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# **Hospitalisations due to falls by older people, Australia 2009–10**

*Clare Bradley*



**Flinders**  
UNIVERSITY

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**Australian Government**

**Australian Institute of  
Health and Welfare**

*Authoritative information and statistics  
to promote better health and wellbeing*

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Number 70

# **Hospitalisations due to falls by older people, Australia**

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**Clare Bradley**

Australian Institute of Health and Welfare  
Canberra

Cat. no. INJCAT 146

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# 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                           |
| ICD-10-AM | International Classification of Diseases, 10th revision, Australia Modification |
| ICISS     | ICD-based injury severity score   |
| NCCH      | National Centre for Classification in Health                                    |
| NHDD      | National Health Data Dictionary   |
| 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 sixth 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 2009–10.

## Falls in 2009–10

The estimated number of hospitalised injury cases due to falls in people aged 65 and over in 2009–10 was 83,800 – more than 5,100 extra cases than in 2008–09.

Women accounted for most of the hospitalised fall injury cases and rates of fall cases were higher for women than for men for all age groups. As in the previous year, the age-standardised rate of hospitalised fall injuries involving older women 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 1 in 5 hospitalised cases and were proportionately more common for men than for women.

## 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 hospitalised injury.

About 70% of hospitalised falls in 2009–10 were recorded as having occurred in either the home or an aged care facility. About half of the falls in the home were recorded as having occurred in ‘other and unspecified’ places in the home (48%). Outdoor areas of the home, the bathroom and the bedroom were common places of occurrence. However, this level of detail was only available for about half the cases that occurred in the home.

## Burden of fall-related injury

One in every 10 days spent in hospital by a person aged 65 and older in 2009–10 was directly attributable to an injurious fall (1.3 million patient days over the year), and the average total length of stay per fall injury case was estimated to be 15.5 days.

The first period of hospital care for a fall-related injury at ages 65 and older in 2009–10 accounted for 0.57 million patient days.

In about 10,000 cases the patient was transferred to another hospital, accounting for another 0.14 million patient days. Fall-related follow-up care hospitalisations numbered almost 34,000 and accounted for a further 0.57 million patient days.

In addition to the burden directly attributable to fall-related injury, ‘other fall-related’ and ‘tendency to fall’ separations added a further 47,000 episodes of hospital care (0.62 million patient days) to the total due to falls. Of note, the age-standardised rates of fall-related hospitalisations of these types are increasing, substantially in the case of fall-related follow-up care separations.

# 1 Introduction

This report is the sixth 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 2008–09 (Bradley 2012a, 2012b; Bradley & Harrison 2007; Bradley & Pointer 2009, 2012). This report analyses fall-related hospital separations data from the National Hospital Morbidity Database (NHMD) for the financial year 2009–10.

Falls are common among older people and often result in fractures or other serious injuries (McClure et al. 2005; Rubenstein 2006; Sattin 1992; Tinetti et al. 1988). In Australia, about one-third of community-dwelling older people experience at least one fall in a year (for example, Gill et al. 2009; Lord et al. 1993; NSW Health 2010). Risk factors for falls include age, sex, medication use and predisposing medical conditions such as Parkinson’s disease, stroke, incontinence and vision problems (for example, Chiarelli et al. 2009; Lord 2006; Lord et al. 2001; Mackintosh et al. 2005; Shuto et al. 2010; 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; Stanaway et al. 2011; West et al. 2004) and being admitted to hospital, for any reason, increases an older person’s risk of falling (for example, Batchelor et al. 2009; Fischer et al. 2005; Foss et al. 2005). 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 (Rubenstein 2006).

Falls are the cause of a substantial number of injury-related deaths in Australia, more numerous now than transport crash fatalities (ABS 2012). Non-fatal falls can also considerably impact the older person’s health and well-being (LeBlanc et al. 2011; Lord et al. 2001; Rubenstein 2006; Sattin 1992). Hip fractures, which constitute a large proportion of hospitalised fall injuries in Australia, are particularly burdensome. About one-third of hip fracture cases in the older population do not reach their pre-fracture level of functioning within a year post-fracture, and those who do recover tend to take around 6 months to return to their pre-fracture levels of functioning (Bertram et al. 2011; see also LeBlanc et al. 2011). Therefore, falls can result in a substantial loss of independence and hasten admission to residential care. 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 (short-term) residential care (Karmel et al. 2008).

The cost to the health system due to fall-related injuries is considerable (for example, Hall & Hendrie 2003; Tiedemann et al. 2008). The most comprehensive estimate of the national ‘lifetime’ cost of falls (including indirect costs such as costs borne by the family or community) exceeds \$1 billion per year (Moller 2003). Moller’s study, however, is now a decade old and more recent analyses suggest that \$1 billion may be a considerable underestimate. The AIHW report on falls hospitalised in 2007–08 stated the cost of acute care due to falls by older people was conservatively estimated at \$648.2 million (Bradley 2012a). Further, analysis of the cost of health care associated with falls by older people in New South Wales in 2006–07 – about one-third of the Australian population – estimates a total cost of nearly \$560 million (see also Potter-Forbes & Aisbett 2003; Watson et al. 2010).



## This report

The hospital separations analysed in this report were coded according to the sixth edition of the *International Classification of Diseases, 10th Revision, Australia Modification* (ICD-10-AM). The 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 2009–10. 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).

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

1. The annual incidence of new cases.
2. The burden to the hospital system (the additional admitted patient episodes of fall-related care, the health interventions undertaken and the patient days attributed to these episodes).

The structure of this report is similar to that of reports for previous years. Chapter 2 presents the estimated annual incidence of fall events resulting in injury and hospitalisation in 2009–10 for people aged 65 and older, while Chapter 3 describes the characteristics of these fall injury cases, including the mechanism and circumstances (place of occurrence, activity when injured).

Chapter 4 discusses the burden to the hospital system of fall-related episodes of admitted patient care. The section briefly describes a set of separations omitted from Chapters 2 and 3; the hospital records that meet our definition of an incident case, but have been generated through an admitted patient's transfer 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 4 also presents estimates of additional hospital episodes involving fall-related injuries for people aged 65 and older in 2009–10, principally admitted patient care that can be characterised as either 'fall-related follow-up care' or 'other fall-related' hospital separations.

Records containing the R29.6 (tendency to fall, not elsewhere classified) diagnosis are also considered in Chapter 4. The nature of these separations and their relationship to injurious falls are not fully understood, nevertheless it seems appropriate to include these separations as a component of the fall-related burden on the Australian hospital system.

Continuing our assessment of the burden on the hospital system due to falls by older Australians, Chapter 5 provides an overview of the health interventions (procedures) recorded for fall-related episodes of care while Chapter 6 presents a short analysis of the length of stay for fall-related episodes of care.

This report does not analyse the costs of fall-related hospital care or trends in the rates of fall-related hospitalisations. Readers are directed to the previous reports in the series for this information (specifically, Bradley 2012a; and Bradley 2012b).

Confidence intervals, standard deviations and standard errors around single estimates are provided in some sections to show non-sampling variation. Variation can be large when case numbers are small. Further information is provided in the Appendix.

## 2 Fall injury incidence

This chapter presents the estimated annual incidence of fall events resulting in injury and hospitalisation in 2009–10 for people aged 65 and older.

During 2009–10, nearly 3 million hospital separations in Australia were for people aged 65 and older (AIHW 2011a). Of these, 121,509 (4%) had a principal diagnosis in the range S00–T75 or T79, denoting community injury (excluding injuries sustained in the context of surgical and medical care or sequelae of injury). More than three-quarters of these injury separations (77%,  $n = 93,391$ ) also had a first reported 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 2009–10 was 83,768. This was 5,162 (7%) more cases than in 2008–09 (Bradley 2012b). As in previous years, these 83,768 fall injury cases accounted for 3% of all hospital separations for the population aged 65 and older (Table 2.1).

**Table 2.1: Key indicators for hospital separations of people aged 65+, Australia 2009–10**

| Key indicators  | Men       | Women     | People <sup>(a)</sup> |
|---|-----------|-----------|-----------------------|
| All hospital separations 2009–10, aged 65+ <sup>(b)</sup>   | 1,656,923 | 1,538,295 | 3,195,238             |
| Principal diagnosis S00–T75 or T79                          | 42,592    | 78,916    | 121,509               |
| Principal diagnosis S00–T75 or T79 & external cause W00–W19 | 28,557    | 64,834    | 93,391                |
| Estimated fall injury cases                                 | 25,597    | 58,171    | 83,768                |
| 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+       | 60.1%     | 73.7%     | 68.9%                 |
| Mean length of stay for fall injury cases: days (SD)        | 7.0 (9.8) | 7.0 (8.9) | 7.0 (9.2)             |
| Total patient-days, fall injury cases                       | 179,757   | 409,898   | 589,655               |
| As percentage of all hospital patient days aged 65+         | 3.1%      | 6.2%      | 4.7%                  |

(a) People totals include separations for which sex was not reported.

(b) Data source: *Australian hospital statistics 2009–10* (AIHW 2011a).

The age-standardised rate of fall injury cases for people aged 65 and older in 2009–10 was 2,663 per 100,000 population. This is a 4% increase in the age-standardised rate from 2008–09 (2,573 per 100,000) and a greater increase than the estimate presented for the 1999–2009 period in the previous report in this series (Bradley 2012b).

