008–09, overtaking procedures on the musculoskeletal system as the second most common type of procedure to be listed in separations for hospitalised fall injury cases.

'Non-invasive, cognitive and other interventions' procedures include health assessments, diagnostic tests, counselling, therapeutic interventions, anaesthesia and allied health interventions such as physiotherapy, while the fixation or reduction of fractures, arthroplasty and amputations are examples of musculoskeletal procedures. Imaging services includes such procedures as ultrasound, tomography, radiography and magnetic resonance imaging.

Procedures classed as 'non-invasive, cognitive and other interventions, not elsewhere classified' were recorded at a rate of 206 per 100 fall injury case separations. Age-specific rates of these procedures were lowest for people aged 65–69 and generally increased for older age groups (Figure 5.1). Rates of imaging services followed a similar pattern, although at a lower overall rate (48 per 100 fall injury case separations). Conversely, rates of procedures on the musculoskeletal system were highest for younger age groups and lowest for people aged 90 and older. Procedures on the musculoskeletal system were recorded at a rate of 38 per 100 fall injury case separations overall.

Table 5.1: Total number of procedures listed in fall injury case separations for people aged 65+, Australia 2008–09

ACHI procedure groups	Males	Females	Persons
Procedures on nervous system	551 (0.8%)	676 (0.4%)	1,227 (0.5%)
Procedures on eye & adnexa	82 (0.1%)	115 (0.1%)	197 (0.1%)
Procedures on ear & mastoid process	60 (0.1%)	49 (0.0%)	109 (0.0%)
Procedures on nose, mouth & pharynx	157 (0.2%)	208 (0.1%)	365 (0.1%)
Dental services	21 (0.0%)	30 (0.0%)	51 (0.0%)
Procedures on respiratory system	791 (1.1%)	658 (0.4%)	1,449 (0.6%)
Procedures on cardiovascular system	585 (0.8%)	817 (0.5%)	1,402 (0.6%)
Procedures on blood & blood-forming organs	27 (0.0%)	33 (0.0%)	60 (0.0%)
Procedures on digestive system	422 (0.6%)	528 (0.3%)	950 (0.4%)
Procedures on urinary system	614 (0.8%)	659 (0.4%)	1,273 (0.5%)
Procedures on musculoskeletal system	7,062 (9.8%)	22,446 (13.1%)	29,508 (12.1%)
Dermatological & plastic procedures	2,549 (3.5%)	4,243 (2.5%)	6,792 (2.8%)
Radiation oncology procedures	23 (0.0%)	9 (0.0%)	32 (0.0%)
Non-invasive, cognitive and other interventions, n.e.c.	45,952 (63.5%)	116,013 (67.8%)	161,965 (66.5%)
Imaging services	13,470 (18.6%)	24,510 (14.3%)	37,980 (15.6%)
Other procedures	18 (0.0%)	32 (0.0%)	50 (0.0%)
Total	**72,384 (100%)**	**171,026 (100%)**	**243,410 (100%)**

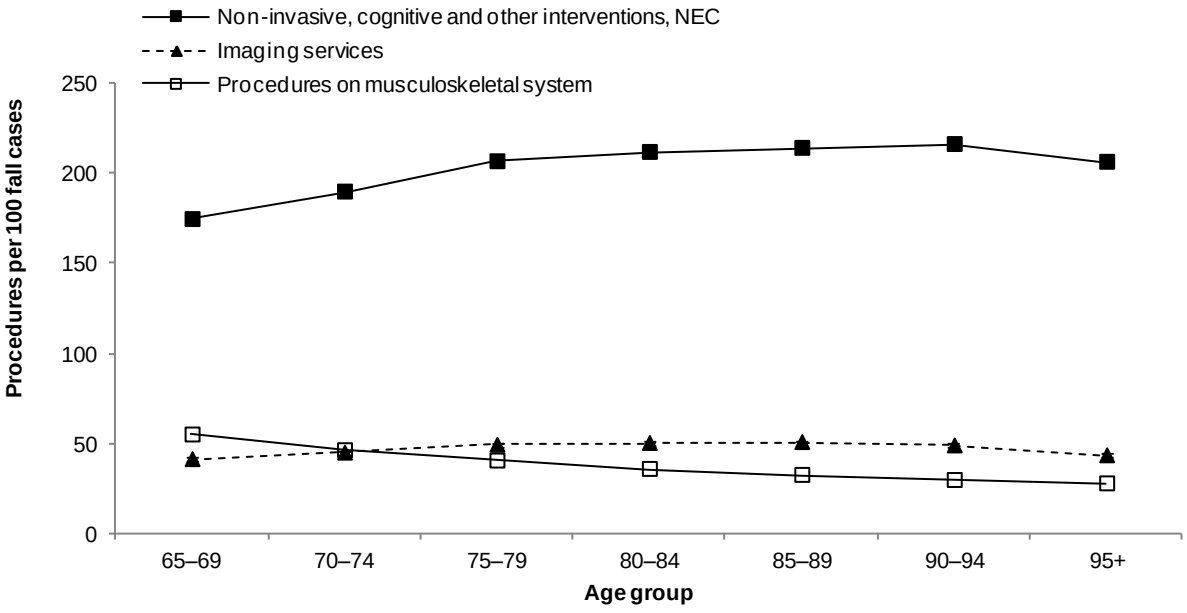


Figure 5.1: Age specific rates per 100 fall injury cases for three common procedure types, persons aged 65+, Australia 2008–09

Table 5.2 describes the ten most common first-listed procedures for fall injury case separations. Computerised tomography of brain (imaging services) was the most common first-listed procedure for males and the second most common for females. The most common procedure for females was allied health intervention, physiotherapy (non-invasive, cognitive and other interventions, not elsewhere classified). Overall, the most common procedures lists were similar for both males and females, with only repair of wound of skin and subcutaneous tissue of face or neck, superficial and computerised tomography of pelvis (males) and closed and open reductions of the distal radius (females) differing between the two.

Table 5.2: First-listed procedures—ten most common for fall injury case separations; males and females aged 65+, Australia 2008–09

Males		Females	
ACHI procedure name	**Per cent of separations**	**ACHI procedure name**	**Per cent of separations**
No procedure	*19.7%*	*No procedure*	*17.4%*
Computerised tomography of brain	14.8%	Allied health intervention, physiotherapy	14.3%
Allied health intervention, physiotherapy	12.2%	Computerised tomography of brain	11.0%
Internal fixation of fracture of trochanteric or sub-capital femur	7.5%	Internal fixation of fracture of trochanteric or sub-capital femur	9.5%
Hemiarthroplasty of femur	4.2%	Hemiarthroplasty of femur	5.2%
Repair of wound of skin & subcutaneous tissue of other site, superficial	3.6%	Closed reduction of fracture of distal radius	2.9%
Allied health intervention, occupational therapy	2.4%	Allied health intervention, occupational therapy	2.8%
Repair of wound of skin & subcutaneous tissue of face or neck, superficial	1.6%	Open reduction of fracture of distal radius with internal fixation	2.6%
Allied health intervention, social work	1.3%	Repair of wound of skin & subcutaneous tissue of other site, superficial	2.4%
Computerised tomography of pelvis	1.3%	Open reduction of fracture of femur with internal fixation	2.0%
Open reduction of fracture of femur with internal fixation	1.2%	Allied health intervention, social work	1.5%

Note: Shading indicates that the procedure does not feature in the ten most common list for the opposite sex.

Procedures listed in fall injury inward transfer separations

There were 36,314 procedures listed in fall injury inward transfer separations for people aged 65 and older in 2008–09. The number of procedures per fall injury inward transfer separation ranged from 0 (7.3%, *n* = 677) to 28 (*n* = 2). The mean number of procedures per inward transfer separation was 3.9 (± 2.7 SD) and males underwent slightly higher numbers of procedures on average (4.2 ± 3.1 SD) than females (3.8 ± 2.5 SD). There was little difference in the number of procedures recorded for the different age groups, however. As for fall injury cases, the most common type of procedure for fall injury inward transfers was 'non-invasive, cognitive and other interventions, not elsewhere classified' (76.1% of all procedures, *n* = 27,628), imaging services (8.1%, *n* = 2,954) and procedures on the musculoskeletal system (11.2%, *n* = 4,059). Note that imaging services were proportionately less common for inward

transfer separations than for procedures on the musculoskeletal system, unlike for fall injury cases.

Table 5.3 describes the ten most common first-listed procedures for inward separations. Allied health intervention, physiotherapy (non-invasive, cognitive and other interventions, not elsewhere classified) and internal fixation of fracture of trochanteric or sub-capital femur (procedures on the musculoskeletal system) were the first- and second-most common procedures for both males and females. Allied health intervention, physiotherapy alone accounted for about one in every four procedures recorded in fall injury transfer separations in 2008–09 (24.1%, *n* = 2,222).

Table 5.3: First-listed procedures—ten most common for fall injury inward transfer separations; males and females aged 65+, Australia 2008–09

Males		Females	
ACHI procedure name	**Per cent of separations**	**ACHI procedure name**	**Per cent of separations**
Allied health intervention, physiotherapy	21.7%	Allied health intervention, physiotherapy	25.2%
Internal fixation of fracture of trochanteric or sub-capital femur	10.8%	Internal fixation of fracture of trochanteric or sub-capital femur	12.6%
No procedure	*7.6%*	Hemiarthroplasty of femur	7.3%
Hemiarthroplasty of femur	6.9%	*No procedure*	*7.2%*
Computerised tomography of brain	6.0%	Allied health intervention, occupational therapy	4.6%
Allied health intervention, occupational therapy	4.1%	Allied health intervention, dietetics	4.3%
Allied health intervention, dietetics	3.6%	Computerised tomography of brain	3.7%
Drainage of intracranial haemorrhage	3.2%	Allied health intervention, social work	3.3%
Allied health intervention, social work	2.9%	Open reduction of fracture of femur with internal fixation	2.7%
Open reduction of fracture of femur with internal fixation	2.7%	Total arthroplasty of hip, unilateral	1.7%
Total arthroplasty of hip, unilateral	1.4%	Open reduction of fracture of distal radius with internal fixation	1.4%

Note: Shading indicates that the procedure does not feature in the ten most common list for the opposite sex.

Procedures listed in fall-related follow-up care separations

There were 88,681 procedures listed in fall-related follow-up care separations for people aged 65 and older in 2008–09. The number of procedures per separation ranged from 0 (5.2%, *n* = 1,534) to 17 (*n* = 1). While this range is smaller than for both fall injury cases (0–49) and inward transfer separations (0–28), a larger proportion of follow-up care separations had at least one procedure listed (94.8%, compared with 81.9% and 92.7% for cases and inward transfers, respectively). The mean number of procedures per follow-up care separation was 3.0 (± 1.7 SD) and, as for fall injury cases, there was little difference in the number of procedures recorded for males and females or for the different age groups.

The most common procedure type listed in fall-related follow-up care separations was 'non-invasive, cognitive and other interventions, not elsewhere classified', accounting for

95.2% of all procedures in these records (n = 84,442). As for fall injury cases, imaging services were the second most common type of procedures for follow-up care separations but these accounted for only 3.2% of the total (n = 2,848).

The ten most common first-listed procedures for fall-related follow-up care separations are shown in Table 5.4. Allied health intervention, physiotherapy was the most common procedure for both males and females, being the first-listed procedure for more than half of all follow-up care separations (55.7%, n = 16,512). All of the procedures featured in Table 5.4 are classed as non-invasive, cognitive and other interventions, not elsewhere classified, except for computerised tomography of brain (imaging services).

Table 5.4: First-listed procedures—ten most common for fall-related follow-up care separations; males and females aged 65+, Australia 2008–09

Males		Females	
ACHI procedure name	**Per cent of separations**	**ACHI procedure name**	**Per cent of separations**
Allied health intervention, physiotherapy	51.8%	Allied health intervention, physiotherapy	57.3%
Allied health intervention, occupational therapy	15.4%	Allied health intervention, occupational therapy	15.3%
No procedure	*5.6%*	*No procedure*	*5.0%*
Allied health intervention, social work	5.3%	Allied health intervention, social work	5.0%
Allied health intervention, dietetics	5.1%	Allied health intervention, dietetics	5.0%
Computerised tomography of brain	3.0%	Computerised tomography of brain	2.1%
Allied health intervention, speech pathology	1.8%	Allied health intervention, speech pathology	1.2%
Administration of packed cells	0.9%	Administration of packed cells	1.0%
Hydrotherapy	0.8%	Allied health intervention, pastoral care	0.5%
Exercise therapy, total body	0.6%	Hydrotherapy	0.4%
Allied health intervention, other	0.6%	Allied health intervention, pharmacy	0.4%

Note: Shading indicates that the procedure does not feature in the ten most common list for the opposite sex.

Procedures listed in 'other fall-related' separations

There were 90,702 procedures listed in 'other fall-related' separations for people aged 65 and older in 2008–09. The number of procedures per 'other fall-related' separation ranged from 0 (11.6%, n = 2,795) to 50 (n = 2). The mean number of procedures per 'other fall-related' separation was 3.8 (± 3.4 SD), and males underwent a slightly higher number of procedures on average (4.0 ± 3.6 SD) than females (3.6 ± 3.2 SD). The mean number of procedures per separation deceased slightly with age, from 4.1 ± 4.4 SD for people aged 65–69 to 3.1 ± 2.4 SD for people aged 95 and older.

The most common procedure types listed in 'other fall-related' separations for both males and females were 'non-invasive, cognitive and other interventions, not elsewhere classified' (66.4% of all procedures, n = 60,241) and imaging services (19.1%, n = 17,332). Unlike fall injury cases and inward transfer separations, procedures on the musculoskeletal system were relatively uncommon (2.2% of procedures, n = 2,008). Instead, procedures on the

cardiovascular system were the third most common type of procedure coded for 'other fall-related' separations in 2008–09 (3.4%, *n* = 3,067).

Computerised tomography of brain (imaging services) was the most common procedure for 'other fall-related' separations in 2008–09, being the first-listed in one of every five of these separations (Table 5.5). Six of the remaining procedures in Table 5.5 were from the 'non-invasive, cognitive and other interventions, not elsewhere classified' group and insertion of cardiac pacemaker generator (procedures on cardiovascular system) was also a relatively common procedure for both males and females.

Table 5.5: First-listed procedures—ten most common for 'other fall-related' separations; males and females aged 65+, Australia 2008–09

Males		Females	
ACHI procedure name	**Per cent of separations**	**ACHI procedure name**	**Per cent of separations**
Computerised tomography of brain	19.8%	Computerised tomography of brain	20.8%
Allied health intervention, physiotherapy	13.9%	Allied health intervention, physiotherapy	17.3%
No procedure	*11.0%*	*No procedure*	*12.2%*
Administration of packed cells	3.6%	Allied health intervention, occupational therapy	3.5%
Allied health intervention, social work	3.2%	Allied health intervention, social work	3.4%
Allied health intervention, occupational therapy	3.0%	Administration of packed cells	3.0%
Allied health intervention, dietetics	2.4%	Allied health intervention, dietetics	2.2%
Repair of wound of skin and subcutaneous tissue of other site, superficial	1.9%	Repair of wound of skin and subcutaneous tissue of other site, superficial	1.9%
Allied health intervention, speech pathology	1.7%	Allied health intervention, speech pathology	1.2%
Insertion of cardiac pacemaker generator	1.1%	Insertion of cardiac pacemaker generator	1.0%
Repair of wound of skin and subcutaneous tissue of face or neck, superficial	0.9%	Spiral angiography by computerised tomography of chest, with intravenous contrast medium	0.9%

Note: Shading indicates that the procedure does not feature in the ten most common list for the opposite sex.