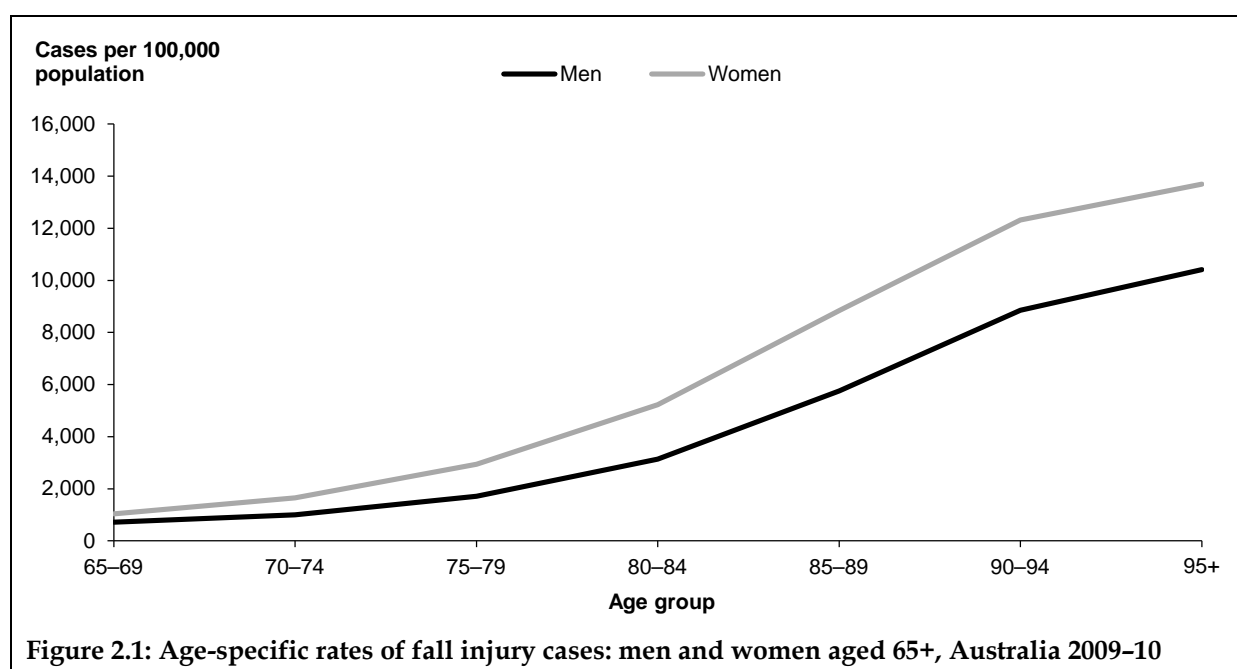
## Age and sex

Women aged 65 and older sustained a greater number of hospitalised fall injuries than men, constituting 69% of the cases in 2009–10 ( $n = 58,171$ ). As in 2008–09, the age-standardised rate of hospitalised falls for older women was more than 3,000 per 100,000 population (3,154 per 100,000), continuing the steady increase observed since 1999–00. This compares with 1,997 per 100,000 population for fall cases involving men aged 65 and older – a male:female (M:F) rate ratio of 0.6 hospitalised falls for men for every case for women, the same as noted in previous years.

Women aged 65 and older who were hospitalised due to an injurious fall were older than the men similarly hospitalised: women were aged 82.5 ( $\pm 8.0$  SD) on average, and men 80.5 ( $\pm 8.1$  SD). Overall, the mean age of all people aged 65 and older hospitalised due to an injurious fall was 81.9 years ( $\pm 8.1$  SD).

Age-specific rates of fall injury cases increase markedly with age. In 2009–10 the highest rate observed for hospitalised cases was for people aged 95 and older: 12,907 cases per 100,000 population. This is a slight increase on the rate observed for this age group in 2008–09. Figure 2.1 describes the age-specific rates of fall injury cases for men and women aged 65 and older. The rate of fall injury cases was markedly higher for women than men in all age groups. As in previous years, this difference was greatest for people aged 75–79, for whom the M:F rate ratio was 0.58 to 1.00 (that is, hospitalised falls involving women were nearly twice as common as those involving men).

Figure 2.1 also demonstrates that the rate of serious falls was substantially higher for men and women aged 75 and over. Convention maintains that fall injury indicators include all people aged 65 and older. However, following Pointer et al. (2003), 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 – 4,517 per 100,000 population (women: 5,310 per 100,000; men: 3,354 per 100,000).



## Injury type

As in previous years, the largest proportion of fall injury cases for both men and women 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 (75%). Injuries to the hip and thigh, and fractures of the neck of the femur, were proportionately more common for women than men. The proportion of people with a principal diagnosis of an injury to the hip and thigh in 2009–10 was slightly lower than that in previous years (28%, compared with 29%–34%), continuing the declining trend for rates of hip fracture observed since 1999–00 (Bradley 2012b; see also Cassell & Clapperton 2012; Dowling & Finch 2009).

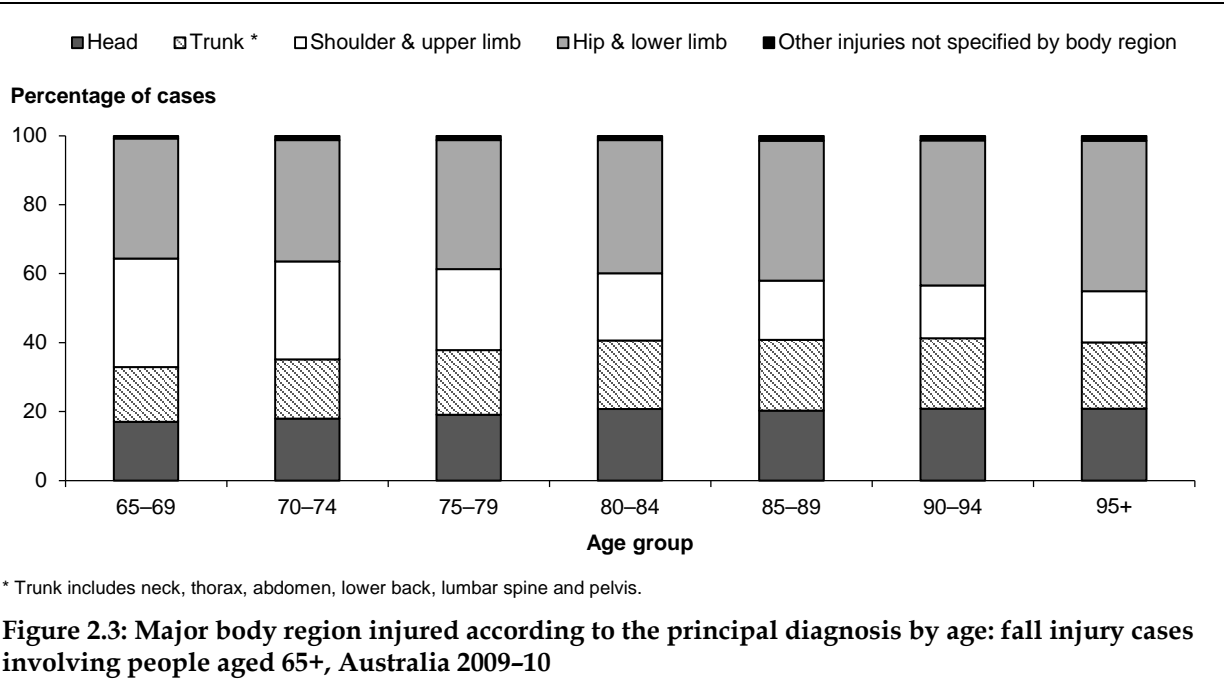
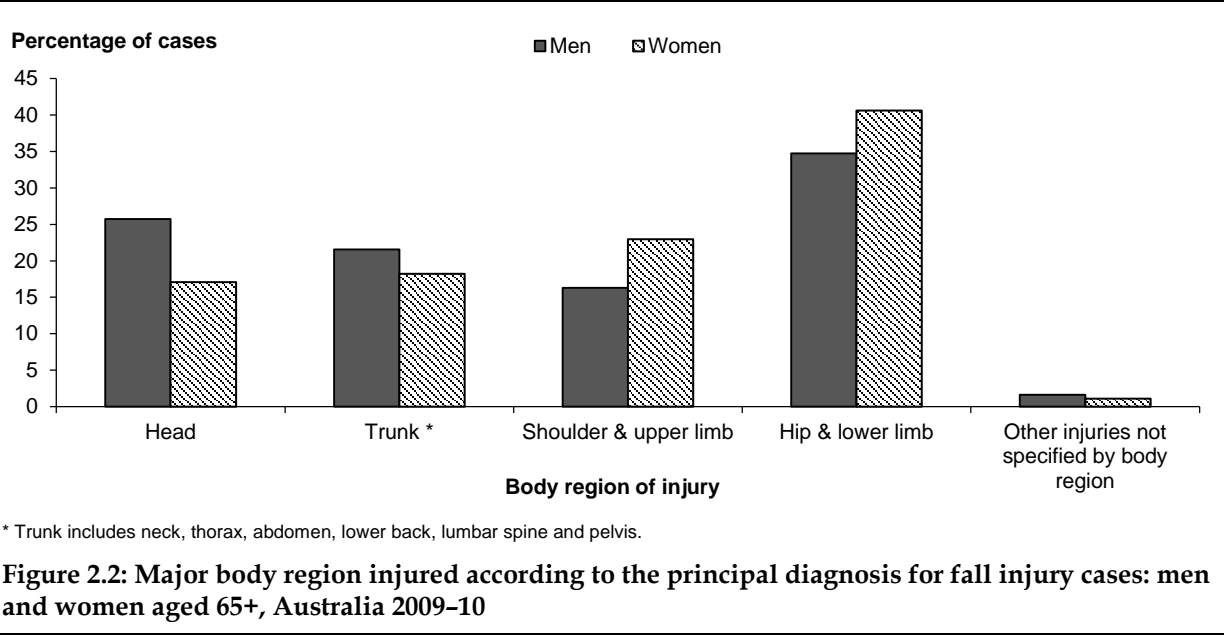
Injuries to the head were the second most common type of principal diagnosis for both men and women, constituting 20% of all fall cases. Again, this is a rise in proportion compared with previous years and is consistent with a significant increasing trend in rates for fall-related head injury cases since 1999–00 (approximately 7% increase annually, see Bradley 2012b). Unlike hip fractures, however, the proportion of men who suffered head injuries due to a fall was much higher (26%) than for women (17%).