Procedures listed in 'tendency to fall' separations

There were 56,490 procedures listed in the 19,256 'tendency to fall' separations for people aged 65 and older in 2008–09. The number of procedures per 'tendency to fall' separation ranged from 0 (11.0%, *n* = 2,117) to 38 (*n* = 1). As for most of the other types of fall-related separation, the mean number of procedures per 'tendency to fall' separation was about 3 (2.9 ± 2.3SD). There was little difference in the number of procedures recorded for males and females or for the different age groups (data not shown).

'Non-invasive, cognitive and other interventions, not elsewhere classified' and imaging services accounted for 95.3% of all the procedures contained within 'tendency to fall' separations (82.3% and 13.0%, respectively, *n* = 53,833. See Table 5.6).

Table 5.6: First-listed procedures—ten most common for 'tendency to fall' separations; males and females aged 65+, Australia 2008–09

Males		Females	
ACHI procedure name	**Per cent of separations**	**ACHI procedure name**	**Per cent of separations**
Allied health intervention, physiotherapy	33.5%	Allied health intervention, physiotherapy	36.1%
Computerised tomography of brain	16.4%	Computerised tomography of brain	15.0%
No procedure	*10.3%*	*No procedure*	*11.5%*
Allied health intervention, occupational therapy	6.8%	Allied health intervention, occupational therapy	7.4%
Allied health intervention, social work	6.0%	Allied health intervention, social work	5.7%
Allied health intervention, dietetics	3.4%	Allied health intervention, dietetics	3.4%
Allied health intervention, speech pathology	2.3%	Administration of packed cells	1.4%
Administration of packed cells	1.5%	Allied health intervention, speech pathology	1.4%
Computerised tomography of brain with intravenous contrast medium	1.0%	Allied health intervention, pharmacy	0.9%
Allied health intervention, other	0.9%	Computerised tomography of brain with intravenous contrast medium	0.7%
Magnetic resonance imaging of brain	0.8%	Allied health intervention, other	0.6%

Note: Shading indicates that the procedure does not feature in the ten most common list for the opposite sex.

6 Length of stay

This chapter provides information on the average and total admitted patient care days due to fall-related hospital care.

Fall injury case separations

The 78,606 fall injury case separations for people aged 65 and older in 2008–09 accounted for 579,260 patient days in this period. This represents 4.7% of all patient days for hospitalisations for this age group for the year. This in an increase of 15,898 days (2.8%) on the number of patient days used in 2007–08 (n = 563,362), a smaller increase than that noted between 2006–07 and 2007–08.

The length of stay per fall injury case separation ranged from one day (34.5%, n = 27,139) to more than 8 years (n = 1). While previous reports in this series (for example, Bradley & Harrison 2007) have omitted such lengthy stays from some analyses, the record has been left in here as examination suggests it is not erroneous. In all, less than 0.1% of fall injury case separations had a length of stay of 100 days or more (n = 46). The mean length of stay for all fall injury case separations was 7.4 days (± 14.4 SD), with the mean length of stay for males (7.2 days ± 10.2 SD) being similar to that for females (7.4 days ± 15.9 SD). As observed in previous reports, the mean length of stay for fall injury case separations increased with age for both males and females, although some decease in length of stay was noted for people aged 90 and older (Figure 6.1).

Fall injury case separations with a principal diagnosis of an injury to the hip and thigh accounted for the greatest proportion of patient days in 2008–09 (39.5%, the same proportion as in 2007–08, n = 229,040 days). Injuries to the abdomen, lower back, lumbar spine and pelvis accounted for a further 14.3% of patient days, and injuries to the head another 11.2%. Unsurprisingly, the three most common causes of fall injury cases—falls due to tripping, slipping and stumbling, 'other falls on the same level' and unspecified falls—accounted for the vast majority of the patient days for case separations in 2008–09 (82.6% combined, n = 478,227 days).

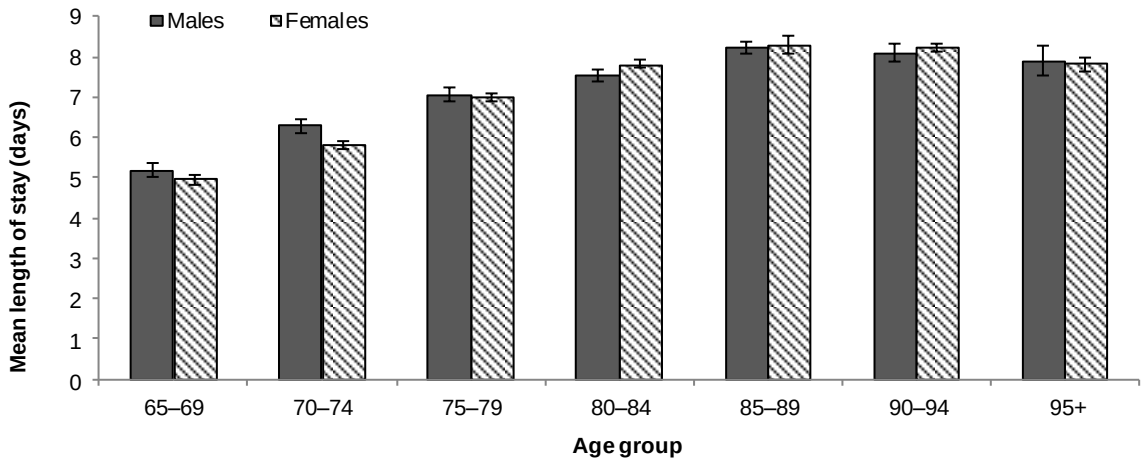


Figure 6.1: Mean length of stay (days ± SE) for fall injury case separations; males and females aged 65+, Australia 2008–09

Fall injury transfer separations

Fall injury inward transfer separations for people aged 65 and older (*n* = 9,212) accounted for 127,457patient days in 2008–09, 1.0% of all patient days for hospitalisations for this age group. This was an increase of 3,815 days (2.8%) since 2007–08 (see Bradley 2012b).

The proportion of fall injury inward transfer separations with a length of stay of one day was much smaller than that for fall injury case separations (8.0% versus 34.5%, respectively). Similarly, a relatively larger proportion of inward transfer separations had a length of stay of 100 days or more compared with case separations (0.26% versus 0.06%, respectively). Accordingly, the mean length of stay for fall injury inward transfer separations was substantially longer than that for fall injury case separations (13.8 days ± 15.3 SD versus 7.4 days ± 14.4 SD, respectively). The mean length of stay for fall injury inward transfers for males was 13.5 days (± 14.3 SD) while the equivalent mean length of stay for females was 14.0 days (± 15.7 SD). Lengths of stay were longer for the older age groups (Figure 6.2).

As for fall injury case separations, inward transfers with a principal diagnosis of an injury to the hip and thigh accounted for the greatest proportion of patient days in 2008–09 (41.2%, *n* = 52,490 days). Injuries to the abdomen, lower back, lumbar spine and pelvis (accounting for 14.6% of inward transfer patient days) and injuries to the head (9.3%) were the second- and third-most common source of patient days for fall injury inward transfers, as they were for fall injury cases.

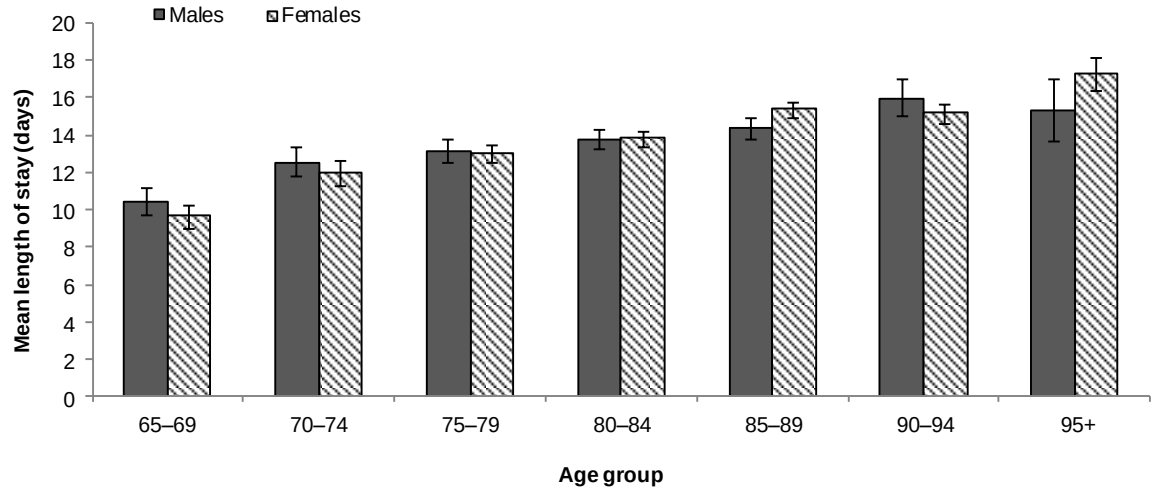


Figure 6.2: Mean length of stay (days ± SE) for fall injury inward transfer separations; males and females aged 65+, Australia 2008–09

Fall-related follow-up care separations

The 29,634 fall-related follow-up care separations for people aged 65 and older in 2008–09 accounted for 535,488 patient days—32,084 (6.4%) more patient days than in 2007–08 (*n* = 503,404 days). These half-million patient days for fall-related follow-up care were almost as numerous as those for case separations (*n* = 78,606 separations, 579,260 patient days) and accounted for 4.4% of all patient days for hospitalisations for people aged 65 and older in 2008–09.

The proportion of fall-related follow-up care separations with a length of stay of one day was much smaller than that for fall injury case separations (19.9 % versus 34.5%, respectively). Also, a larger proportion of follow-up care separations had a length of stay of 100 days or more compared with case and transfer separations (0.6%, *n* = 186 separations).

Overall, the mean length of stay for fall-related follow-up care separations was 18.1 days (± 26.7 SD). This is substantially longer than the means for both fall injury case separations and fall injury inward transfers. The mean length of stay for follow-up care separations for males (18.4 days ± 23.8 SD) was about the same as that for females (17.9 days ± 27.7 SD). Mean lengths of stay for fall-related follow-up care separations were generally longer for the older age groups, although this pattern was more marked for females than for males (Figure 6.3).

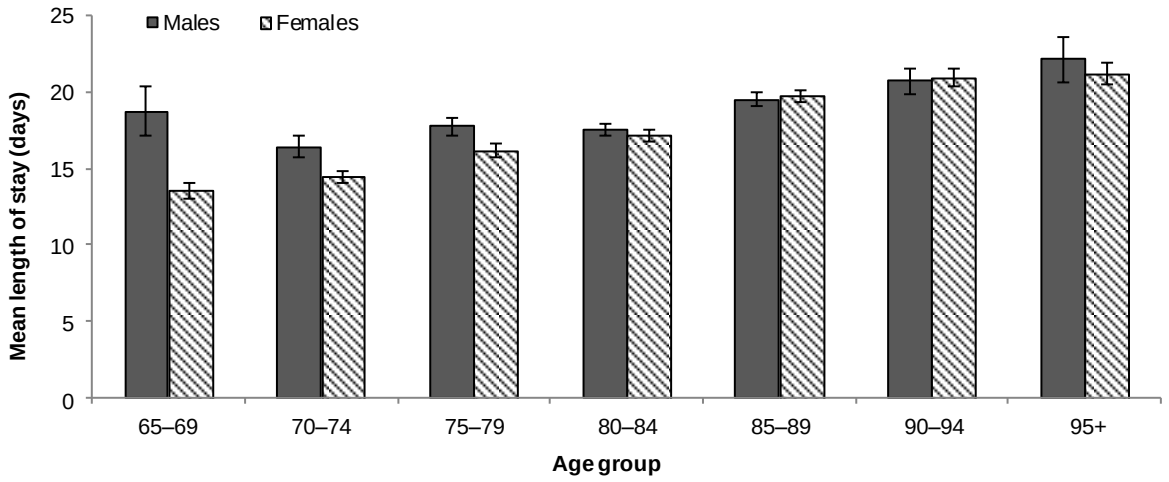


Figure 6.3: Mean length of stay (days ± SE) for fall-related follow-up care separations; males and females aged 65+, Australia 2008–09

As observed in 2007–08, the most common type of fall-related follow-up care separation in 2008–09, those with a principal diagnosis of Z50 (care involving use of rehabilitation procedures, *n* = 25,850), accounted for most patient days (83.1%, *n* = 444,995). However, separations with a principal diagnosis of Z75.1 (person awaiting admission to adequate facility elsewhere, *n* = 1,914) accounted for a greater number of patient days (10.4%, *n* = 55,952 days) than expected from separation counts (6.5% of follow-up care separations).

As observed in previous reports, mean lengths of stay for fall-related follow-up care separations differed between the four principal diagnosis groups (Figure 6.4). Separations with principal diagnoses of 'other orthopaedic follow-up care', 'other surgical follow-up care' or 'care involving use of rehabilitation procedures' had similar mean lengths of stay (15.8–20.9 days) while separations with a principal diagnosis describing 'person awaiting admission to adequate facility elsewhere' had a much longer mean length of stay (29.2 days ± 79.8 SD).

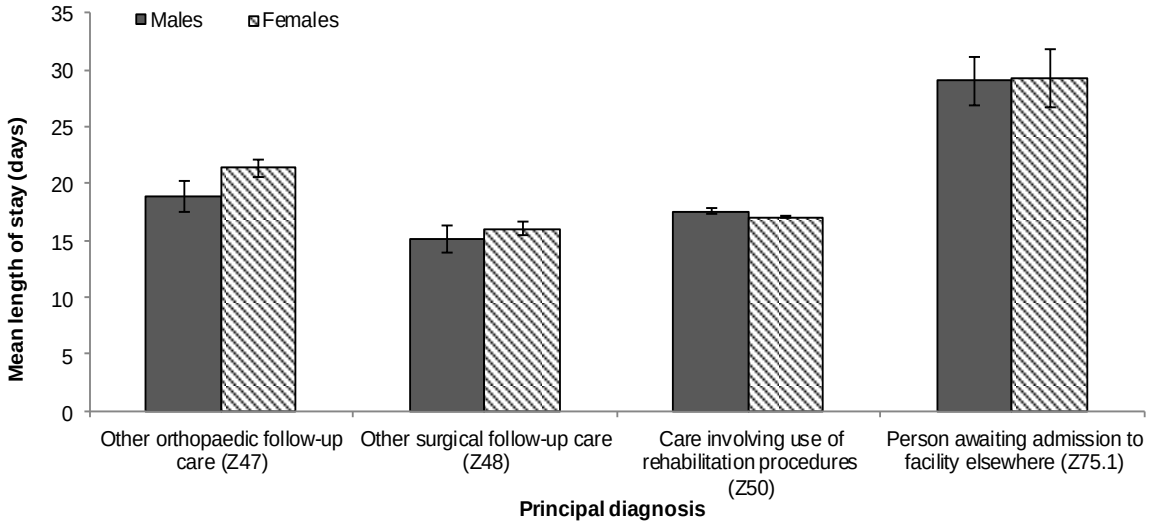


Figure 6.4: Mean length of stay (days ± SE) for fall-related follow-up care principal diagnosis groups; males and females aged 65+, Australia 2008–09

'Other fall-related' and 'tendency to fall' separations

A further 603,297 patient days in 2008–09 were attributed to 'other fall-related' separations (*n* = 349,940 patient days) and separations including the diagnosis 'tendency to fall' (*n* = 253,357 patient days)—some 11,444 patient days fewer than in 2007–08 (1.9%).

The mean length of stay for 'other fall-related' separations was 14.6 days (± 29.5 SD), similar to that for fall injury inward transfers. (This was longer than the mean length of stay for fall injury cases, but shorter than that for fall-related follow-up care separations). The mean length of stay for 'other fall-related' separations involving males (15.1 days ± 30.9 SD) was slightly longer than that for females (14.1 days ± 28.3 SD) and mean lengths of stay for 'other fall-related' separations were similar for all age groups (although slightly shorter for those aged 95 and older; 12.4 ± 13.8 SD). As in 2007–08, separations with principal diagnoses describing diseases of the circulatory system (Chapter IX of the ICD-10-AM) accounted for the largest proportion of patient days for this 'other fall-related' group (19.0%, *n* = 66,658 patient days).