**Table 2.2: Principal diagnosis injury types for fall injury cases: men, women and people aged 65+, Australia 2009–10**

| Principal diagnosis   | Men           |              | Women         |              | People        |              |
|---|---------------|--------------|---------------|--------------|---------------|--------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Injuries to the head  | 6,590         | 25.7         | 9,939         | 17.1         | 16,529        | 19.7         |
| Injuries to the neck  | 518           | 2.0          | 705           | 1.2          | 1,223         | 1.5          |
| Injuries to the thorax                                      | 2,421         | 9.5          | 3,059         | 5.3          | 5,480         | 6.5          |
| Injuries to the abdomen, lower back, lumbar spine & pelvis  | 2,582         | 10.1         | 6,835         | 11.7         | 9,417         | 11.2         |
| Injuries to the shoulder & upper arm                        | 2,003         | 7.8          | 5,823         | 10.0         | 7,826         | 9.3          |
| Injuries to the elbow & forearm                             | 1,536         | 6.0          | 6,635         | 11.4         | 8,171         | 9.8          |
| Injuries to the wrist & hand                                | 634           | 2.5          | 900           | 1.5          | 1,534         | 1.8          |
| Hip fractures   | 4,717         | 18.4         | 12,949        | 22.2         | 17,666        | 21.1         |
| Other injuries to the hip & thigh                           | 1,771         | 6.9          | 4,190         | 7.2          | 5,961         | 7.1          |
| <i>Total injuries to the hip &amp; thigh</i>                | <i>6,488</i>  | <i>25.3</i>  | <i>17,139</i> | <i>29.5</i>  | <i>23,627</i> | <i>28.2</i>  |
| Injuries to the knee & lower leg                            | 2,094         | 8.2          | 5,686         | 9.8          | 7,780         | 9.3          |
| Injuries to the ankle & foot                                | 312           | 1.2          | 811           | 1.4          | 1,123         | 1.3          |
| Injuries involving multiple body regions                    | 30            | 0.1          | 24            | 0.0          | 54            | 0.1          |
| Injuries to unspecified parts of trunk, limb or body region | 230           | 0.9          | 405           | 0.7          | 635           | 0.8          |
| Effects of foreign body entering through natural orifice    | n.p.          | 0.0          | n.p.          | 0.0          | n.p.          | 0.0          |
| 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              | 38            | 0.1          | 47            | 0.1          | 85            | 0.1          |
| Certain early complications of trauma                       | 119           | 0.5          | 159           | 0.3          | 278           | 0.3          |
| <b>Total</b>  | <b>25,597</b> | <b>100.0</b> | <b>58,171</b> | <b>100.0</b> | <b>83,768</b> | <b>100.0</b> |

Summarising the information in Table 2.2, Figure 2.2 highlights the differences in the types of injury that were sustained by men and women aged 65 and older in 2009–10. As in previous years, men sustained proportionately more injuries to the head and trunk regions while women 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 2009–10, according to 5-year age groups. As in previous years, 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.



## Fractures

About 3 in every 5 people aged 65 and older who were hospitalised due to an injurious fall in 2009–10 sustained at least one fracture (61.0%,  $n = 51,120$ ). This continues a decreasing trend observed in previous years. The number of fractures present in the multiple diagnosis fields of the case separations in 2009–10 ranged from 0 (39%,  $n = 32,648$ ) to 16 ( $n = 1$ ). Most people hospitalised due to a fall injury sustained a single fracture (53%,  $n = 44,196$ ) and a higher proportion of women than men sustained fractures (65% versus 52%, respectively).

As observed in previous years, fall cases with a principal diagnosis denoting injuries to the hip and thigh and injuries to the elbow and forearm had the largest proportion of fractures present in the record: 82.5% ( $n = 19,484$ ) and 81.6% ( $n = 6,669$ ), respectively (see Table 2.3). Injuries to the hip and thigh accounted for the greatest proportion of all fracture-related fall injury cases, about 2 in every 5 such injuries (38%). The vast majority of these hip and thigh fracture cases (91%) had a principal diagnosis of fractured neck of femur.

Fracture-related fall injury cases that had a principal diagnosis of fractured neck of femur ( $n = 17,666$ ) occurred at an age-standardised rate of 550 per 100,000 population in 2009–10, a rate similar to that observed in 2008–09. Women aged 65 and older in 2009–10 had a higher rate of fall-related fractured neck of femur (674 cases per 100,000) than men (375 per 100,000). Age-specific rates of fall-related fractured neck of femur injuries were highest for people aged 95 and older: 3,526 per 100,000 population, compared with 92 per 100,000 for people aged 65–69.

**Table 2.3: Principal diagnosis injury type for fall injury cases involving fractures: men, women and people aged 65+, Australia 2009–10**

| Principal diagnosis  | Men           |              | Women         |              | People        |              | Per cent of type |
|--|---------------|--------------|---------------|--------------|---------------|--------------|------------------|
|  | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |                  |
| Injuries to the head                                       | 1,035         | 7.8          | 1,532         | 4.1          | 2,567         | 5.0          | 15.5             |
| Injuries to the neck                                       | 325           | 2.4          | 411           | 1.1          | 736           | 1.4          | 60.2             |
| Injuries to the thorax                                     | 1,835         | 13.8         | 2,205         | 5.8          | 4,040         | 7.9          | 73.7             |
| Injuries to the abdomen, lower back, lumbar spine & pelvis | 1,586         | 11.9         | 5,003         | 13.2         | 6,589         | 12.9         | 70.0             |
| Injuries to the shoulder & upper arm                       | 1,182         | 8.9          | 4,290         | 11.3         | 5,472         | 10.7         | 69.9             |
| Injuries to the elbow & forearm                            | 811           | 6.1          | 5,858         | 15.5         | 6,669         | 13.0         | 81.6             |
| Injuries to the wrist & hand                               | 220           | 1.7          | 470           | 1.2          | 690           | 1.3          | 45.0             |
| Hip fractures  | 4,717         | 35.4         | 12,949        | 34.3         | 17,666        | 34.6         | 100.0            |
| Other injuries to the hip & thigh                          | 450           | 3.4          | 1,368         | 3.6          | 1,818         | 3.6          | 30.5             |
| <i>Total injuries to the hip &amp; thigh</i>               | <i>5,167</i>  | <i>38.8</i>  | <i>14,317</i> | <i>37.9</i>  | <i>19,484</i> | <i>38.1</i>  | <i>82.5</i>      |
| Injuries to the knee & lower leg                           | 1,000         | 7.5          | 3,301         | 8.7          | 4,301         | 8.4          | 55.3             |
| Injuries to the ankle & foot                               | 147           | 1.1          | 387           | 1.0          | 534           | 1.0          | 47.6             |
| Other diagnoses  | 13            | 0.1          | 25            | 0.1          | 38            | 0.1          | 3.6              |
| <b>Total</b>   | <b>13,321</b> | <b>100.0</b> | <b>37,799</b> | <b>100.0</b> | <b>51,120</b> | <b>100.0</b> | <b>61.0</b>      |

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% of all fall injury cases for those aged 65–69 but only 58% 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 (47% of all fractures due to falls for people aged 95 and older).

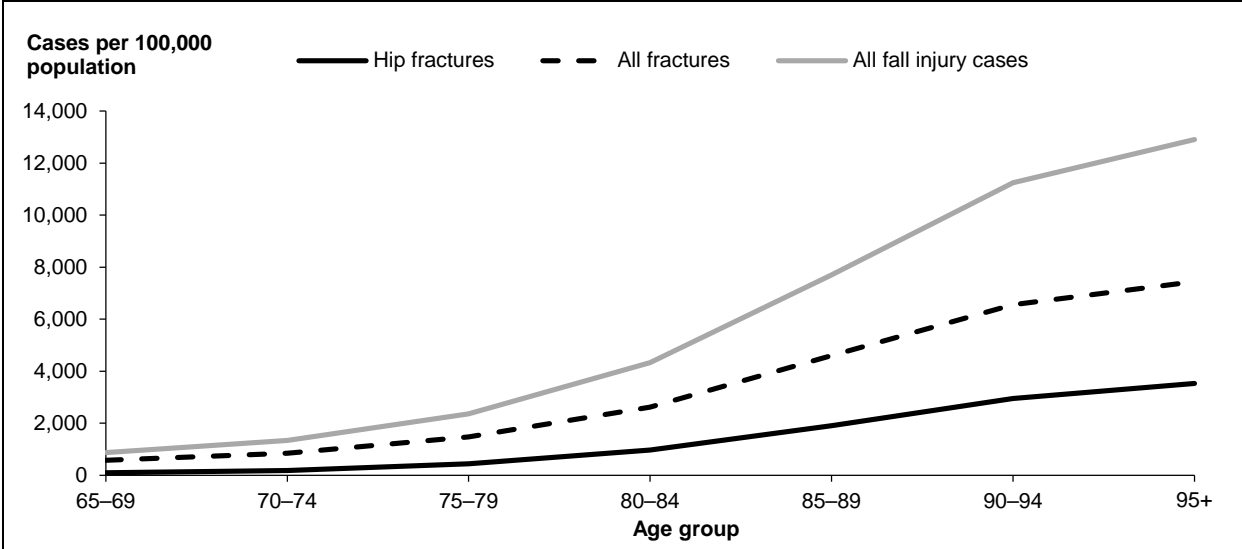


Figure 2.4: Age-specific rates of fall injury cases: hip fractures, all fractures and all fall injuries, people aged 65+, Australia 2009-10

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 women, as the proportion of cases involving fractures remained fairly consistent for men (Figure 2.5).