The mean length of stay for R29.6 (tendency to fall) separations was 13.2 days (± 28.9 SD). This is substantially longer than the mean for fall injury case separations but similar to that for inward transfer and follow-up care separations. Mean lengths of stay were similar for both males and females (13.4 days ± 31.1 SD and 13.0 days ± 27.0 SD, respectively). As in 2007–08, mean lengths of stay for fall-related follow-up care separations varied inconsistently with age, but were nonetheless relatively similar for all age groups (range; 12.3–15.0 days). The one-third of 'tendency to fall' separations (30.9%) with a principal diagnosis from Chapter XXI of the ICD-10-AM (*Factors influencing health status and contact with health services*) accounted for 35.1% (*n* = 89,054) of all patient days for this group of fall-related separations.

All fall-related separations

The total number of patient days for hospital care *directly* attributable to injurious falls (that is, fall injury case, inward transfer and fall-related follow-up care separations) by people aged 65 and older in 2008–09 was 1,242,205 (Table 6.1). This figure represents 10.1% of all patient days for this population in this period and some 51,500 more patient days than used in 2008–09 (4.3% increase, a larger increase than noted between 2006–07 and 2007–08).

The additional 603,297 patient days attributable to 'other fall-related' and 'tendency to fall' separations brings the total number of patient days for fall-related separations for people aged 65 and older in 2007–08 to more than 1.8 million. However, as the relationship between the injurious fall and the principal reason for hospitalisation for the 'other fall-related' category and the use of the 'tendency to fall' code are not fully understood, the patient days for such separations have been omitted from the following analyses.

Table 6.1: Sum patient days for fall-related hospitalisations; males, females and persons aged 65+ years, Australia 2008–09

Separation type	Males	Females	Persons
Fall injury case separations	169,874	409,386	579,260
Fall injury inward transfer separations	37,823	89,634	127,457
Fall-related follow-up care separations	157,244	378,244	535,488
Total	**364,941**	**877,264**	**1,242,205**

The 117,452 hospital separations directly attributable to injurious falls (that is, fall injury case, inward transfer and fall-related follow-up care separations) involving people aged 65 and older in 2008–09 accounted for 6.3% of all patient days for males and 13.5% of patient days for females. These proportions are similar to those observed for 2007–08 (see Bradley 2012b). As observed in previous reports, the patient days for fall-related separations in 2008–09, as a proportion of all patient days for any cause, increased with age for both males and females (Figure 6.5). For persons aged 85 and older, fall-related separations accounted for nearly one-fifth of the total number of patient days for this population (18.3%).

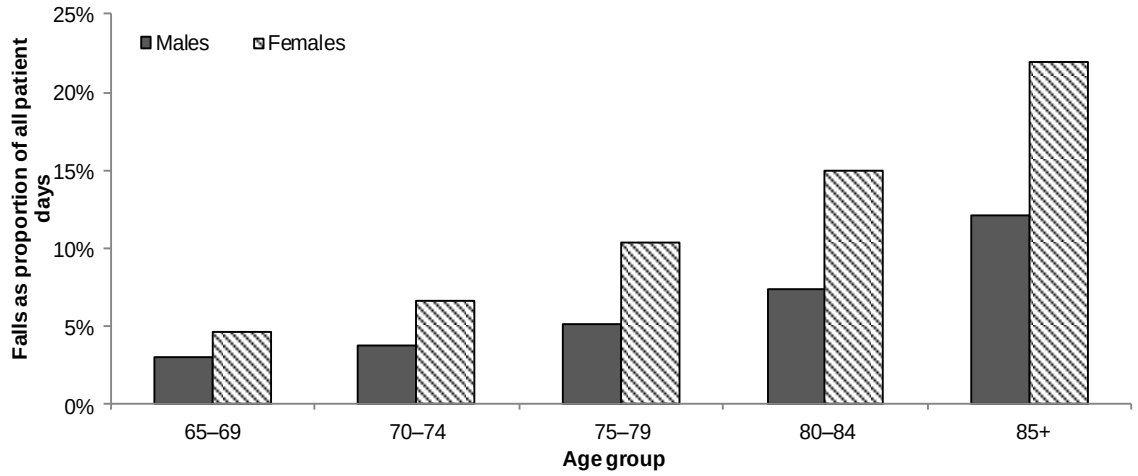


Figure 6.5: Total burden of fall-related hospitalisations as a proportion of all patient days for the population aged 65+, males and females, Australia 2008–09

Total mean length of stay

The length of stay analysis presented above separately considers the three groups of hospital separations directly attributable to falls. The fall injury inward transfers and fall-related follow-up care episodes discussed in Chapter Four are typically preceded by an initial episode for acute care (the cases of Chapters Two and Three). Hence, a valid estimate of the average total duration of hospital care (mean total length of stay) for admitted incidents of fall-related injury should include the patient days for all phases of care. On this basis, the estimated total mean length of stay for fall injury cases in 2008–09 (n = 78,606) was 15.8 days. This estimate is very similar to that reported for falls hospitalised in the previous year (Bradley 2012b).

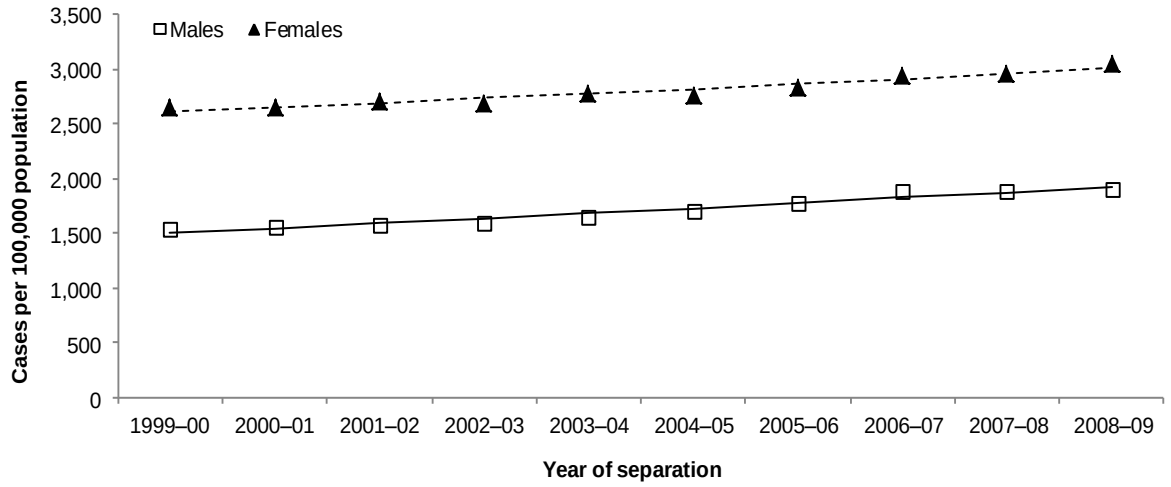
7 Trends over time

We have previously presented trends analyses for fall-related hospital data from 1999–00 to 2006–07 (Bradley 2012a). In this report we revise this work to include the two most recent years of fall-related hospital data.

Trends: all cases

The age-standardised rates of hospitalised fall injury cases for both males and females aged 65 and older continued to rise over the period to 2008–09 (Figure 7.1). Using negative binomial regression techniques, these increases in rate were of the order of 2.8% (males) and 1.6% (females) per year (persons: 1.8% per year). These results are statistically significant ($p < 0.001$) and are similar to the values determined in the previous analysis (see Bradley 2012a).

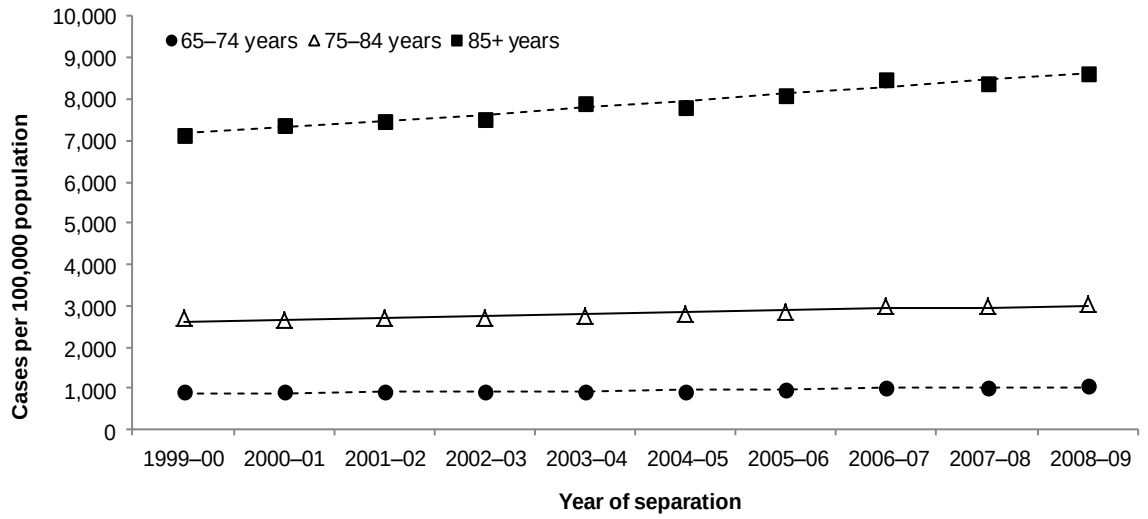
Based on these observations, we estimate that an extra 10,881 fall injury cases for people aged 65 and older separated from hospital in 2008–09 than would have if the age-standardised rate had remained stable since 1999–00.



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.1: Age-standardised rates for fall injury cases; males and females aged 65+, Australia 1999–2009

As observed in the previous analysis, increases in the rate of hospitalised falls were not consistent across all age groups in the older population. Figure 7.2 shows that the annual increase in the rate of fall injury cases was of greater magnitude for the oldest old; for those aged 85 and older, this increase was 2.1% per year between 1999–00 and 2008–09, compared with 1.8% per year for people aged 65–74 and 1.5% per year for people aged 75–84. Again, all of these increases were statistically significant ($p < 0.001$).



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

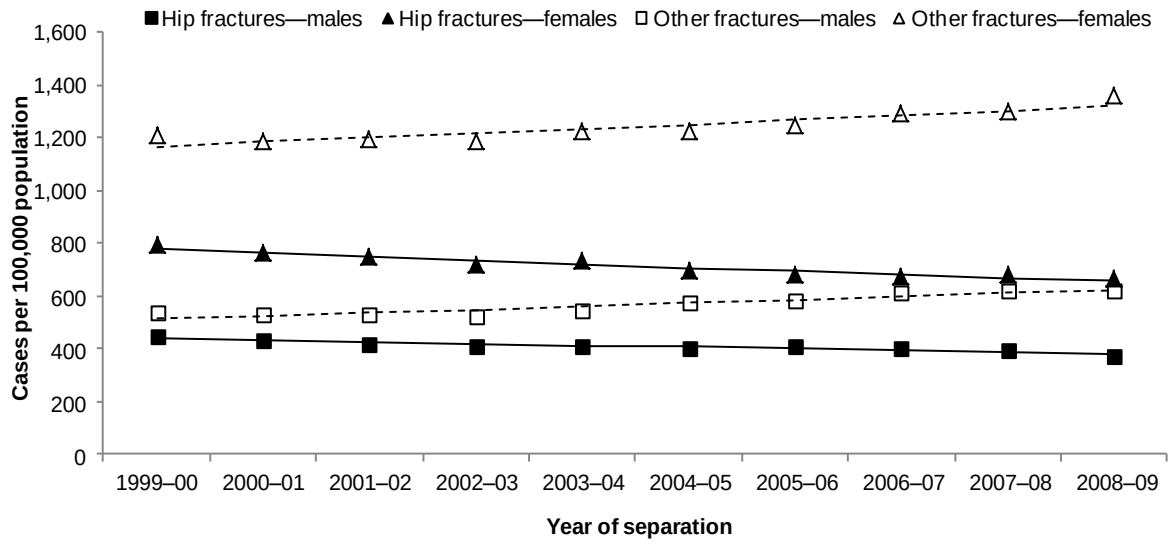
Figure 7.2: Age-standardised rates for fall injury cases for three age groups; those aged 65–74, 75–84, and 85 and older, Australia 1999–2009

Trends: hip fractures and other fractures

In contrast to all fall injury cases, the rates of hospitalised cases of hip fracture (principal diagnoses S72.0–S72.2) due to falls in people aged 65 and older have decreased since 1999–00 (Figure 7.3). While the rate of all hospitalised falls injury cases may be affected by changes in admission practices over time, it is thought that hip fractures are serious enough to be admitted to hospital in nearly every instance. Hence, rates of admission should provide a relatively reliable indicator of rates of severe falls (see Boufous et al. 2007; Dowling & Finch 2009).

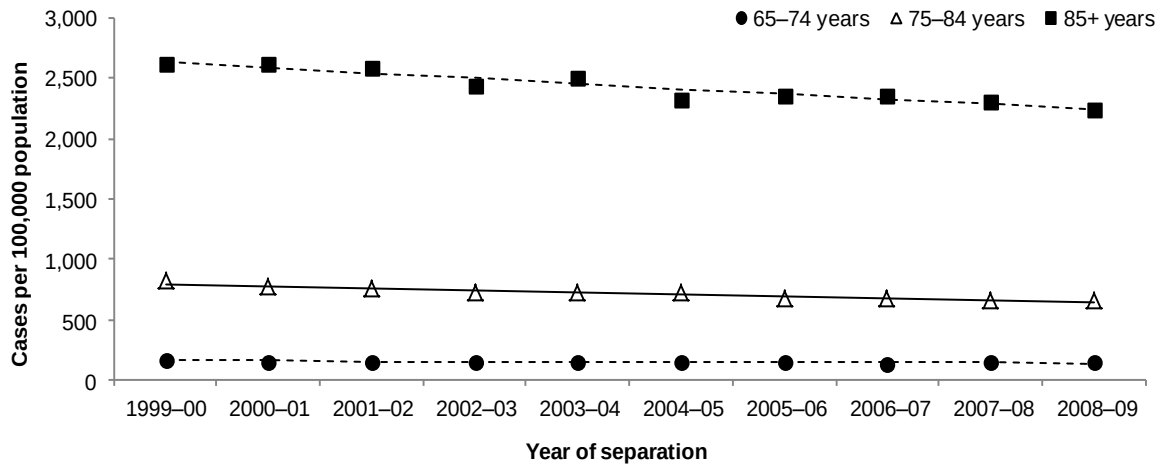
The decreases in the rates of hip fracture over the decade 1999–2009 were estimated to be –1.5% per year for males and –1.9% per year for females (persons: –2.0% per year). These values are similar to those previously reported (Bradley 2012a). Using these figures, we estimate that some 3,081 fewer hip fracture cases involving people aged 65 and older were hospitalised in 2008–09 than would have been if the age-standardised rate had remained stable since 1999–00. Rates of other types of fracture (that is, any other bones but the neck of the femur) were estimated to have increased over the decade (also plotted on Figure 7.3). The magnitude of these increases was estimated to be 2.2% per year for males and 1.4% per year for females (persons: 1.4% per year).

As for all hospitalised fall injuries, decreases in the rate of hip fractures were not consistent across all age groups in the older population (Figure 7.4). The decrease in the rate of hospitalised hip fractures was estimated to be –1.6% per year for people aged 65–74 and –2.3% per year for people aged 75–84. The rate of decrease for the oldest age group, those aged 85 and older, was estimated at –1.8% per year. While this was of a smaller magnitude to that for the group aged 75–84, this rate of decrease accounted for as many hip fractures 'prevented' in this age group (n = 1,464) as the larger rate of decrease did for those aged 75–84 (n = 1,476).