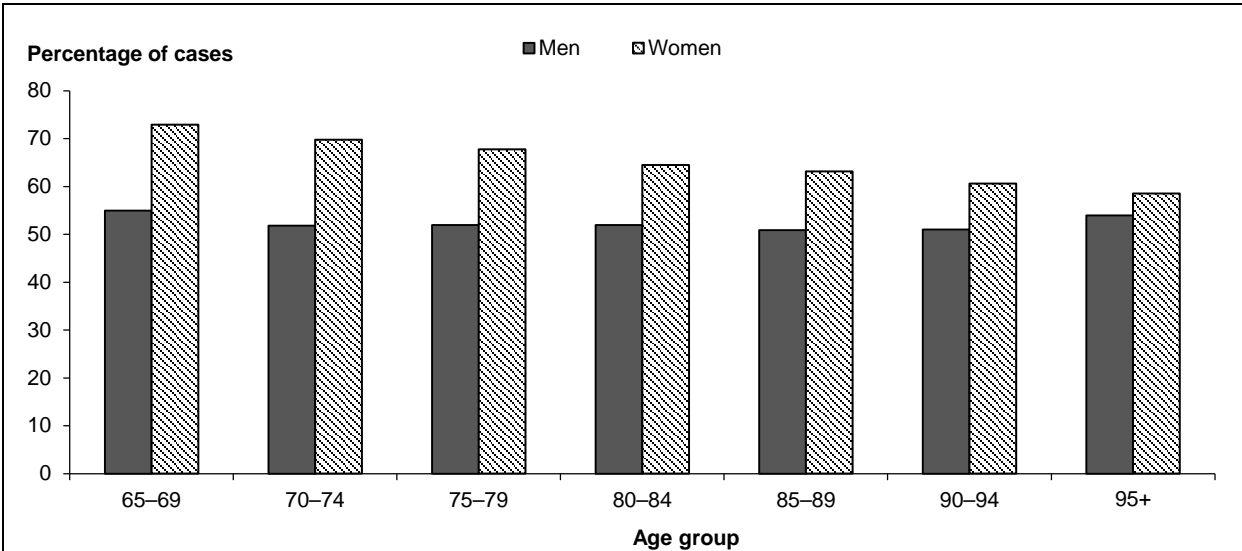


Figure 2.5: Fall injury cases having one or more fracture diagnoses as a proportion of the total number of hospitalised cases: men and women aged 65+, Australia 2009-10

## 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 ( $\pm$  0.081 SD). This is very similar to that observed in previous years.

Cases with a principal diagnosis of injuries to the hip and thigh accounted for the largest proportion of high-severity falls (59%,  $n$  = 18,243) and about one-third of the high-severity falls were attributed to slipping, tripping and stumbling (31%,  $n$  = 9,671).

## Geographical distribution

### State or territory of usual residence

Age-standardised rates of hospitalised fall injury cases for people aged 65 and older in 2009–10 varied according to the jurisdiction of the person's usual residence (Figure 2.6). Older residents of Queensland, Western Australia, South Australia and Tasmania all had rates of hospitalised fall injuries substantially lower than that for Australia as a whole. Conversely, older residents of New South Wales, Victoria and the Australian Capital Territory had rates of fall injuries substantially higher than that for Australia as a whole. This is largely similar to the patterns observed in previous years (for example, Bradley 2012b).

Rates of hospitalised fall injuries involving women aged 65 and older in 2009–10 were significantly higher than those for men in all jurisdictions. The highest age-standardised rate for women was observed for residents of the Australian Capital Territory (3,628 per 100,000 population) and the lowest for Tasmanians (2,307 per 100,000). The highest rate observed for men was for residents of the Northern Territory (2,260 per 100,000) and the lowest for Tasmanians (1,317 per 100,000).

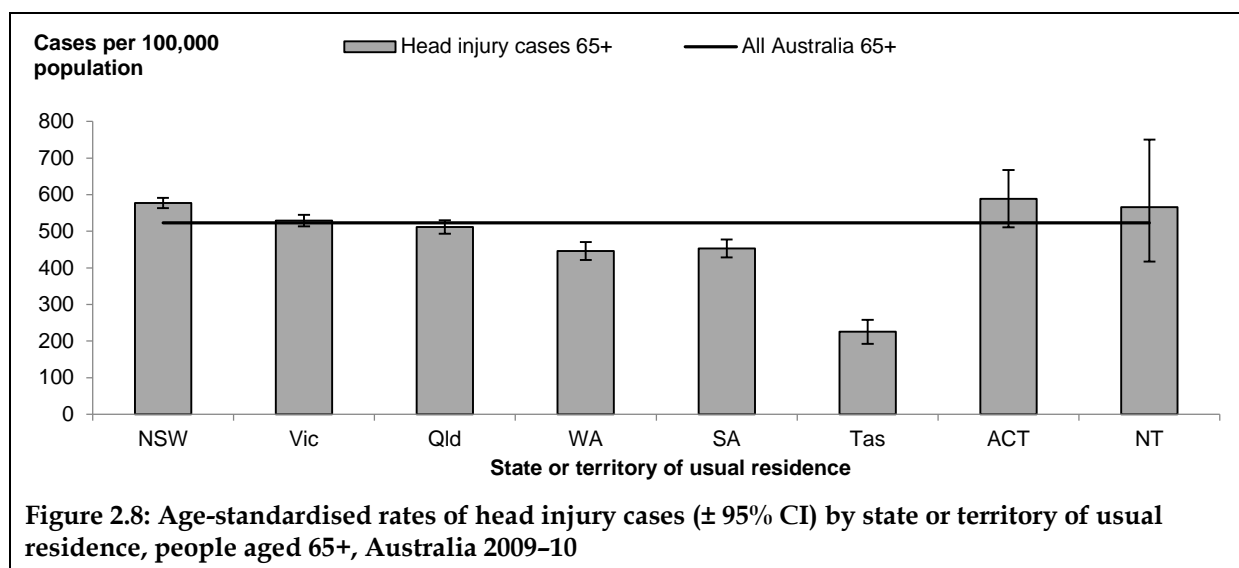
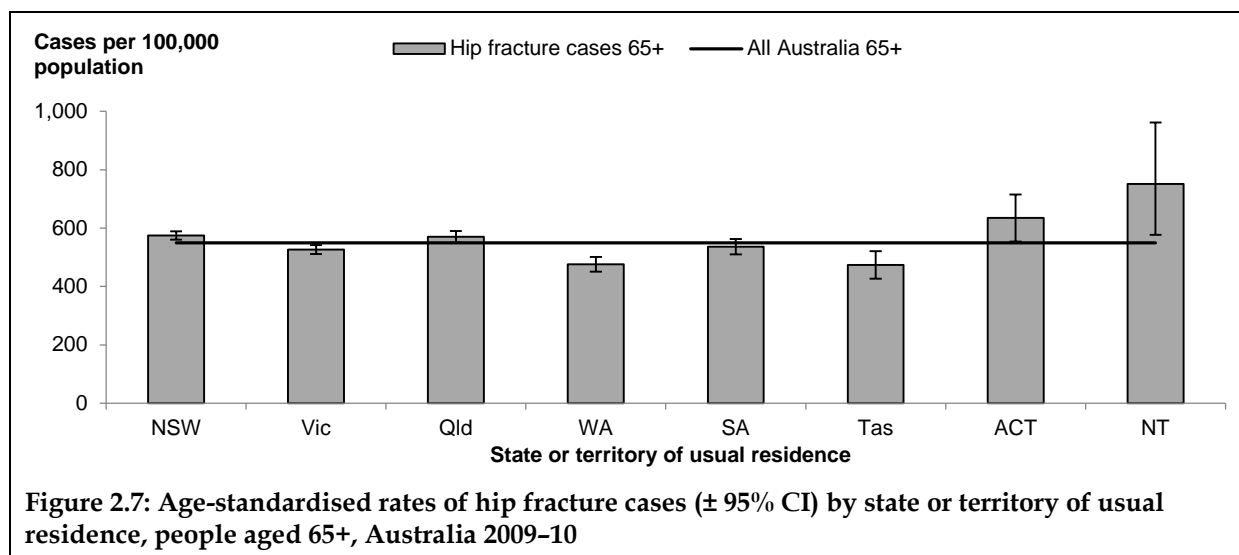
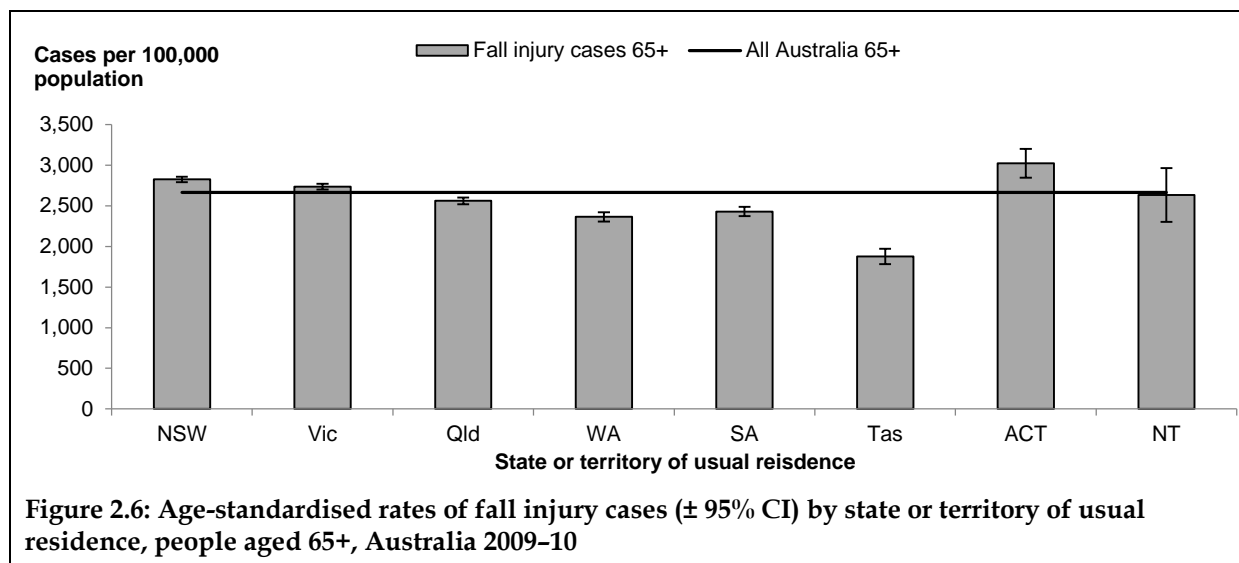
Age-standardised rates of hip fracture (principal diagnoses S72.0– S72.2) varied to a lesser degree by jurisdiction of residence than all fall injury cases (see Figure 2.7) and have a pattern that does not closely reflect that for all falls (Figure 2.6). For most jurisdictions, the 95% confidence intervals for the rates approached the national rate of hospitalised hip fracture, suggesting that there is little difference between them.