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.3: Age-standardised rates for hip fracture cases (principal diagnosis S72.0–S72.2) and all other fractures; males and females aged 65+, Australia 1999–2009



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.4: Age-standardised rates for hip fracture cases (principal diagnosis S72.0–S72.2) for three age groups; those aged 65–74, 75–84, and 85 and older, Australia 1999–2009

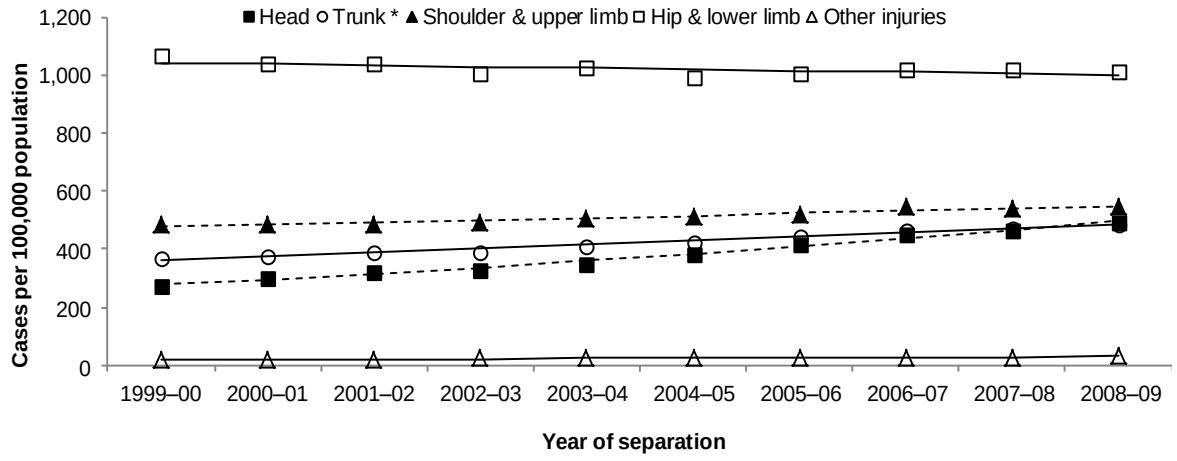
Trends: body region

As discussed above, the age-standardised rate of hospitalised hip fracture cases due to a fall by a person aged 65 and older decreased over the ten years to 2008–09, while rates of all other types of fracture (combined) increased over this time. It is of interest, then, to examine rates over time according to the body region of the principal injury, whether or not a fracture was sustained.

Analyses of fall injury cases hospitalised over the 1999–2009 study period according to the body part injured demonstrate that age-standardised rates increased for all body regions other than the hip and lower limbs (Figure 7.5). Rates of injuries to the head increased over time most substantially; 6.7% per year (p <0.001). Rates of injuries to the trunk region and the shoulders and upper limbs also increased significantly over the ten years to 2009 (by 3.2% and 1.5% per year, respectively).

While only 1.0% of fall cases in the study period were classed as 'other injuries not specified by body region', it is of interest that rates of cases of this type increased by 5.6% per year. Counts of cases of this type (commonly having a principal diagnosis describing 'injuries to unspecified part of trunk, limb or body region' or 'certain early complications of trauma, not elsewhere classified') increased from 444 in 1999–00 to 1,039 in 2008–09.

Conversely, injuries to the hip and lower limb region significantly decreased over the study period (–0.4% per year, p <0.01). This was largely due to the decrease in rates of hip fractures, discussed above. Increased rates of injuries to the knee and lower leg (1.0% per year) or ankle and foot (3.2% per year) mitigate the effect of the decrease in the rate of fall-related hip fracture cases, however.



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.5: Age-standardised rates for fall injury cases by body region of injury; persons aged 65+ years, Australia 1999–2009

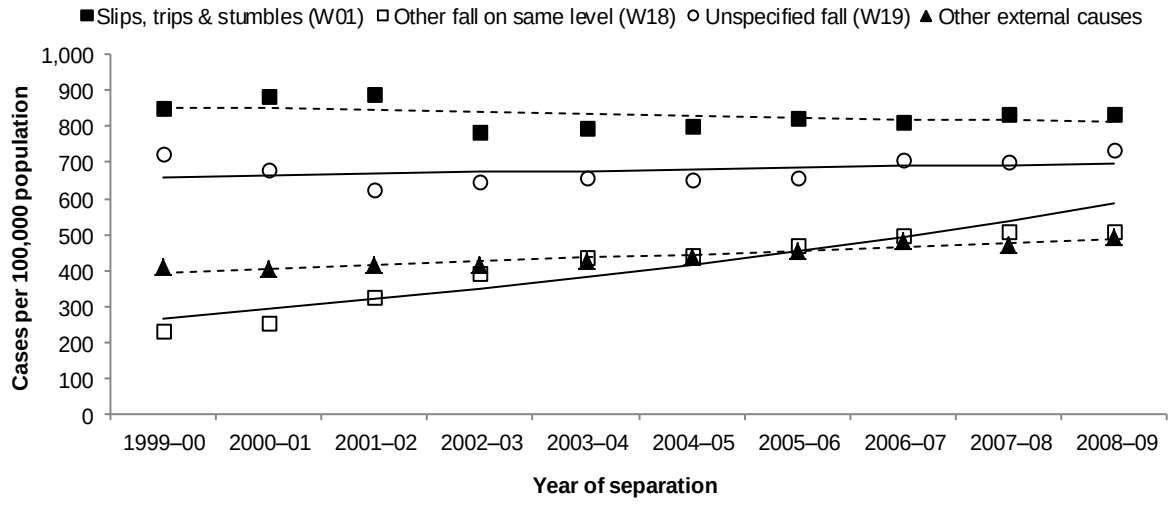
Trends: external cause

As found in the previous analysis (see Bradley 2012a), three external cause codes accounted for four in five (81.5%) fall injury cases for the ten year study period 1999–2009 (W01: fall due to slipping, tripping and stumbling, 35.0%; W18: other fall on same level, 17.6%; and W19: unspecified fall, 28.9%). Rates for these three external causes, and all other fall external causes combined, are shown in Figure 7.6.

The age-standardised rate of falls due to slipping, tripping and stumbling was observed to decrease by –0.6% per year ($p = 0.17$) over the decade 1999–2009. This is a notable change in results from the previous analysis, when the rate of falls due to slipping, tripping and stumbling was estimated to have significantly decreased by –1.2% per year ($p < 0.05$). Similarly, the rate of 'other falls on the same level' over the ten year study period was also estimated to have increased at a lesser magnitude than previously reported; 9.2% per year (compared with 11.8% per year over the eight years to 2007). This result remains statistically significant, however ($p < 0.001$).

Similar to that reported previously, the rate of unspecified falls remained stable over the 1999–2009 study period (–0.6% change per year, $p = 0.24$). This suggests that the observed changes in rates over time are not due to changes in the specificity of external cause coding.

Falls due to all other external causes combined (18.5% of cases over 1999–2009) increased over the study period by an estimated 2.4% per year; this increase was statistically significant ($p < 0.001$). Included in this group were falls on or from stairs and steps (which increased by an estimated 3.5% per year); falls from, out of or through building or structure (3.5% per year); falls involving chairs (2.7% per year); and falls involving beds (2.2% per year). Of note, rates of falls from one level to another and falls on the same level due to collision with, or pushing by, another person were observed to significantly decrease over the study period (–4.1% and –3.6% per year, respectively, $p < 0.001$).

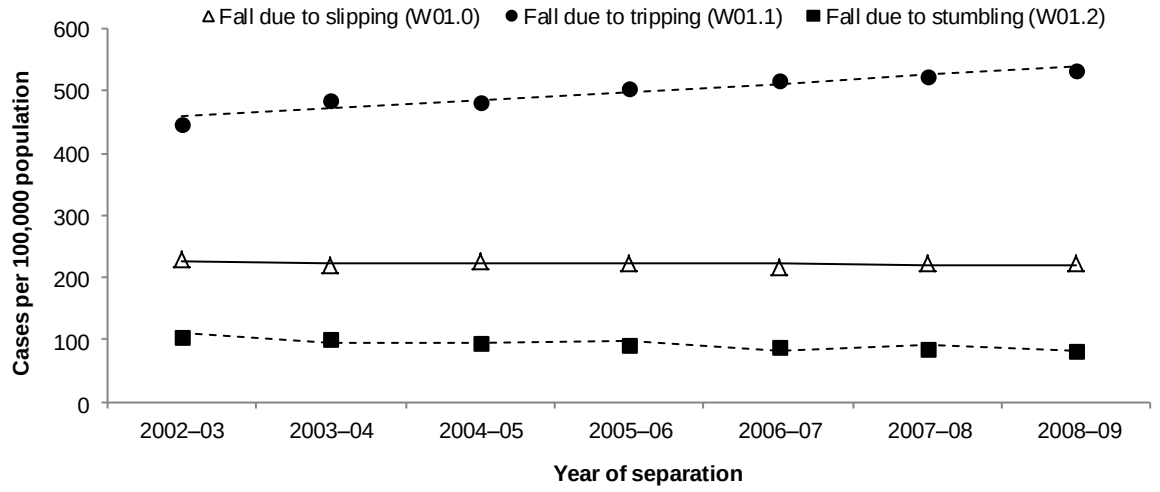


Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.6: Age-standardised rates for fall injury cases by selected external causes; persons aged 65+ years, Australia 1999–2009

From the 2002–03 data year onwards, the W01 external cause code has included a fourth digit to explicitly differentiate between slipping, tripping and stumbling (see NCCH 2008). Over the seven years to 2008–09, rates of falls due to slipping (27% of all W01 fall injury cases in this period) were estimated to have remained stable, decreasing by a non-significant –0.4% per year ($p = 0.22$, see Figure 7.7). Rates of falls due to stumbling (12% of all W01 fall injury cases over 2002–09) were estimated to have significantly decreased, however, by –4.0% per year ($p < 0.001$). Conversely, falls due to tripping, which accounted for three in five W01 fall injury cases in the study period (61%), significantly increased by 2.7% per year ($p < 0.001$).

These results give a somewhat different picture to that reported previously (see Bradley 2012a) and suggest a tendency towards stability in the individual slips, trips and stumbles external causes. Additional data in future years will be beneficial to this particular analysis as well as that for W01 external cause cases as a group, possibly being able to mitigate the sharp drop in rates coincident with the introduction of the fourth digit coding (in 2002–03) that can be seen in Figure 7.6.



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the actual age-standardised rate value for each year.

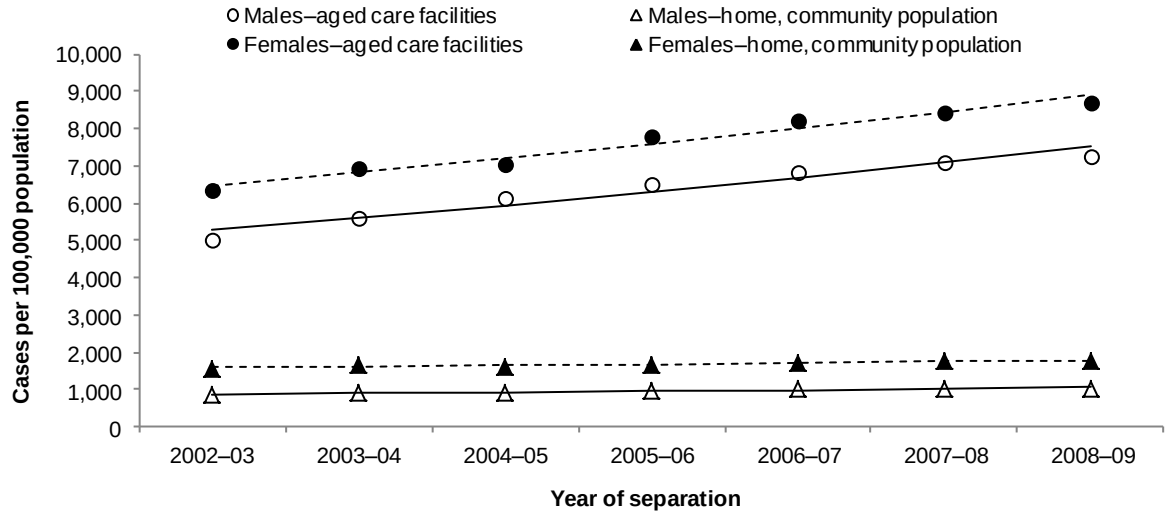
Figure 7.7: Age-standardised rates for fall injury cases due to slipping, tripping or stumbling; persons aged 65+, Australia 2002–09

Trends: place of occurrence

As discussed in Chapter Three, the two most common places of occurrence recorded for hospitalised fall injury cases for people aged 65 and older are the home and aged care facilities. Over the seven-year period 2002–2009 (when the ICD-10-AM included an explicit 'aged care facility' place of occurrence code), 70.4% of falls were reported to have occurred in the home or in aged care facilities. Using the same method as that underlying Figure 3.1 (see also Appendix), Figure 7.8 describes the rates over time for fall injury cases resulting in hospitalisation that had been recorded as occurring in the home or in aged care facilities.

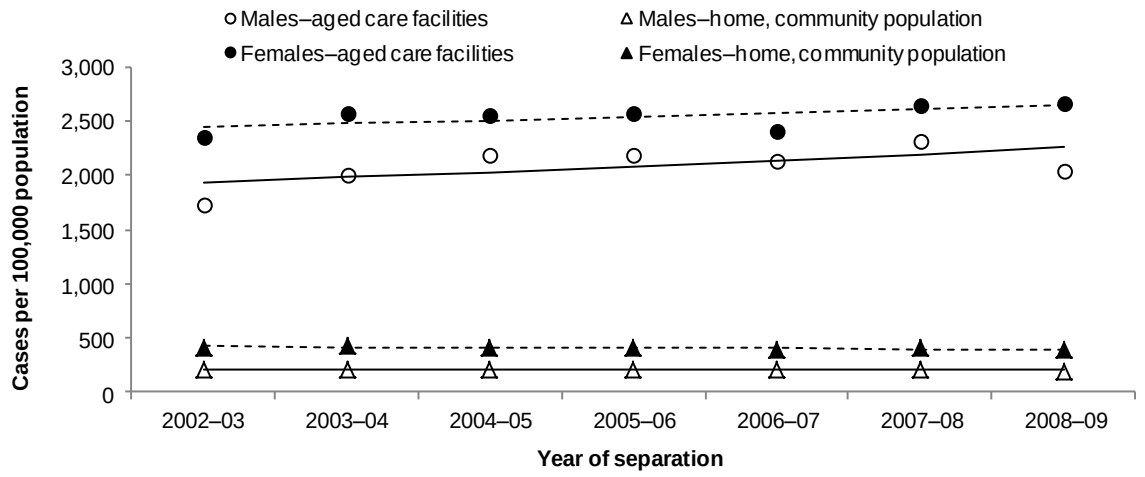
Residents of aged care facilities had considerably higher rates of hospitalised falls than community residents falling in the home in each year of the analysis, and both sets of rates increased significantly over the study period. However, while age-standardised rates of falls occurring in the home that involved people aged 65 and older resident in the community significantly increased between 2002–03 and 2008–09 (males: 3.3% per year; females: 2.0% per year), rates of falls that occurred in an aged care facility increased by a greater magnitude (males: 6.1% per year; females: 5.5% per year).

Similarly, the pattern of rates of hospitalised hip fractures due to falls has altered somewhat since the previous analysis (that is, Bradley 2012a). While the rates of hip fractures involving residents of aged care facilities do not show the decreasing trend observed for hip fractures occurring in the home (see Figure 7.9), or all places more generally, the magnitude of the increase observed for the 2002–09 period is less than that observed for 2002–07. That is, rates of hip fractures involving male and female residents of aged care facilities are now essentially stable (2.7% and 1.3% increase per year, respectively, $p = 0.04$), compared with decreasing rates of hip fractures due to falls in the home for both males and females resident in the community (–1.0% and –1.0% decrease per year, respectively, $p < 0.01$).