Rates of hospitalised hip fractures for women aged 65 and older in 2009–10 were higher than those for men in all jurisdictions (data not shown).

Given the increasing prominence of fall-related head injury cases, for the first time in this report series we examined rates of head injuries due to falls by people aged 65 and older by jurisdiction of usual residence.

The overall pattern of head injury cases was more like that for all types of fall injury (Figure 2.6) than hip fracture cases. Residents of the Australian Capital Territory, New South Wales and Northern Territory had the highest rates of fall-related head injury while residents of Tasmania had rates substantially below that of all other jurisdictions and the nation as a whole. This pattern was similar for both men and women (data not shown).





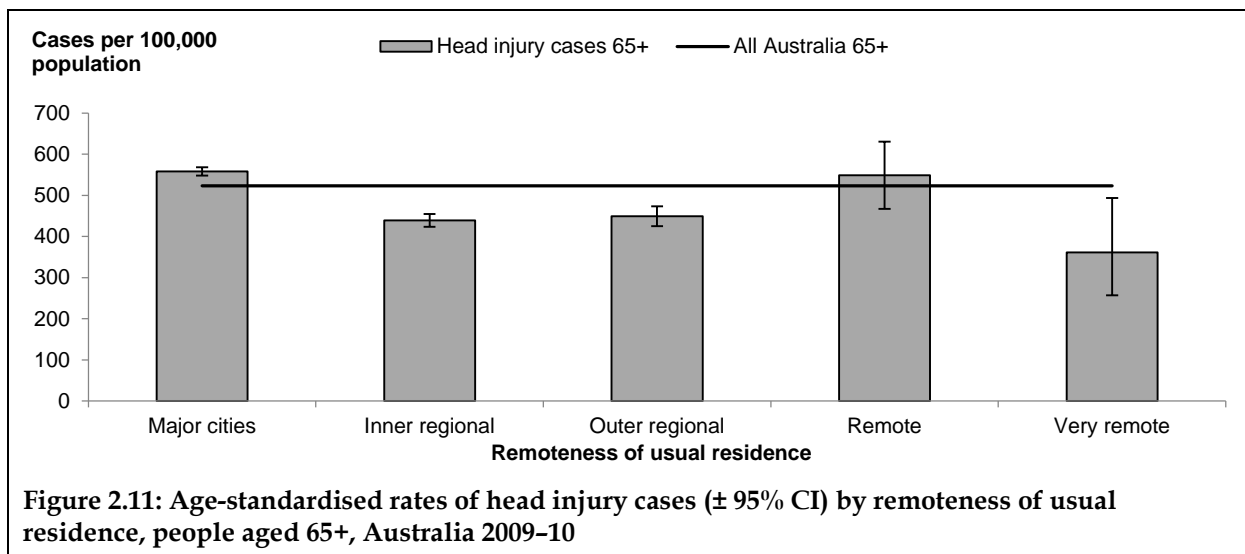
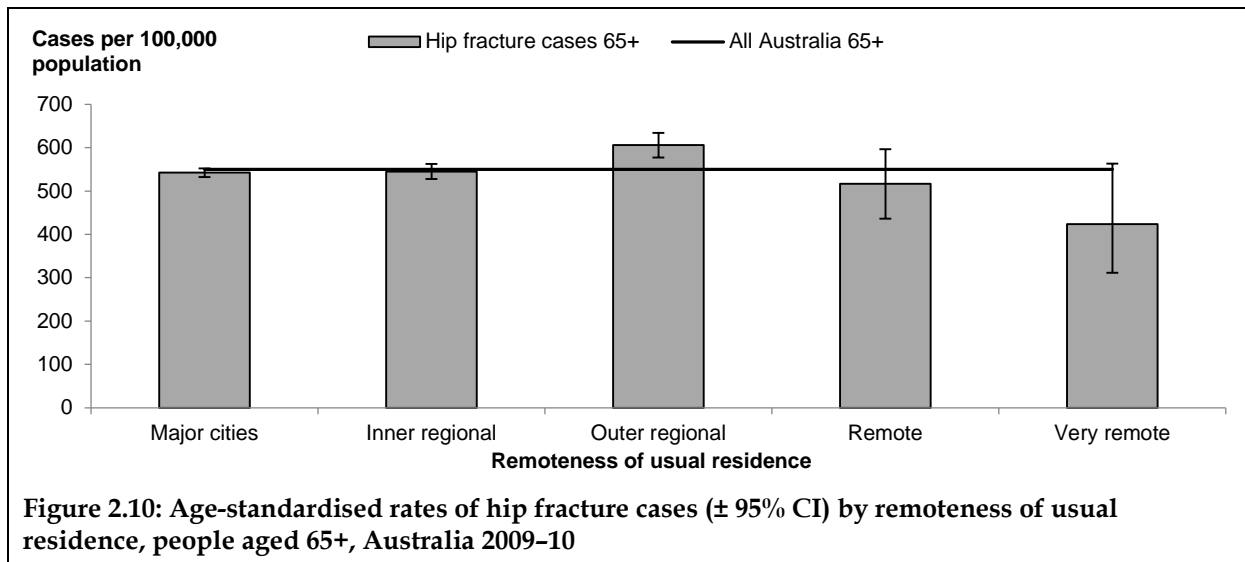
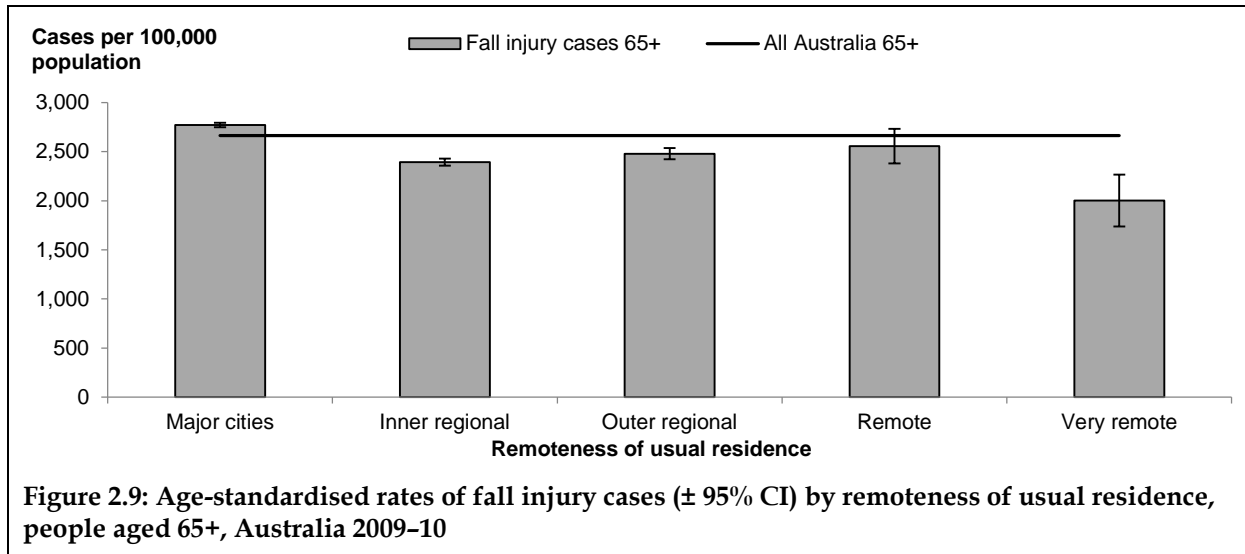
## Remoteness of usual residence

Age-standardised rates of hospitalised falls involving people aged 65 and older in 2009–10 were calculated according to the Australian Standard Geographical Classification (ASGC) of the remoteness of the place of usual residence (ABS 2010b). The rate for *Major cities* was substantially higher than those for other regions (2,771 per 100,000 population) and the rate for *Very remote* regions was substantially lower (2,002 per 100,000, see Figure 2.9).