Note: Lines represent the modelled rates for the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.8: Age-standardised rates for 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 aged 65+, Australia 2002–2009



Note: Lines represent the modelled rates for the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.9: Age-standardised rates of hip fractures (S72.0–S72.2) due to 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 aged 65+, Australia 2002–2009

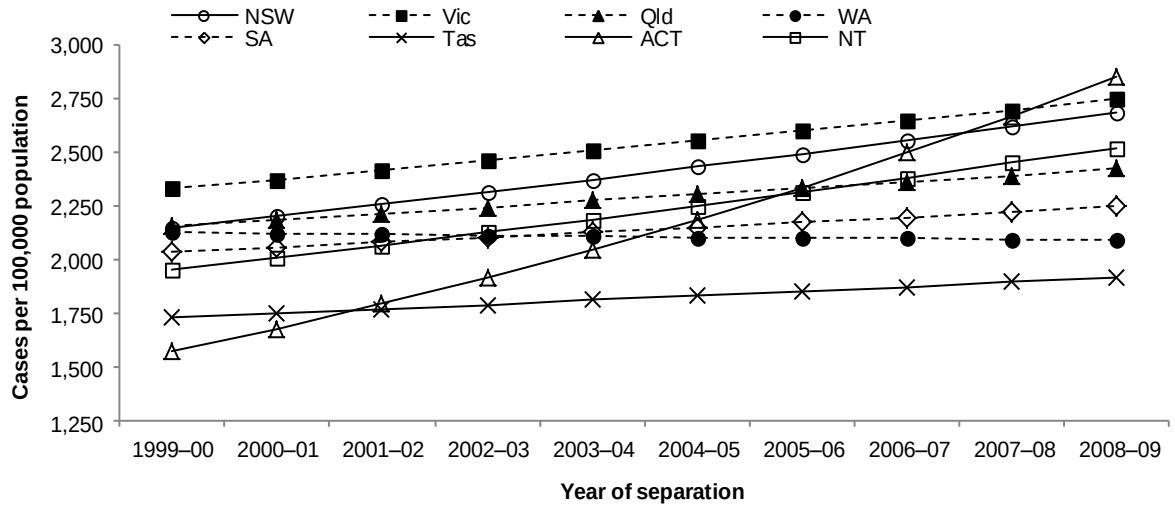
Trends: state or territory of usual residence

Significant increases in the rate of fall injury cases (persons per 100,000 population) were not observed in all jurisdictions (Figure 7.10). Estimated rate increases of 2.5% per year for New South Wales, 1.8% per year for Victoria, 1.3% per year for Queensland and 1.1% for South Australia were significant at the p <0.001 level. Rates of hospitalised falls for Western Australia were stable, however.

While an increase in rate of 1.1% per year for Tasmania was significant at the $p < 0.01$ level, this result is probably unduly influenced by the small size of the Tasmanian population. Similarly, the very large annual increase in hospitalised falls (6.8%) observed for the Australian Capital Territory is likely to be an artefact of the small population. By way of example, the 5.3% ($p < 0.05$) annual increase in hospitalised falls for the Northern Territory reported for the eight years 1999–2007 is now estimated to be only 2.9% per year for the ten-year study period of the present report ($p = 0.09$).

Conversely, significant decreases ($p < 0.01$) in rates of hip fractures (cases with principal diagnosis S72.0– S72.2) were observed in all jurisdictions other than the Northern Territory (Figure 7.11). These decreases ranged from –1.2% per year for New South Wales and South Australia to –4.1% per year in the Australian Capital Territory (although, again, small number issues are thought to have driven the observation of this particularly large decrease).

The estimated –1.7% per year decrease in rates of hip fracture in the Northern Territory was not significant ($p = 0.31$).

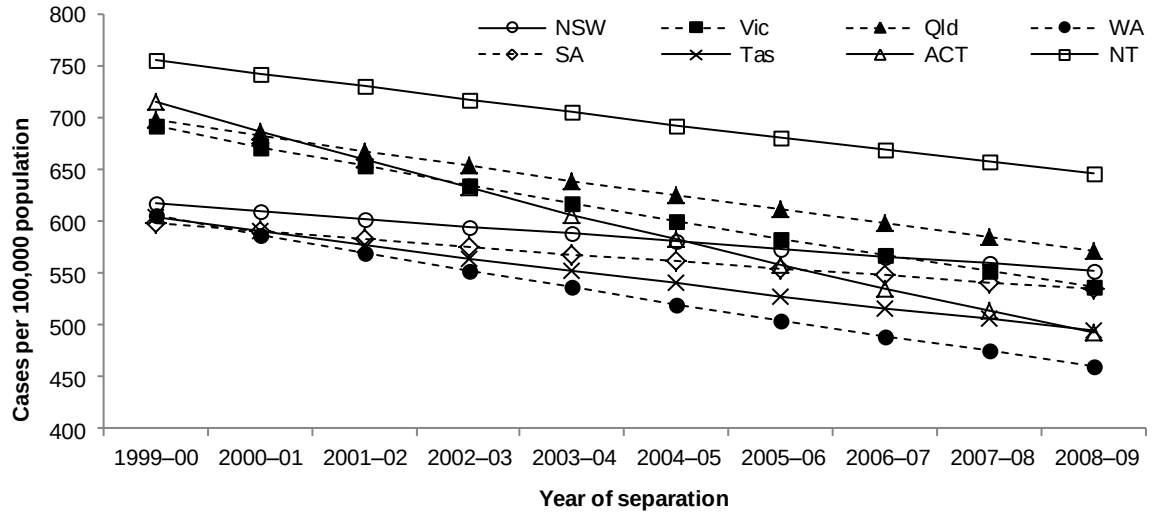


Notes

1. Lines and symbols represent the modelled rates over the ten-year period.

2. Y-axis scale starts at 1,250, not 0.

Figure 7.10: Age-standardised rates for fall injury cases by state or territory of usual residence; persons aged 65+, 1999–2009



Notes

1. Lines and symbols represent the modelled rates over the ten-year period.

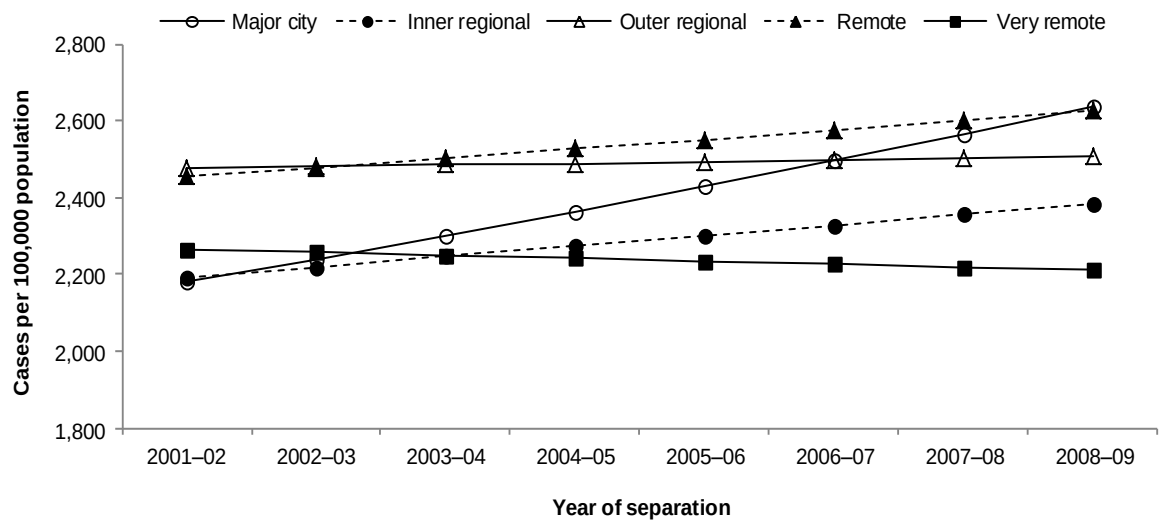
2. Y-axis scale starts at 400, not 0.

Figure 7.11: Age-standardised rates for hip fractures (S72.0–S72.2) due to falls by state or territory of usual residence; persons aged 65+, 1999–2009

Trends: remoteness of usual residence

Using the Remoteness Structure of the ASGC, we examined trends in fall-related hospitalisations over the period 2001–09. The data were limited due to changes in the Remoteness Structure at the time of the 2006 Census (see ABS 2006). For continuity, estimated resident population data for 2001–05, originally classified to the 2001 Census Remoteness Structure, have also been mapped to the 2006 Remoteness Structure.

The observed increase in the national rate of fall injury cases was not observed in all remoteness areas (Figure 7.12). While the age-standardised rate of hospitalised fall injuries involving residents of Australia's *Major cities* and *Inner regional* areas significantly increased (by 2.7% and 1.7% per year, respectively, $p \leq 0.001$), the increases observed for residents of *Outer regional* and *Remote areas* were not significant (0.2% and 1.0% per year, respectively, $p > 0.20$). Rates of hospitalised fall injuries involving residents of Australia's *Very remote* areas were also statistically stable over the 2001–09 study period (–0.3% decline per year, $p = 0.84$). This result, however, is likely to be influenced by the small size of this population ($n < 12{,}000$ people aged 65 and older).

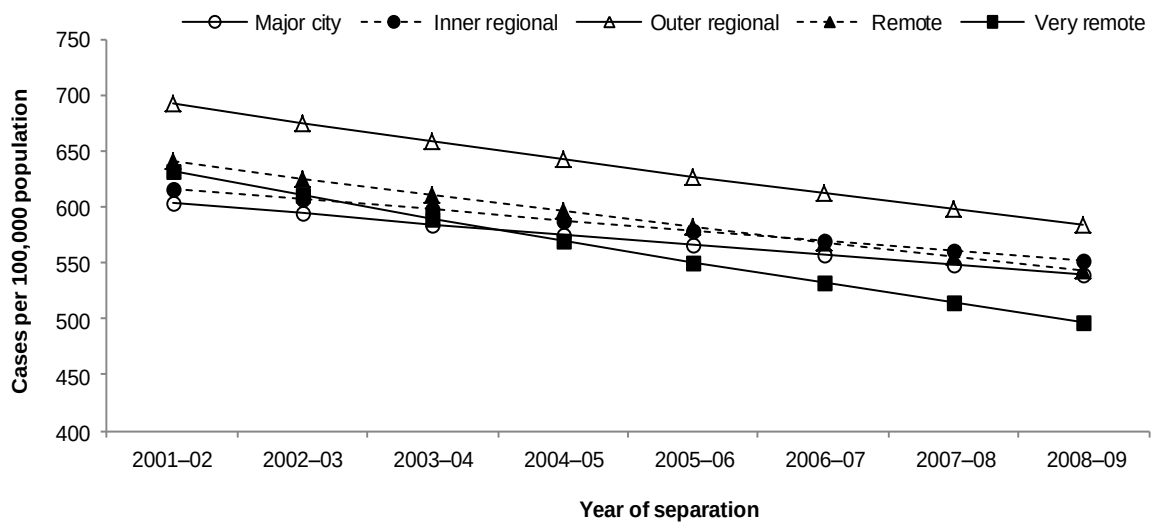


Notes

1. Lines and symbols represent the modelled rates over the ten-year period.
2. Y-axis scale starts at 1,800, not 0.

Figure 7.12: Age-standardised rates for fall injury cases by remoteness of usual residence; persons aged 65+, 2001–09

Decreases in the rate of fall-related hip fractures were observed in all remoteness areas, however (Figure 7.13), although results were not statistically significant for the *Remote* and *Very remote* populations ($p > 0.06$). The largest decrease in the age-standardised rate of hospitalised hip fractures involved residents of Australia's *Outer regional* areas, falling –2.4% per year over the 2001–09 period ($p < 0.001$). The rates of fall-related hip fractures involving residents of *Major cities* and *Inner regional* areas both decreased by –1.6% per year ($p \leq 0.001$).



Notes

1. Lines and symbols represent the modelled rates over the ten-year period.
2. Y-axis scale starts at 400, not 0.

Figure 7.13: Age-standardised rates for hip fractures (S72.0–S72.2) due to falls by remoteness of usual residence; persons aged 65+, 2001–09

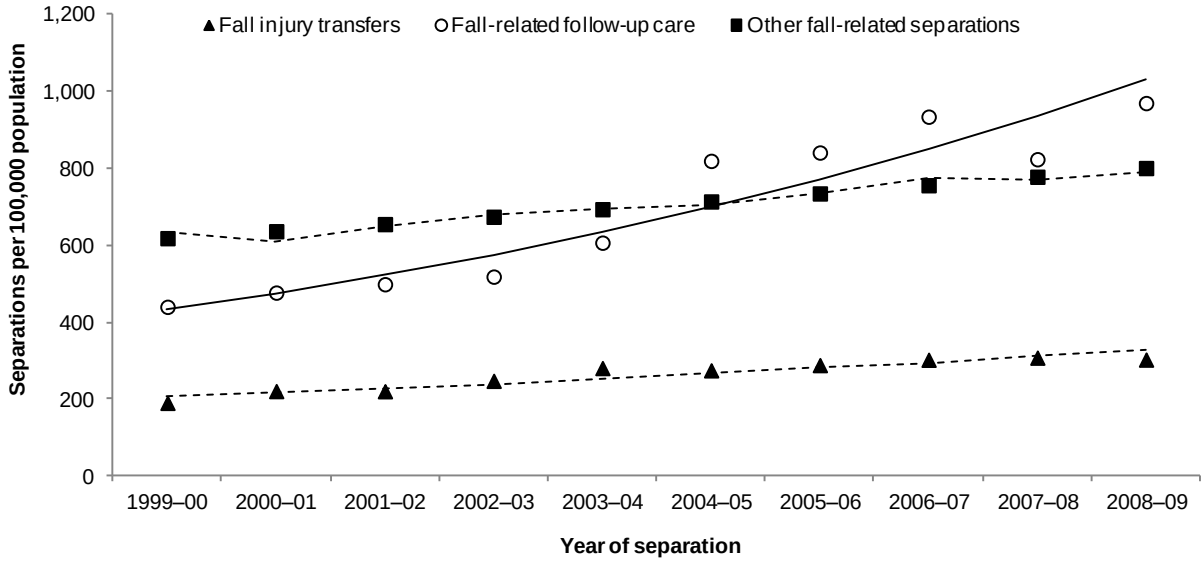
Trends: 'other fall-related' separations

Age-standardised rates of both fall injury inward transfer separations and fall-related follow-up care separations were observed to substantially increase over the ten-year period to June 2009 (Figure 7.14). Similar to fall injury cases, rates of injury transfer separations involving males increased by the greatest magnitude; 6.6% per year, compared with 5.0% per year for females (persons: 5.3% per year). However, and as observed in the previous analysis of this type (see Bradley 2012a), increases in rates of fall-related follow-up care separations were similar for both sexes; 10.7% per year for males and 10.3% per year for females. All of these increases were significant ($p < 0.001$).

Although we are not entirely certain of the role of fall injury in the episodes of care we identify as 'other fall-related' separations, Figure 7.14 also presents the age-standardised rate of these separations over the 1999–2009 study period. Rates of 'other fall-related' separations significantly increased for both males and females over this time, by 3.5% and 2.4% per year, respectively (persons: 2.9% per year, $p < 0.001$).

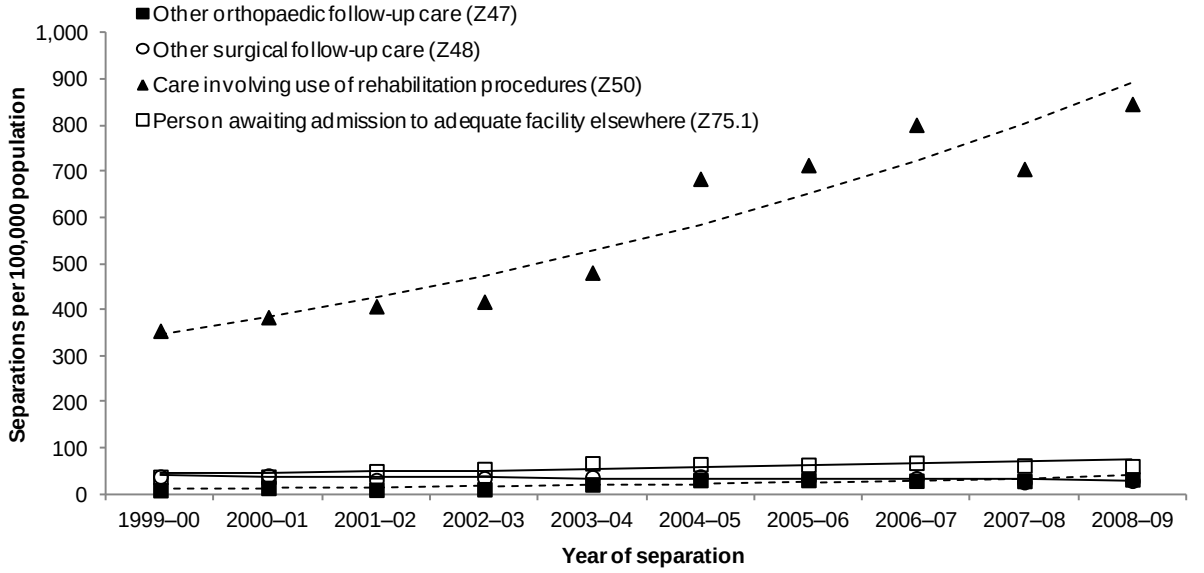
Of the four types of fall-related follow-up care separations (principal diagnoses Z47, Z48, Z50 and Z75.1), the largest increase in rate was observed for Z47 (other orthopaedic follow-up care), increasing by an estimated 17.2% per year ($p < 0.001$). These separations were relatively few in number, however, accounting for only 3.1% of all follow-up care separations over the 1999–2009 period. Far more numerous were the fall-related follow-up care separations with Z50 as the principal diagnosis (84.0% of all follow-up care separations). The age-standardised rate of these episodes of hospital care increased by an estimated 11.2% per year ($p < 0.001$). In real terms, this meant an increase from 355 per 100,000 population in 1999–00 to 847 per 100,000 in 2008–09 (see Figure 7.15).

Although difficult to see in Figure 7.14, rates of fall-related hospitalisations with the principal diagnosis Z75.1 (person awaiting admission to adequate facility elsewhere) increased by 6.1% per year between 1999 and 2009 ($p < 0.001$), while rates of fall-related follow-up care coded to Z48 (other surgical follow-up care) significantly decreased over the same period (–3.1% per year, $p < 0.01$).



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.14: Age-standardised rates for fall injury transfers, fall-related follow-up care and other fall-related injury separations; persons aged 65+, Australia 1999–2009



Note: Lines represent the modelled rates over the ten-year period, while symbols represent the age-standardised rate value for each year.

Figure 7.15: Age-standardised rates for fall-related follow-up care separations by principal diagnosis; persons aged 65+, Australia 1999–2009

Trends: length of stay

Despite the significant increase in the age-standardised rate of fall injury cases involving people aged 65 and older over the ten years 1999–2009, the rate of patient days for these separations did not increase in the same period (Figure 7.16). About 19,800 patient days per 100,000 population were for fall injury case separations in 1999–00 compared with about 18,800 patient days per 100,000 in 2008–09. We estimate that there was a –0.4% per year decrease in the age-standardised rate of patient days for fall injury case separations over the study period, which was not a statistically significant result ($p = 0.13$).

Conversely, there were significant increases in the rates of patient days for fall injury transfer and fall-related follow-up separations over the ten-year study period, similar to the significant increases observed for the counts of these episodes of hospital care outlined in the previous section. The age-standardised rate of patient days for fall injury transfer separations increased by 5.4% per year ($p < 0.001$) while the rate of patient days for fall–related follow-up care separations increased by 7.4% per year ($p < 0.001$).

Consequently, a significant increase of 3.0% per year ($p < 0.001$) was estimated for the rate of patient days for hospital care attributable to injurious falls (that is, fall injury case, inward transfer and fall-related follow-up care separations).

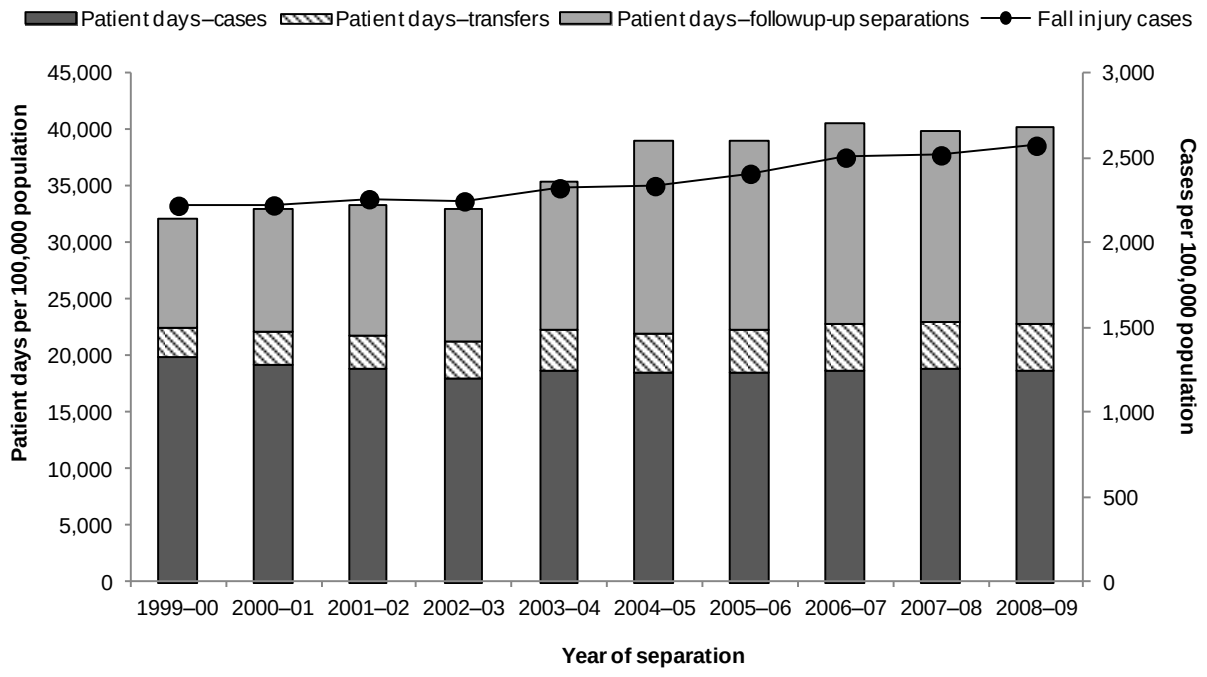


Figure 7.16: Age-standardised rates for fall-related patient days (case, transfer and follow-up care separations) and fall injury case counts; persons aged 65+, Australia 1999–2009

8 Discussion

Falls are common among older people and often result in fractures or other serious injuries (Lord et al. 2001; McClure et al. 2005; Sattin 1992; Tinetti et al. 1988). About one in three older people living at home experiences a fall annually (for example, Dolinis et al. 1997; Gill et al. 2005; Lord et al. 1993; NSW Health 2010) and nearly three in four hospitalised injuries involving older Australians are due to falls (Bradley & Harrison 2008; Kreisfeld & Harrison 2010). The fifth in the series, this report confirms that the rate of hospitalised falls, and the burden to the hospital system due to these injuries, for people aged 65 and older remains high.

In total, 117,452 hospital separations were identified as being directly related to injurious falls by people aged 65 and older in 2008–09, including 78,606 fall injury case separations, 9,212 inward transfers and 29,634 fall-related follow-up care separations. These directly fall-related records represent 3.9% of all hospital separations for any cause for this population. Further, these fall-related hospitalisations accounted for 1.2 million patient days in 2008–09, 10.1% of all hospital patient days for the population aged 65 and older. That falls account for a greater proportion of both separations and patient days in 2008–09 than in 2007–08 suggests that the upward trends over time observed for fall-related hospital care are continuing (see Bradley 2012a; Bradley & Pointer 2008).

A further 43,280 hospital separations were identified as being in some way due to falls by older Australians in 2008–09: 24,024 'other fall related' separations (having a fall-related injury in the record, but not as the principal diagnosis) and 19,256 'tendency to fall' separations (not meeting the criteria for our other fall-related categories but having an R29.6 'tendency to fall' diagnosis in the record). Separations of these types contributed 0.6 million additional patient days (4.9%) to the burden to the hospital system for people aged 65 and older.

Fall injuries and circumstances

The estimated number of fall injury cases for people aged 65 and over that resulted in hospitalisation in 2008–09 was 78,606, some 4,000 (5.6%) more cases than estimated for the previous year. The age-standardised rate of fall injury cases in 2008–09 was only marginally higher than in 2007–08, 2,573 per 100,000 population compared with 2,516 per 100,000, respectively (a 2.2% increase). The larger increase in case counts is due to the rapidly increasing older population (see ABS 2008) as well as to the increasing incidence of injurious falls.

As in previous years, and reflective of the general population aged 65 and older, females made up a higher proportion of fall-related hospitalisations in 2008–09. Similarly, the age-standardised rate of injurious falls was again higher for females than for males. Of note however, the age-standardised rate of falls for females aged 65 and older was observed to be more than 3,000 per 100,000 population for the first time in 2008–09 (and compares with a rate of about 1,900 per 100,000 for males).

While injuries to the hip and thigh continued to be the most common principal diagnosis for a hospitalised fall injury case for both males and females in 2008–09, the proportion of all cases these injuries represent has fallen compared with that for previous years (and consistent with the trends reported in Bradley 2012a; see also Dowling & Finch 2009).

Conversely, a higher proportion of hospitalised falls resulted in head injuries: 19.1% in 2008–09 compared with 18.6% and 18.0% in the previous two years. While these figures give the impression that the observed increase is marginal, the actual increase in the number of head injuries due to falls is about 7% per year (Bradley 2012a). Again, this is consistent with the findings of other epidemiologists both in Australia and overseas (for example, Hartholt et al. 2011; Kannus et al. 2007; Kleiven et al. 2003; Watson & Mitchell 2010). Of note, head injuries remain proportionately more common for older males than for older females and this may affect the design of any intervention specifically developed to reduce these injuries.

As in previous years, the most common type of fall for fall injury cases in 2008–09 was a fall on the same level due to slipping, tripping and stumbling; this was also the most common cause of a fall-related injury for both males and females. The second- and third-most common types of fall injury case were 'unspecified' falls and 'other fall on same level'. These three types of fall were also the most commonly listed external causes for other groups of fall-related hospitalisations. The ICD-10-AM allows slips, trips and stumbles to be individually identified and, of the 25,346 such cases in 2008–09, nearly two-thirds (n = 16,153) were attributed to trips. While the external cause code W18 'other fall on same level' also has several subcategories (for example, W18.1, fall from or off toilet), the 'other specified' and 'unspecified' subcategories are used far more frequently than the more specific codes in this group. These findings are similar to those made in previous years and may have relevance for falls prevention interventions. For example, interventions may attempt to specifically prevent injuries due to tripping (as opposed to, say, stumbling) and thus address a large, and relatively defined, group of falls. Similarly, further work could be put in to expanding the W18 'other fall on same level' external cause, to tease out the specific mechanisms involved in the many thousands of falls assigned to the 'other specified' and 'unspecified' subcategories of this code.

Place of occurrence

As in previous years, seven out of ten fall injury cases were recorded as having occurred in the home or in aged care facilities, and place was recorded as 'unspecified' for a further 17% of fall cases. Differing from previous analyses, however, was our ability to differentiate falls occurring in different areas of the home with the introduction of the sixth edition of the ICD-10-AM (NCCH 2008). About half of the falls occurring in the home were coded to the 'other specified' and 'unspecified' subcategories of this code. Nonetheless, useful observations can be made from the expanded code in its first year of use: about one in five falls in the home (20%) happen in either the bathroom or the bedroom while a further 10% occur in 'outdoor areas'. Further, falls involving males were more common in areas external to the home (the driveway, garage and outdoor areas) while falls involving females were proportionately more common in areas within the home itself (the bedroom, bathroom, kitchen, laundry etc.). These findings may be useful to occupational therapists or other allied professionals seeking to reduce falls risk in and around an older person's home.

Further findings relating to the place of occurrence of hospitalised fall injuries in 2008–09 suggest that rates of fall injury cases in aged care facilities remain markedly higher than those in the home for people resident in the general community (see also Gibson et al. 2008). Moreover, the disparity between the rate of falls in aged care facilities and that in the home appears to be widening, with rates in aged care facilities being more like six times that for the home in 2008–09. This is consistent with the findings from our last analysis of the trends in fall-related hospitalisations (Bradley 2012a). As that analysis demonstrated that this disparity

was even more distinct for older males, these results suggest that substantial effort needs to be put into interventions to prevent falls for older male residents of age care facilities as a matter of priority.

As in previous years, the about seven in every ten fall injury cases were coded to 'unspecified activity' in 2008–09, giving us little to work with in terms of developing targeted interventions. As discussed in previous reports (for example, Bradley 2012a, 2012b), we suggest that future revisions of the ICD-10-AM activity codes include subcategory coding to explicitly describe the types of activity older people more commonly undertake (for example, housework, DIY, gardening and volunteer work) much like the very detailed coding available for sporting activities (for example, Flood & Harrison 2006). Further, a category describing 'while being taken care of' or 'while receiving hospital treatment' (or similar) would be a timely addition to the activity codes of the ICD-10-AM, particularly given the recent introduction of condition onset coding (see AIHW 2010a).

Health interventions

We also examined the health interventions coded to fall-related separations in 2008–09, revisiting analyses last undertaken for the 2003–04 and 2005–06 study periods (see Bradley & Harrison 2007; Bradley & Pointer 2008). The most common procedure types listed in fall injury cases were 'non-invasive, cognitive and other interventions, not elsewhere classified' (accounting for all procedures for cases), imaging services and procedures on the musculoskeletal system. While similar to findings in previous reports, we observed that increases in both the number and relative proportion of imaging services procedures noted between 2003–04 and 2005–06 continue with this analysis of 2008–09 records, with imaging services becoming more common than procedures on the musculoskeletal system in this time. 'Non- invasive, cognitive and other interventions, not elsewhere classified' procedures were also by far the most common type of procedure listed in the records of all other groups of fall-related separations.

The burden of fall-related injury

The groups of separations identified in this report as being fall-related but not fall injury cases (that is, fall injury inward transfers, fall-related follow-up care, 'other fall-related' and 'tendency to fall' separations) significantly increased the already substantial estimate of the burden of hospitalised fall injury cases among people aged 65 and older in 2008–09. As in 2007–08, fall-related follow-up care separations contributed almost as many patient days as those for fall injury cases; 0.54 million days compared with 0.58 million days, respectively. This brought the total number of hospital patient days for falls by older Australians to more than 1.2 million days. Put another way, one in every ten days spent in hospital by a person aged 65 and older in 2008–09 was attributable to an injurious fall.