Figure 2.10 presents rates of hip fracture due to falls in older people by remoteness of residence for 2009–10. It shows a relatively low rate for residents of *Very remote* areas (424 per 100,000 population) and a relatively high rate for residents of *Outer regional* areas (606 per 100,000). The overlapping confidence intervals, however, indicate that these differences were not particularly noteworthy.

For the first time in this report series we present the rate of head injury due to falls by people aged 65 and older by remoteness of usual residence. Figure 2.11 shows a pattern for head injury that is very similar to that for all types of fall-related cases (Figure 2.9), with a relatively high rate observed for residents of *Major cities* (558 per 100,000 population) and a relatively low rate for residents of *Very remote* areas (361 per 100,000). Again, the generally overlapping confidence intervals, however, indicate that differences between remoteness areas were only noteworthy for *Very remote* areas.

The frequent observation of low rates of hospitalised falls (and hip fractures) for residents of *Very remote* areas (for example Bradley 2012a, 2012b) 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 (of low rates in remote areas) has been observed for rates of osteoporosis diagnoses in the Australian population (AIHW 2011c). The drivers of these observations are unknown. As we have done previously, we suggest 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.



### 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 2009–10 (those included in Chapter 2).

The 2009–10 data-year was coded to the sixth edition of the ICD-10-AM. In this edition, a number of subcategories are available to describe specific areas of the home (for example; the bathroom 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.

As in previous years, the most common cause of hospitalised fall injury cases for people aged 65 and older in 2009–10 were falls on the same level from slipping, tripping and stumbling (33%, see Table 3.1). Slips, trips and stumbles were proportionately more common for women than for men and, for both sexes, most of these types of fall (63%) were explicitly attributed to tripping. Similarly, ‘unspecified falls’ (accounting for 27% of cases) and ‘other falls on same level’ (22%) remained the second and third most common types of injurious fall resulting in the hospitalisation of people aged 65 and over in 2009–10.

Most ‘other falls on same level’ were coded to the other or unspecified categories (95% of the 18,443 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 for men, women and people aged 65+, Australia 2009–10**

| External cause  | Men          |             | Women         |             | People        |             |
|---|--------------|-------------|---------------|-------------|---------------|-------------|
|   | Count        | Per cent    | Count         | Per cent    | Count         | Per cent    |
| Fall on same level involving ice & snow                                       | 5            | 0.0         | 8             | 0.0         | 13            | 0.0         |
| Fall on same level from slipping  | 1,913        | 7.5         | 5,231         | 9.0         | 7,144         | 8.5         |
| Fall on same level from tripping  | 4,515        | 17.6        | 12,833        | 22.1        | 17,348        | 20.7        |
| Fall on same level from stumbling   | 928          | 3.6         | 1,927         | 3.3         | 2,855         | 3.4         |
| <i>Total fall on same level from slipping, tripping &amp; stumbling</i>       | <i>7,356</i> | <i>28.7</i> | <i>19,991</i> | <i>34.4</i> | <i>27,347</i> | <i>32.6</i> |
| Fall involving pedestrian conveyances   | 158          | 0.6         | 181           | 0.3         | 339           | 0.4         |
| Other fall on same level due to collision with, or pushing by, another person | 47           | 0.2         | 153           | 0.3         | 200           | 0.2         |
| Fall while being carried or supported by other people                         | 7            | 0.0         | 29            | 0.0         | 36            | 0.0         |
| Fall involving wheelchair   | 214          | 0.8         | 358           | 0.6         | 572           | 0.7         |
| Fall involving bed  | 1,114        | 4.4         | 2,420         | 4.2         | 3,534         | 4.2         |
| Fall involving chair  | 793          | 3.1         | 1,737         | 3.0         | 2,530         | 3.0         |
| Fall involving other furniture  | 53           | 0.2         | 91            | 0.2         | 144           | 0.2         |
| Fall involving playground equipment   | n.p.         | 0.0         | n.p.          | 0.0         | 10            | 0.0         |
| Fall on & from stairs & steps   | 1,515        | 5.9         | 3,326         | 5.7         | 4,841         | 5.8         |
| Fall on & from ladder   | 1,175        | 4.6         | 319           | 0.5         | 1,494         | 1.8         |

(continued)

**Table 3.1 (continued): Causes of hospitalised fall injury cases: first external cause code for men, women and people aged 65+, Australia 2009–10**

| External cause  | Men           |              | Women         |              | People        |              |
|---|---------------|--------------|---------------|--------------|---------------|--------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Fall on & from scaffolding  | n.p.          | 0.1          | n.p.          | 0.0          | 23            | 0.0          |
| Fall from, out of or through building or structure                            | 384           | 1.5          | 126           | 0.2          | 510           | 0.6          |
| Fall from tree  | n.p.          | 0.2          | n.p.          | 0.0          | 46            | 0.1          |
| Fall from cliff   | 42            | 0.2          | 19            | 0.0          | 61            | 0.1          |
| Diving or jumping into water causing injury other than drowning or submersion | 14            | 0.1          | 6             | 0.0          | 20            | 0.0          |
| Other fall from one level to another  | 466           | 1.8          | 555           | 1.0          | 1,021         | 1.2          |
| Other fall on same level  | 5,499         | 21.5         | 12,944        | 22.3         | 18,443        | 22.0         |
| Unspecified fall  | 6,690         | 26.1         | 15,894        | 27.3         | 22,584        | 27.0         |
| <b>Total</b>  | <b>25,597</b> | <b>100.0</b> | <b>58,171</b> | <b>100.0</b> | <b>83,768</b> | <b>100.0</b> |

## Place of occurrence

Place of occurrence was not specifically identified in 17% of records for fall injury cases in 2009–10 (Y92.9 unspecified place of occurrence  $n = 14,043$ , or not reported  $n = 14$ ).

As in previous years, half of all hospitalised fall injury cases involving people aged 65 and older in 2009–10 occurred in the home, including the driveway to the home (49%, see Table 3.2). The bulk of these cases were recorded as occurring in 'other and unspecified' places in the home (48%,  $n = 19,848$ ). A further 15% of falls in the home were recorded as occurring in the outdoor areas of the home ( $n = 6,216$ ), with falls occurring in the bathroom and bedroom also relatively common (11% and 9% of falls in the home, respectively).

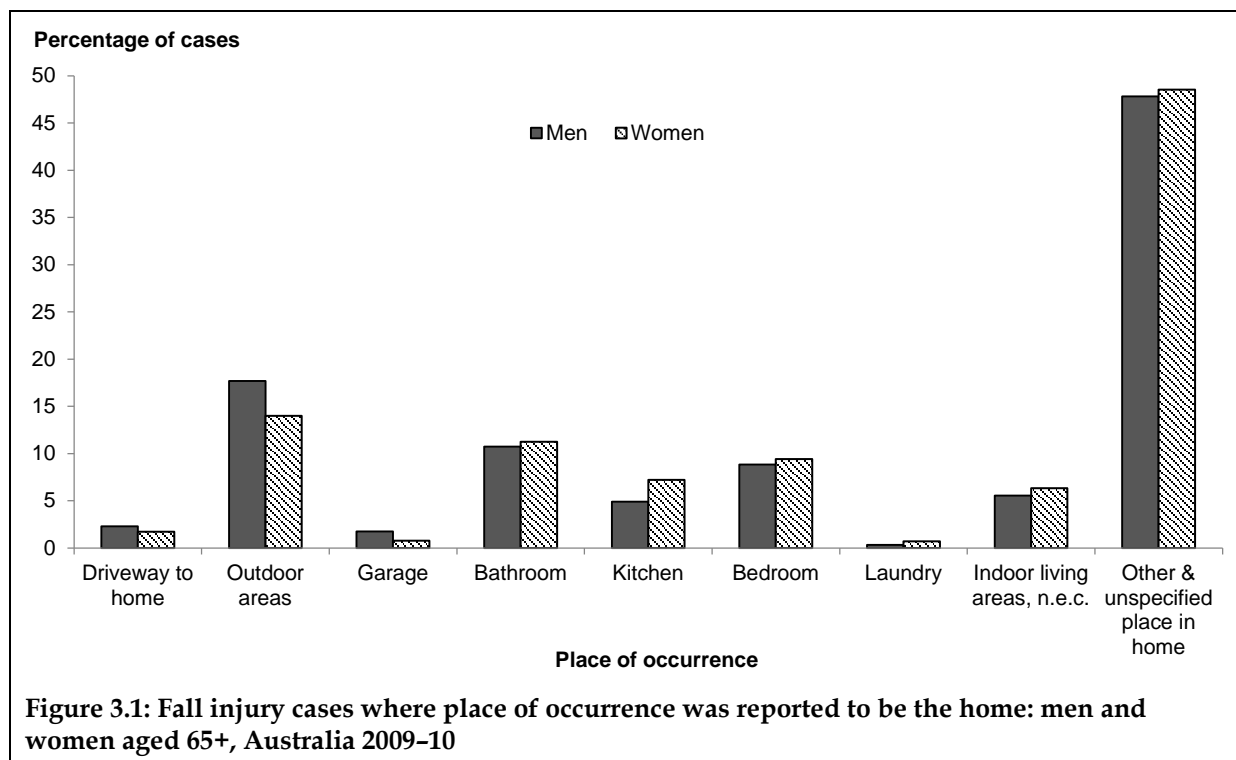
Figure 3.1 shows that cases involving men were proportionately more common in areas outside of the home (the driveway, garage and outdoor areas) while falls involving women were proportionately more common in areas within the home itself (the bathroom, kitchen, laundry etc.).