Fall-related follow-up care

Defined by a set of four principal diagnoses from Chapter XXI of the ICD-10-AM (*Factors influencing health status and contact with health services*) and having both an injury diagnosis and a fall external cause code, 29,634 fall-related follow-up care separations for people aged 65 and older were identified for the 2008–09 period. As in previous years, the principal diagnosis Z50.9 (care involving use of rehabilitation procedure, unspecified) was found to be particularly common for this type of separation; about four in every five fall-related follow-

up care separations had this principal diagnosis. A further 6% of fall-related follow-up care separations had a principal diagnosis indicating that the person was awaiting admission to an adequate facility elsewhere (Z75.1). Most of these specified that the person was waiting for admission to a residential aged care service and it is thought that separations of this type are additional to the 21–23% of older people who are admitted to residential aged care directly following a hospitalised fall injury (as estimated by the AIHW for 2001–02, see Karmel et al. 2008).

Another class of fall-related separation that added to the burden to the hospital system due to falls was for those we term 'other fall-related' separations. These separations do not meet the criteria specified for fall injury cases, inward transfers or fall-related follow-up care separations, but do contain both a community injury additional diagnosis (S00–T75 or T79) and fall external cause code (W00–W19). The exact relationship between the fall injury and the principal diagnosis for these 'other fall-related' separations is not known. Our examination of place of occurrence for both these 'other fall-related' separations and fall-related follow-up care separations suggests that a substantial proportion occur in a health service area and so could possibly be 'new' falls. This finding makes it vital that we be able to use the new national condition onset data (see AIHW 2010a) as soon as possible in order to better understand these groups.

As currently defined, 'other fall-related' separations contributed a further 24,024 episodes of hospital care and 0.3 million patient days for people aged 65 and older in 2008–09. As in previous years, about one in five 'other fall-related' separations (21%) had a principal diagnosis describing diseases of the circulatory system while principal diagnoses describing 'symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified' were also common. Of note, unlike fall injury cases, inward transfers and fall-related follow-up care separations, both the age-standardised and age-specific rates of 'other fall-related' separations were higher for older males than older females.

'Tendency to fall' separations

The final group of fall-related hospital separations considered in this report are those defined by the presence of the diagnosis code R29.6 (tendency to fall, not elsewhere classified). This diagnosis should be used in situations where the patient has the "tendency to fall because of old age or other unclear health problems" but not for injurious falls or a tendency to fall due to known conditions (see NCCH 2008). Nevertheless, a relatively small number of separations that contained a 'tendency to fall' diagnosis in 2008–09 also contained both an injury and a fall external cause code and were considered elsewhere in the report (that is, as fall injury cases, transfers, follow-up care or 'other fall-related' separations). A further 19,256 separations in 2008–09 were identified as containing 'only' an R29.6 (tendency to fall) diagnosis, however—about 7% more such separations than in 2007–08. Nearly 0.3 million patient days were attributed to these episodes of care. Interestingly, as for 'other fall-related' separations, but unlike the other fall-related groups, the age-standardised rate of 'tendency to fall' separations (and the age-specific rate for all age groups) was higher for older males than for older females.

Trends for fall-related hospital care

This report's analysis of the trends in fall-related episodes of hospital care over the ten years to 2009 demonstrates that while the age-standardised rate of one of the most serious consequences of falls—hip fractures—continues to decline, the rates of many other types of fall-related injury, and fall injuries overall, continue to increase. These results are puzzling. It is tempting to attribute the decline in rates of hip fracture to increased use of anti-osteoporotic treatments (for example, Fisher et al. 2009); however, unless such explanations can adequately account for the increasing trend for other fractures, they must be viewed with some scepticism.

Rate increases for many specific injury types (body regions injured, external cause etc.) were observed to have increased between 1999–00 and 2008–09. Accordingly, there does not appear to be one particular type of injury or cause of injury that singularly explains the overall rate rise. Of interest, however, the rate of head injuries due to falls has increased markedly over the decade, and similar observations are being made internationally (see Hartholt et al. 2011; Kannus et al. 2007; Kleiven et al. 2003). Given that head injuries can have extremely serious outcomes, these observations suggest that concerted effort to identify the types of fall that are causing these injuries, and so inform prevention activities, is warranted.

Unlike the previous analysis (for which rate of falls due to slips, trips and stumbles were observed to have decreased between 1999–00 and 2006–07, see Bradley 2012a), the current analysis suggests that rates of slips, trips and stumbles were stable over the 1999–2009 study period. The rate of 'unspecified' falls (another very common external cause for fall injury cases) was also estimated to be stable over this time. However, while the magnitude has lessened somewhat since the previous analysis, the rate of 'other falls on same level' (the third most common cause of hospitalised fall injury) is still estimated to be increasing substantially.

These findings have ramifications for fall prevention policies and programs. Much recent effort has gone into preventing slips, trips and stumbles in the older population (for example, Chari et al. 2009; Clemson et al. 2008; Gillespie et al. 2009; Haran et al. 2009; Menant et al. 2008) but, as the period under analysis lengthens, these programs do not appear to be having any measurable impact on the rate of hospital admissions for fall-related injury. Indeed, the rate of falls due to tripping—the most common cause of falls of this type—is estimated to be increasing at a significant rate. More also needs to be known about the increase in the rate of 'other falls on [the] same level'. Recent changes in the ICD-10-AM coding structure allow more specific coding of this type of fall, but such detail is lacking for cases that occurred before July 2007. Future analyses may be able to determine whether the increase in the rate of 'other falls on same level' (presuming it continues) can be explicitly attributed to increasing numbers of falls due to bumping against objects, from or off toilets, or in or into bathtubs or showers. Such information would be invaluable for developing interventions. If such work can also give insight into the interaction between the changes in the rates of certain types of fall and rates by age, sex and injury type, this would be of even greater benefit.

As previously suggested, further analyses of trends in fall injuries or falls risk according to place of occurrence are also warranted. We have again observed that while rates of fall injury cases involving older people falling in their home are increasing significantly, rates of falls in residential aged care facilities (assuming they involve residents of aged care facilities) are increasing by a greater magnitude. This may indicate an increasing degree of frailty in

Australia's residential aged care population and a need to focus more specifically on interventions designed for the aged care setting. Similarly, rates of hip fracture for residents of aged care facilities do not reflect the declining trend of rates of hip fracture in the home or in all places of occurrence. Targeted research examining the drivers of the recent (community-based) reductions in hip fracture rates and ways to translate these for the residential aged care population would be of great benefit for all older Australians.

Rates of other fall-related separations (transfers, fall-related follow-up care, 'other fall-related' separations) have also increased markedly over the period 1999–2009, and by a much larger magnitude than observed for fall injury cases. These findings indicate that the burden to the hospital system due to injurious falls is increasing to a greater extent than increases in the rate of fall injury cases by themselves suggest. It is possible that the ageing of the Australian population is resulting in a need for more complex hospital care, due to increased frailty or co-morbid conditions. However, more needs to be known about hospital behaviours and admission practices before we can properly interpret these findings.

Potential for improved surveillance

As discussed in reports in the series for previous years, our surveillance of injurious falls is limited by the de-identification of the NHMD records. Our enumeration of injury events (that is, cases) over a given period is an estimate based on a method derived from a study of person-linked data from a single jurisdiction (Western Australia). Our identification of 'fall-related follow-up care separations' is based on findings from this same study. These findings demonstrated that a large proportion of injury cases (particularly fall-related hip fractures) were associated with subsequent separations coded with one of four particular principal diagnoses from Chapter XXI of the ICD-10-AM (*Factors influencing health status and contact with health services*). While there is no evidence to suggest that these methods are incorrect, further work using person-linked data is highly desirable to resolve the uncertainties inherent in the use of non-linked separation records in this report and to improve our understanding of injurious falls (see also Boufous & Finch 2005).

Such work would also be ideally placed to provide greater understanding of those separations coded with the diagnosis R29.6 (tendency to fall). In particular, linkage-based work could examine the role of the 'tendency to fall' diagnosis in an individual's fall history; does the diagnosis shortly precede an injurious fall? Does the diagnosis facilitate targeted interventions and successfully reduce the risk of a later injurious fall? Ideally, such a linkage study should incorporate as many jurisdictions as possible. It should certainly include Western Australia and New South Wales (where suitable linkage systems are well established) and preferably South Australia and Northern Territory (where a similar system is in the later stages of development).

Moreover, our understanding of fall-related hospital separations would be substantially improved by analysing the recently introduced condition onset data (see AIHW 2010a). These flags provide a means of differentiating those conditions that were present on admission from those that arose during the episode of hospital care. Condition onset is to be reported for each diagnosis, external cause, place of occurrence, and activity when injured variable. Condition onset data are mandated for national collection in the Admitted Patient Care National Minimum Data Set from 1 July 2008. These new data need to be validated for quality and completeness; after they are cleared for use, the information they contain will be vital for improving our surveillance of in-hospital falls. These falls are currently identified only through the use of the 'health service area' place of occurrence code. Our examination

of place of occurrence for both fall-related follow-up care separations and, importantly, 'other fall-related' separations in this report (finding that some nearly 10% of follow-up care and 40% of 'other fall-related' separations have 'health service area' as the first-listed place of occurrence) makes it imperative that we analyse the condition onset information as soon as possible. In time, condition onset data may also aid our understanding of the increasing rates for these types of fall-related separation.

It is also hoped that the condition onset data will allow a better understanding of activity coding, which is notoriously unspecific for all injuries other than those sustained during sports.

Appendix: Data issues

Data sources

Hospital separations data were provided by the AIHW (see AIHW 2010a). 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 were also obtained from the AIHW, similar to that published as the *Australian demographic statistics series* (ABS 2009a). Population estimates of residents of aged care facilities were obtained from the AIHW report series *Residential aged care in Australia* (for example, AIHW 2009, 2010c). The number of people aged 65 and older resident in the community was estimated by subtracting the number of residents of aged care facilities from the general population data.

ICD-10-AM

This report is based on hospital separations data coded according to the sixth edition of the Australian clinical modification of ICD-10, the ICD-10-AM (NCCH 2008).

Selection criteria

Fall cases and inward transfers

Fall cases were defined as all NHMD unit records with a date of separation between 1 July 2008 and 30 June 2009 that met the following specifications:

- The patient was aged 65 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 falls and,
- The mode of admission was not a transfer from another hospital.

Diagnoses S00–T75 or T79 have been used to specify 'community injury' (that is, injuries that are not complications of surgical or medical care) in recent NISU reports (e.g. Bradley & Harrison 2008). Selection has been based on principal diagnosis because this refers to the condition "chiefly responsible for occasioning [the] episode of admitted patient care" (AIHW 2010b; NCCH 2008). The left-most (first-listed) external cause code was chosen as a selection criterion as this is most likely to be related to the principal diagnosis (see also Table A1).

Inward transfers from other hospitals were omitted from incidence estimates as this reduces multiple counting of cases that generate more than one separation record. NHMD unit records are de-identified and do not contain specific 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 one hospital and then transferred to another hospital results in two (un-linked) unit records for the same health event. Further, re-admissions relating to the same health event/injury are not flagged within the NHMD, again generating multiple entries in the database. Accordingly, the number of hospital separations meeting our definition of injury overestimates the number of injury cases that led to hospitalisation due to the unavoidable inclusion of these re-admissions.

The separations omitted from our estimate of fall injury incidence on the basis of being inward transfers (that is, 'cases' but with a mode of admission indicating a transfer from another hospital) were analysed separately and included in measures of the burden to the hospital system due to fall-related injuries.

Follow-up care separations

Analysis of person-linked data 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). 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 NHMD unit records with a date of separation between 1 July 2008 and 30 June 2009 that met the following specifications:

- The date of separation was between 1 July 2008 and 30 June 2009
- The patient was aged 65 or older
- The principal diagnosis was either Z47, Z48, Z50 or Z75.1
- Any diagnosis variable contained a code in the range S00–T75 or T79 and,
- Any external cause code variable contained a code in the range W00–W19.

These 'fall-related follow-up care' separations accounted for 93.2% of the total number of separations for people aged 65 and over in 2008–09 with a principal diagnosis from Chapter XXI of the ICD-10-AM and a falls external cause code within the record (n = 29,634 of 31,804 separations).

'Other fall-related' separations

Another group of fall-related separations was specified that includes all separation records containing a diagnosis code for community injury (S00–T75 or T79) and an external cause code for an unintentional fall (W00–W19), and that are not included in any of the groups above. This group includes NHMD unit records with a date of separation between 1 July 2008 and 30 June 2009 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 contained a code in the range W00–W19
- The separation was not classed as a fall injury incident case or inward transfer and,
- The separation was not classed as a fall-related follow-up care separation.

Most of these 'other fall-related' separations had a principal diagnosis for a non-injury condition; however, the group also included separations with a community injury principal diagnosis and a fall external cause, but not as the left-most external cause.

‘Tendency to fall’ separations

The sixth edition of the ICD-10-AM includes the diagnosis code R29.6 (tendency to fall) (NCCH 2008). The code R29.6 replaces the R29.81 ‘other and unspecified symptoms and signs involving the nervous and musculoskeletal systems—falls’ code used in the fourth and earlier editions of the classification (see NCCH 2004). The entry in the coding manual for R29.6 reads “tendency to fall because of old age or other unclear health problems” (‘Australian Coding Standards’, NCCH 2008) and falls due to difficulty walking, dizziness and giddiness, syncope and collapse or causing injury are explicitly excluded. Further, the ICD-10-AM coding standards regarding both the R29.6 and R29.81 codes (that is, across editions) specify that these codes *should not be applied* in cases of known injury or when a medical condition is found to be the cause of the falls. Nevertheless, some records containing fall injury coding (for example, fall injury case separations, fall-related follow-up care separations) are found to also contain an R29.6 diagnosis. The numbers of such records are small (n = 5,534 in 2008–09); however, to avoid double-counting we have omitted records already included elsewhere in the report from our analysis of ‘tendency to fall’ separations.

Accordingly, in this report, ‘tendency to fall’ separations were defined as NHMD unit records for which:

- The date of separation was between 1 July 2008 and 30 June 2009
- The patient was aged 65 years or older
- Any diagnosis variable contained an R29.6 code
- The separation was not classed as a fall injury incident case or inward transfer;
- The separation was not classed as a fall-related follow-up care separation and,
- The separation was not classed as an ‘other fall-related’ separation.

All case selection criteria used in this report are summarised in Table A1.

Calculation of rates

Age-specific rates were calculated for age groups (five-year bands up to age 90–94, and a group for ages 95 and older) using national and jurisdictional population estimates as at 31 December 2008 (the mid-point of the financial year study period). These data were obtained from the AIHW and are similar to that presented in the *Australian demographic statistics* series (ABS 2009a).

Population estimates according to the ASGC of remoteness (see ABS 2009b) are available from the ABS only for the year ending 30 June. Values for 31 December were calculated using the mean of the population estimates for 2008 and 2009. Further, ASGC data are available only for age groups in five-year bands to age 85 and older, limiting our rate calculations to this range.

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 series *Residential aged care in Australia* (AIHW 2009, 2010c). The populations resident in aged care facilities as at 30 June 2008 and 30 June 2009 were averaged to estimate this population as at 31 December 2008, the mid-point of our study period. The number of people aged 65 and older who were resident in the community was then estimated by subtracting the number of residents of aged care facilities from the general population.

The age distribution of the population aged 65 and older differs between jurisdictions, remoteness zones and genders, and is changing over time. In this report, most rates for the whole age range of 65 and older have been standardised using the direct method to facilitate valid comparisons. The Australian population as at 30 June 2001 has been used as the standard.

Quantifying variability in the counts presented in this report

The data presented in this report are subject to two types of statistical error, non-random and random. (A third type of statistical error, sampling error, does not apply here because none of the data sources used involved probability sampling.)

Non-random error: Some amount of non-random error is to be expected in administrative data collections such as the hospital inpatient data on which this report relies. For example, non-random error could occur if the approach to assigning cause codes to cases were to differ systematically between jurisdictions or over time. Systems are in place to encourage uniform data collection and coding and scrutiny of data during analysis includes checking for patterns that might reflect non-random error. Nevertheless, some non-random error is likely to remain. Identified or suspected non-random errors large enough to materially affect findings are mentioned in reports.