Aged care facilities were the reported place of occurrence for a further 22% of hospitalised fall injury cases in 2009–10 ( $n = 18,355$ ). A greater proportion of cases involving women were reported to have occurred in aged care facilities (24% of all falls involving women) than for men (18%).

In all, about 6 in every 7 fall injury cases with a specified place of occurrence (85%) were reported to have happened in either the home or an aged care facility (59% and 26% of specified places, respectively).

**Table 3.2: Place of occurrence for fall injury cases: men, women and people aged 65+, Australia 2009–10**

| Place of occurrence   | Men           |              | Women         |              | People        |              | Per cent specified |
|---|---------------|--------------|---------------|--------------|---------------|--------------|--------------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |                    |
| Driveway to home  | 291           | 1.1          | 491           | 0.8          | 782           | 0.9          | 1.1                |
| Outdoor areas   | 2,231         | 8.7          | 3,985         | 6.9          | 6,216         | 7.4          | 8.9                |
| Garage  | 223           | 0.9          | 221           | 0.4          | 444           | 0.5          | 0.6                |
| Bathroom  | 1,353         | 5.3          | 3,203         | 5.5          | 4,556         | 5.4          | 6.5                |
| Kitchen   | 621           | 2.4          | 2,052         | 3.5          | 2,673         | 3.2          | 3.8                |
| Bedroom   | 1,116         | 4.4          | 2,685         | 4.6          | 3,801         | 4.5          | 5.5                |
| Laundry   | 43            | 0.2          | 207           | 0.4          | 250           | 0.3          | 0.4                |
| Indoor living areas, n.e.c.   | 703           | 2.7          | 1,807         | 3.1          | 2,510         | 3.0          | 3.6                |
| Other & unspecified place in home                                       | 6,030         | 23.6         | 13,818        | 23.8         | 19,848        | 23.7         | 28.5               |
| <i>Total home (including driveway)</i>                                  | <i>12,611</i> | <i>49.3</i>  | <i>28,469</i> | <i>48.9</i>  | <i>41,080</i> | <i>49.0</i>  | <i>58.9</i>        |
| Aged care facilities  | 4,535         | 17.7         | 13,820        | 23.8         | 18,355        | 21.9         | 26.3               |
| Various other residential institutions                                  | 97            | 0.4          | 198           | 0.3          | 295           | 0.4          | 0.4                |
| <i>Total residential institution</i>                                    | <i>4,632</i>  | <i>18.1</i>  | <i>14,018</i> | <i>24.1</i>  | <i>18,650</i> | <i>22.3</i>  | <i>26.7</i>        |
| Health service area   | 396           | 1.5          | 805           | 1.4          | 1,201         | 1.4          | 1.7                |
| Various other specified institution & public administrative area        | 118           | 0.5          | 323           | 0.6          | 441           | 0.5          | 0.6                |
| <i>Total school, other institution &amp; public administrative area</i> | <i>514</i>    | <i>2.0</i>   | <i>1,128</i>  | <i>1.9</i>   | <i>1,642</i>  | <i>2.0</i>   | <i>2.4</i>         |
| Sports & athletics area   | 139           | 0.5          | 238           | 0.4          | 377           | 0.5          | 0.5                |
| Roadway   | 215           | 0.8          | 335           | 0.6          | 550           | 0.7          | 0.8                |
| Footpath  | 869           | 3.4          | 1,645         | 2.8          | 2,514         | 3.0          | 3.6                |
| Other & unspecified public highway, street or road                      | 185           | 0.7          | 304           | 0.5          | 489           | 0.6          | 0.7                |
| <i>Total public highway, street or road</i>                             | <i>1,269</i>  | <i>5.0</i>   | <i>2,284</i>  | <i>3.9</i>   | <i>3,553</i>  | <i>4.2</i>   | <i>5.1</i>         |
| Trade & service area  | 838           | 3.3          | 1,928         | 3.3          | 2,766         | 3.3          | 4.0                |
| Industrial & construction area  | 48            | 0.2          | 15            | 0.0          | 63            | 0.1          | 0.1                |
| Farm  | 103           | 0.4          | 36            | 0.1          | 139           | 0.2          | 0.2                |
| Other specified place of occurrence                                     | 505           | 2.0          | 936           | 1.6          | 1,441         | 1.7          | 2.1                |
| Unspecified place of occurrence or place of occurrence not reported     | 4,938         | 19.3         | 9,119         | 15.7         | 14,057        | 16.8         | ..                 |
| <b>Total</b>  | <b>25,597</b> | <b>100.0</b> | <b>58,171</b> | <b>100.0</b> | <b>83,768</b> | <b>100.0</b> |                    |



## Aged care facilities

One in 5 injurious falls involving a person aged 65 or older that resulted in hospitalisation in 2009-10 was reported to have occurred in an aged care facility ( $n = 18,355$ , see Table 3.2).

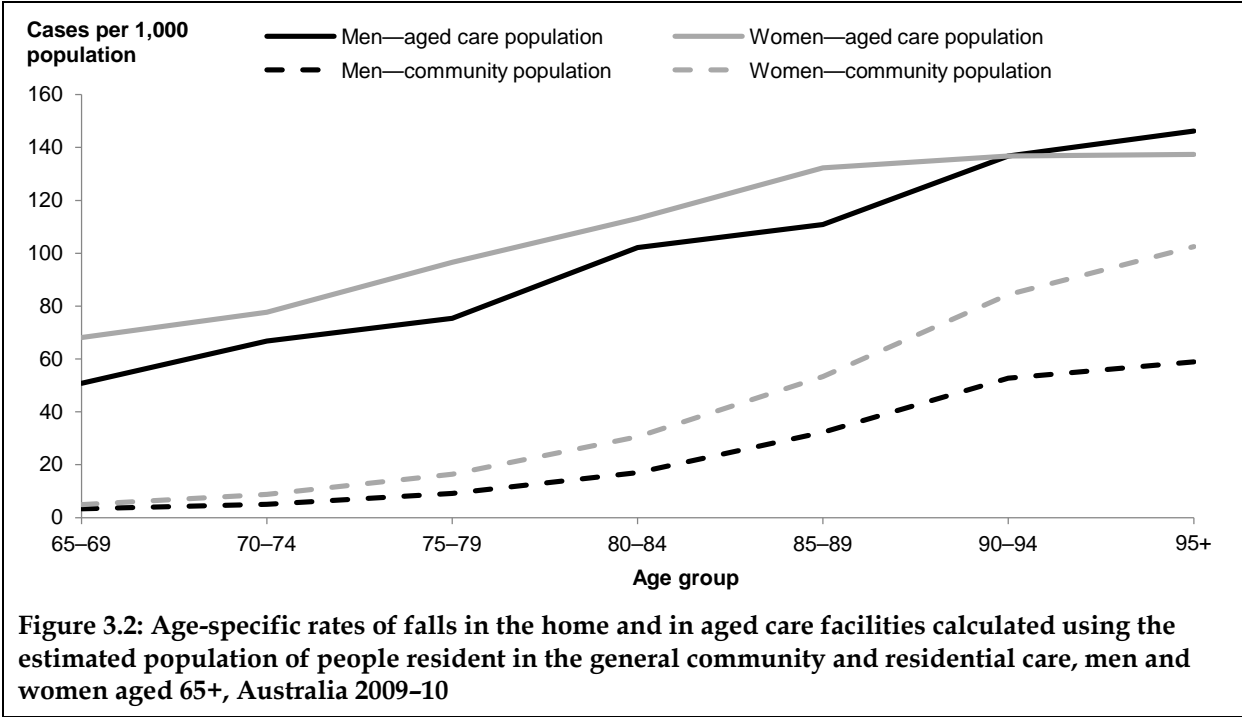
As in previous years, we have calculated the age-standardised rate of falls explicitly reported to have occurred in aged care facilities involving people aged 65 and older resident in such facilities, using population estimates derived from the AIHW's *Residential aged care in Australia* report series (AIHW 2010b; 2011b; see also Appendix). We have also calculated the rate of falls explicitly reported to have occurred in the home for people aged 65 and older and resident in the community (that is, the population who were not residents of aged care facilities in 2009-10). Of course, some of the 17% of falls cases that had either an unspecified place of occurrence code, or no place code recorded, may have occurred in either of these locations but could not be included in this analysis.