Random error: The values presented in the report are subject to random error, or variation. Variation is relatively large when the case count is small (especially if less than about 10) and small enough to be unimportant in most circumstances when the case count is larger (that is, more than a few tens of cases).

Some of the topics for which results are reported compare groups that vary widely in case count, largely due to differences in population size (e.g. the population of NSW is more than 30 times as large as the NT population and the Major City zone population is nearly 90 times as large as that of the Very Remote zone). In this situation, year-to-year changes in counts or rates for the smaller-population groups may be subject to large random variation. There is potential to misinterpret such fluctuations as meaningful rises or falls in occurrence.

In this situation, and similar ones, guidance is provided to readers concerning how much variation of values can be expected due to random variation of small counts. Confidence Intervals (CIs) are calculated for this purpose.

Confidence intervals

The AIHW is currently undertaking a review to assess the provision of confidence intervals and statistical tests when data arise from sources that provide information on all subjects, rather than from a sample survey. This review will include analysis of the methods used to calculate confidence intervals, as well as the appropriateness of reporting confidence intervals and undertaking statistical testing for such data. This review aims to ensure that statistical methods used in AIHW reports remain robust and appropriately inform understanding and decision making. As a consequence, the type of information reported in future editions of this publication may change.

Trends

Trends in age-standardised rates over time were analysed using the negative binomial distribution regression technique, as described in Berry and Harrison (2006).

As for the 2008–09 annual rates, the Australian population as at 30 June 2001 has been used as the standard here.

Small case counts

Cell counts in tables that have five cases or fewer have been suppressed to protect patient confidentiality. In instances where only one cell in a row or column has a count of five or fewer, another cell in the same row or column has also been suppressed to prevent back-calculation.

Errors and inconsistencies

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 the 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, injury incidence (that is, injury cases) is not equivalent to number of hospital separations. Our methods used to identify actual cases of incidence produce estimates only.

Table A1: Case selection criteria for fall-related separations for people aged 65 and older, Australia 2008–09

Separation type	Males	Females	Persons
Fall injury cases:			
– Principal diagnosis is S00–T75 or T79,			
– First external cause is W00–W19, and			
– Mode of admission is not a transfer from another hospital.	23,567	55,039	78,606
Fall injury inward transfer separations:			
– Principal diagnosis is S00–T75 or T79,			
– First external cause is W00–W19, and			
– Mode of admission is a transfer from another acute hospital.	2,802	6,410	9,212
Fall-related follow-up care separations:			
– Principal diagnosis is Z47, Z48, Z50 or Z75.1, and			
– Any external cause is W00–W19.	8,542	21,092	29,634
'Other fall-related' separations:			
– Any diagnosis is S00–T75 or T79,			
– Any external cause is W00–W19,			
– Is not an incident case or inward transfer, and			
– Is not a follow-up care separation.	11,014	13,010	24,024
Tendency to fall separations:			
– Any diagnosis R29.6,			
– Is not an incident case or inward transfer,			
– Is not a follow-up care separation, and			
– Is not an 'other fall-related' separation.	8,620	10,636	19,256
Total number of fall-related separations in 2008–09	**54,545**	**106,187**	**160,732**

References

ABS (Australian Bureau of Statistics) 2006. Statistical Geography Volume 1 - Australian Standard Geographical Classification (ASGC), July 2006. ABS cat. no. 1216.0. Canberra: ABS.

ABS 2008. Population projections, Australia: 2006 to 2101. ABS cat. no. 3222.0. Canberra: ABS.

ABS 2009a. Australian demographic statistics, December 2008. ABS cat. no. 3101.0. Canberra: ABS.

ABS 2009b. Australian standard geographical classification (ASGC), July 2009. ABS cat. no. 1216.0. Canberra: ABS.

AIHW (Australian Institute of Health and Welfare) 2009. Residential aged care in Australia 2007–08: a statistical overview. Aged care statistics series 28. Cat. no. AGE 58. Canberra: AIHW.

AIHW 2010a. Australian hospital statistics 2008–09. Health services series no. 17. Cat. no. HSE 84. Canberra: AIHW.

AIHW 2010b. National health data dictionary, Version 15. National health data dictionary series. Cat. no. HWI 107. Canberra: AIHW.

AIHW 2010c. Residential aged care in Australia 2008–09: a statistical overview. Aged care statistics series 31. Cat. no. AGE 62. Canberra: AIHW.

AIHW 2011a. Health indicators. Canberra: AIHW. Viewed 24 Oct 2011, <http://www.aihw.gov.au/health-indicators/>.

AIHW 2011b. A snapshot of osteoporosis in Australia 2011. Arthritis series no. 15. Cat. no. PHE 137. Canberra: AIHW.

Batchelor F, Hill K, Mackintosh S, Said C & Whitehead C 2009. The FLASSH study: protocol for a randomised controlled trial evaluating falls prevention after stroke and two sub-studies. BMC Neurology 9:14.

Berry J & Harrison J 2006. A guide to statistical methods for injury surveillance (revised). Injury technical paper series no. 5. Cat. no. INJCAT 72. Canberra: AIHW.

Boufous S & Finch C 2005. Estimating the incidence of hospitalized injurious falls: impact of varying case definitions. Injury Prevention 11:334–6.

Boufous S, Finch C, Close J, Day L & Lord S 2007. Hospital admissions following presentations to emergency departments for a fracture in older people. Injury Prevention 13:211–4.

Bradley C 2012a. Hospitalisations due to falls by older people, Australia 2006–07. Injury research and statistics series no. 57. Cat. no. INJCAT 133. Canberra: AIHW.

Bradley C 2012b. Hospitalisations due to falls by older people, Australia 2007–08. Injury research and statistics series no. 61. Cat. no. INJCAT 137. Canberra: AIHW.

Bradley C & Harrison J 2008. Hospital separations due to injury and poisoning, Australia 2004–05. Injury research and statistics series no. 47. Cat. no. INJCAT 117. Canberra: AIHW.

Bradley C & Harrison JE 2007. Hospitalisations due to falls in older people, Australia 2003–04. Injury research and statistics series no. 32. Cat. no. INJCAT 96. Canberra: AIHW.

Bradley C & Pointer S 2008. Hospitalisations due to falls by older people, Australia 2005–06. Injury research and statistics series no. 50. Cat. no. INJCAT 122. Canberra: AIHW.

Cameron I, Murray G, Gillespie L, Robertson M, Hill K, Cumming R et al. 2010. Interventions for preventing falls in older people in nursing care facilities and hospitals. Cochrane Database of Systematic Reviews 1.

Cassell E & Clapperton A 2008. Hazard #67: Preventing injury in Victorian seniors aged 65 and older. Victorian Injury Surveillance Unit, Monash University Accident Research Centre.

Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttorp MJ et al. 2004. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. BMJ 328:680

Chari S, Haines T, Varghese P & Economidis A 2009. Are non-slip socks really 'non-slip'? An analysis of slip resistance. BMC Geriatrics 9:39.

Chiarelli PE, Mackenzie LA & Osmotherly PG 2009. Urinary incontinence is associated with an increase in falls: a systematic review. Australian Journal of Physiotherapy 55:89–95.

Clemson L, Mackenzie L, Ballinger C, Close JCT & Cumming RG 2008. Environmental interventions to prevent falls in community-dwelling older people a meta-analysis of randomized trials. Journal of Aging and Health 20:954–71.

Cumming RG 1998. Epidemiology of medication-related falls and fractures in the elderly. Drugs & Aging 12:43–53.

Dolinis J, Harrison JE & Andrews GR 1997. Factors associated with falling in older Adelaide residents. Australian and New Zealand Journal of Public Health 21:462–8.

Dowling AM & Finch CF 2009. Baseline indicators for measuring progress in preventing falls injury in older people. Australian and New Zealand Journal of Public Health 33:413–7.

Fischer ID, Krauss MJ, Dunagan WC, Birge S, Hitcho E, Johnson S et al. 2005. Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. Infection Control and Hospital Epidemiology 26:822–7.

Fisher AA, O'Brien ED & Davis MW 2009. Trends in hip fracture epidemiology in Australia: Possible impact of bisphosphonates and hormone replacement therapy. Bone 45:246–53.

Flood L & Harrison JE 2006. Hospitalised sports injury, Australia 2002–03. Injury research and statistics series no. 27. Cat no. INJCAT 79. Canberra: AIHW.

Foss NB, Palm H & Kehlet H 2005. In-hospital hip fractures: prevalence, risk factors and outcome. Age Ageing 34:642–5.

Gibson RE, Harden M, Byles J & Ward J 2008. Incidence of falls and fall-related outcomes among people in aged-care facilities in the Lower Hunter region, NSW. New South Wales Public Health Bulletin 19:166–9.

Gill T, Taylor AW & Pengelly A 2005. A population-based survey of factors relating to the prevalence of falls in older people. Gerontology 51:340–5.

Gillespie LD, Robertson MC, Gillespie WJ, Lamb SE, Gates S, Cumming RG et al. 2009. Interventions for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews.

Hall SE & Hendrie D 2003. A prospective study of the costs of falls in older adults living in the community. Australian and New Zealand Journal of Public Health 27:343–51.

Haran MJ, Lord SR, Cameron ID, Ivers RQ, Simpson JM, Lee BB et al. 2009. Preventing falls in older multifocal glasses wearers by providing single-lens distance glasses: the protocol for the VISIBLE randomised controlled trial. BMC Geriatrics 9:10.

Hartholt KA, Van Lieshout EMM, Polinder S, Panneman MJM, Van der Cammen TJM & Patka P 2011. Rapid increase in hospitalizations resulting from fall-related traumatic head injury in older adults in the Netherlands 1986–2008. Journal of Neurotrauma 28:739–44.

Hayes W, Myers E, Robinovitch S, Van Den Kroonenberg A, Courtney A & McMahon T 1996. Etiology and prevention of age related hip fractures. Bone 18:77–86.

Henley G & Harrison JE 2009. Injury severity scaling: a comparison of methods for measurement of injury severity. Injury technical paper series no. 10. Cat. no. INJCAT 126. Canberra: AIHW.

Kannus P, Niemi S, Parkkari J, Palvanen M & Sievänen H 2007. Alarming rise in fall-induced severe head injuries among elderly people. Injury 38:81–3.

Karmel R, Lloyd J & Anderson P 2008. Movement from hospital to residential aged care. Data linkage series no. 6. Cat. no. CSI 6. Canberra: AIHW.

Kleiven S, Peloso PM & Holst H 2003. The epidemiology of head injuries in Sweden from 1987 to 2000. Injury Control and Safety Promotion 10:173–80.

Kreisfeld R & Harrison JE 2010. Hospital separations due to injury and poisoning 2005–06. Injury research and statistics series no. 55. Cat. no. INJCAT 131. Canberra: AIHW.

Kreisfeld R & Newson R 2006. Hip fracture injuries. NISU Briefing 8, Cat. no. INJCAT 93. Canberra: AIHW.

Lord SR 2006. Visual risk factors for falls in older people. Age and Ageing 35:42–5.

Lord SR, Sherrington C & Menz HB 2001. Falls in older people: risk factors and strategies for prevention. Cambridge, UK: Cambridge University Press.

Lord SR, Ward JA, Williams P & Anstey KJ 1993. An epidemiological study of falls in older community-dwelling women: the Randwick falls and fractures study. Australian Journal of Public Health 17:240–5.

McClure R, Turner C, Peel N, Spinks A, Eakin E & Hughes K 2005. Population-based interventions for the prevention of fall-related injuries in older people. Cochrane Database of Systematic Reviews.

Menant JC, Steele JR, Menz HB, Munro BJ & Lord SR 2008. Optimizing footwear for older people at risk of falls. Journal of Rehabilitation Research and Development 45:1167–81.

Moller J 2003. Projected costs of fall related injury to older persons due to demographic change in Australia: report to the Commonwealth Department of Health and Ageing. Canberra: New Directions in Health and Safety.

NCCH (National Centre for Classification in Health) 2004. International Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). Fourth edition. Sydney: NCCH.

NCCH 2006. International Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). Fifth edition. Sydney: NCCH.

NCCH 2008. International Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). Sixth edition. Sydney: NCCH.

NSW Health 2010. New South Wales falls prevention baseline survey: 2009 report. Sydney: Centre for Health Advancement and Centre for Epidemiology and Research, NSW Department of Health.

Pluijm SMF, Smit JH, Tromp EAM, Stel VS, Deeg DJH, Bouter LM et al. 2006. A risk profile for identifying community-dwelling elderly with a high risk of recurrent falling: results of a 3-year prospective study. Osteoporosis International 17:417–25.

Pointer S, Harrison J & Bradley C 2003. National injury prevention plan priorities for 2004 and beyond: discussion paper. Injury research and statistics series no. 18. Cat no. INJCAT 55. Adelaide: AIHW.

Potter-Forbes M & Aisbett C 2003. Injury costs: a valuation of the burden of injury in New South Wales 1998–1999. DN2692. Sydney: NSW Injury Risk Management Research Centre.

Rubenstein LZ 2006. Falls in older people: epidemiology, risk factors and strategies for prevention. Age Ageing 35:ii37–41.

Sattin R 1992. Falls among older persons: a public health perspective. Annual Review of Public Health 13:489–508.

Shuto H, Imakyure O, Matsumoto J, Egawa T, Jiang Y, Hirakawa M et al. 2010. Medication use as a risk factor for inpatient falls in an acute care hospital: a case-crossover study. British Journal of Clinical Pharmacology 69:535–42.

Stephenson S, Henley G, Harrison JE & Langley J 2003. Diagnosis-based injury severity scaling. Injury research and statistics series no. 20. Cat no. INJCAT 59. Canberra: AIHW.

Tiedemann AC, Murray SM, Munro B & Lord SR 2008. Hospital and non-hospital costs for fall-related injury in community-dwelling older people. New South Wales Public Health Bulletin 19:161–5.

Tinetti M, Speechley M & Ginter S 1988. Risk factors for falls among elderly persons living in the community. New England Journal of Medicine 319:1701–7.

Watson W & Mitchell R 2010. Conflicting trends in fall-related injury hospitalisations among older people: variations by injury type. Osteoporosis International 1–9.

West J, Hippisley-Cox J, Coupland CAC, Price GM, Groom LM, Kendrick D et al. 2004. Do rates of hospital admission for falls and hip fracture in elderly people vary by socio-economic status? Public Health 118:576–81.

Wood BH, Bilclough JA, Bowron A & Walker RW 2002. Incidence and prediction of falls in Parkinson's disease: a prospective multidisciplinary study. Journal of Neurology Neurosurgery and Psychiatry 72:721–5.

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Related publications

This report, *Hospitalisations due to falls by older people, Australia 2008–09*, is part of an annual series. The four earlier editions and any published subsequently can be downloaded for free from the NISU website < http://nisu.flinders.edu.au/publications.php>. The website also includes information on ordering printed copies.

The following AIHW publications relating to falls and fall-related injuries might also be of interest:

- AIHW 2011. A snapshot of osteoporosis in Australia 2011. Arthritis series no. 15. Cat. no. PHE 137. Canberra: AIHW.
- Bradley C 2012a. Hospitalisations due to falls by older people, Australia 2006–07. Injury research and statistics series no. 57. Cat. no. INJCAT 133. Canberra: AIHW.
- Bradley C 2012b. Hospitalisations due to falls by older people, Australia 2007–08. Injury research and statistics series no. 61. Cat. no. INJCAT 137. Canberra: AIHW.
- Bradley C & Harrison JE 2007. Hospitalisations due to falls in older people, Australia 2003–04. Injury research and statistics series number 32. Cat. no. INJCAT 96. Canberra: AIHW.
- Bradley C & Pointer S 2008. Hospitalisations due to falls by older people, Australia 2005–06. Injury research and statistics series number 50. Cat. no. INJCAT 122. Canberra: AIHW.