The estimated incidence of fall injury cases occurring in aged care facilities for people aged 65 and older in 2009-10 was 8,352 per 100,000 population; nearly 6 times as high as the rate of falls in the home involving people aged 65 and older. This was an increase of 3% (252 per 100,000) from the 2008-09 rate. The age-standardised rate of falls in the home for older people living in the community was 1,510 per 100,000 population, an increase of 4% (59 per 100,000) from the 2008-09 rate.

The age-standardised rates of falls by female residents of aged care facilities (8,998 per 100,000 population) were somewhat higher than that for male residents (7,470 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 2009-10 are presented in Figure 3.2. As in previous years, the rate of hospitalised falls for the oldest men resident in aged care facilities was higher than the equivalent rate for women – a

very different pattern to that for falls reported to have occurred in the home. The highest age-specific fall injury rate observed for residents of aged care facilities was 146 per 1,000 population for men aged 95 and older (compared with 59 per 1,000 for men of that age resident in the community and falling in the home). For women resident in aged care facilities, the highest rate observed was also for those aged 95 and older: 137 per 1,000 population (compared with 102 per 1,000 for women of that age resident in the community and falling in the home).



### Activity when fall occurred

As in previous years, about two-thirds of the hospitalised fall injury cases for people aged 65 and older in 2009-10 were assigned a U73.9 activity code – ‘unspecified activity’ (70%, see Table 3.3). Of the 24,856 (30%) 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’ (49% of cases with a specified activity, *n* = 12,151). This pattern of activity coding is comparable to that observed in previous years (for example, Bradley 2012a; 2012b).

We have noted previously that, 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 2009-10 was available for less than 2% cent of cases (that is, the 1.4% of cases coded to ‘while engaged in sports’ or ‘while working for income’).



**Table 3.3: Reported activity when injured for fall injury cases: men, women and people aged 65+, Australia 2009–10**

| Activity when injured   | Men           |              | Women         |              | People        |              | Per cent specified |
|---|---------------|--------------|---------------|--------------|---------------|--------------|--------------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |                    |
| While engaged in sports   | 307           | 1.2          | 550           | 0.9          | 857           | 1.0          | 3.4                |
| While engaged in leisure  | 274           | 1.1          | 566           | 1.0          | 840           | 1.0          | 3.4                |
| While working for income  | 204           | 0.8          | 101           | 0.2          | 305           | 0.4          | 1.2                |
| While engaged in other types of work                                  | 1,790         | 7.0          | 3,279         | 5.6          | 5,069         | 6.1          | 20.4               |
| While resting, sleeping, eating or engaging in other vital activities | 3,570         | 13.9         | 8,581         | 14.8         | 12,151        | 14.5         | 48.9               |
| Other specified activity  | 1,692         | 6.6          | 3,942         | 6.8          | 5,634         | 6.7          | 22.7               |
| Unspecified activity or activity not reported                         | 17,760        | 69.4         | 41,152        | 70.7         | 58,912        | 70.3         | ..                 |
| <b>Total</b>  | <b>25,597</b> | <b>100.0</b> | <b>58,171</b> | <b>100.0</b> | <b>83,768</b> | <b>100.0</b> |                    |

## 4 The burden of injury due to falls

Chapters 2 and 3 focused on the estimated number of new cases of hospitalised fall-related injury that occurred in the year to 30 June 2010. 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'.

The 90,565 additional fall-related separations considered in this section consist of:

- 9,623 fall injury inward transfers
- 33,904 fall-related follow-up care separations
- 25,431 'other fall-related' separations
- 21,607 'tendency to fall, not elsewhere classified' separations.

Further information about the inclusion criteria for each of these four types of fall-related separation starts each section in this chapter.

### 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 9,623 fall injury inward transfer separations were identified for the 2009-10 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 305 per 100,000 population, about the same as that for 2008-09. As for fall injury cases, inward transfers occurred at a higher rate for women (359 per 100,000) than for men (232 per 100,000). Women accounted for 69% ( $n = 6,663$ ) 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; 38% of inward transfers ( $n = 3,628$ ) compared with 28% of fall cases. Most of this increase was due to hip fractures rather than other types of injuries to the hip and thigh (31% of transfer separations versus 21% of fall cases). As for cases, injuries to the head was the second most common principal diagnosis for inward transfer separations in 2009-10 ( $n = 1,290$ ), a 17% increase on the previous year. Almost as many inward transfers had a principal diagnosis describing an injury to the abdomen, lower back, lumbar spine or pelvis ( $n = 1,168$ , a 7% increase on 2008-09).

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 (28% versus 33%, respectively) or 'other specified' falls (18% versus 22%) than for fall cases. Conversely, 'unspecified fall' was a far more common external cause ascribed to inward transfer separations than for fall injury cases (38% versus 27%, 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 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 (*Factors influencing health status and contact with health services*) 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 data items flagging whether the condition was present on admission to hospital or not, collected nationally since July 2008, become available for analysis (see AIHW 2011a).

Nearly 34,000 fall-related follow-up care separations were identified for people aged 65 and older in 2009–10 ( $n = 33,904$ ), an increase of 14% on that for 2008–09 and continuing the sharply increasing trend for this type of fall-related separation observed since 1999 (see Bradley 2012b). These 33,904 fall-related follow-up care separations represent 1% of all hospital separations for the older population in 2009–10 and, as in previous years, nearly three-quarters involved women (70%,  $n = 23,748$ ).

The mean age of the person hospitalised in a fall-related follow-up care separation was 82.1 ( $\pm 7.3$  SD), similar to that in previous years and slightly older than the average for fall injury cases.

The age-standardised rate of fall-related follow-up care separations for all people aged 65 and older in 2009–10 was 1,081 separations per 100,000 population. As in previous years, the age-standardised rate for women (1,291 per 100,000) was much higher than that for men (795 per 100,000).

Psoriatic Rates of fall-related follow-up care separations in 2009–10 increased considerably with age for both men and women until very old age (Figure 4.1). For women, however, the oldest age group (95+) had a slightly lower rate of fall-related follow-up care separations than women aged 85–94. As for fall injury cases, age-specific rates of fall-related follow-up care separations were higher for women than for men in every age group (although this was only marginally so for those aged 95 and older).

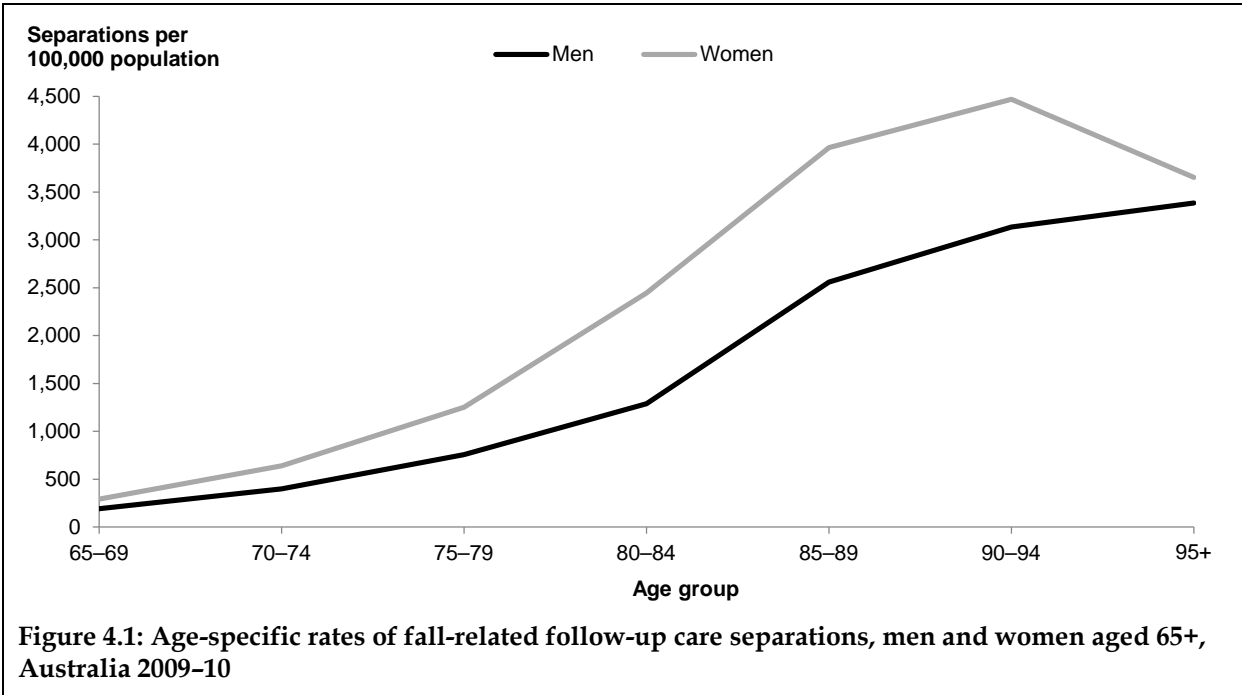


Figure 4.1: Age-specific rates of fall-related follow-up care separations, men and women aged 65+, Australia 2009-10

### Diagnoses for fall-related follow-up care separations

More than three-quarters (89%, *n* = 30,172) 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 (from 3.2% of follow-up care separations for those aged 65–69, to 11.2% for those aged 95 and older).

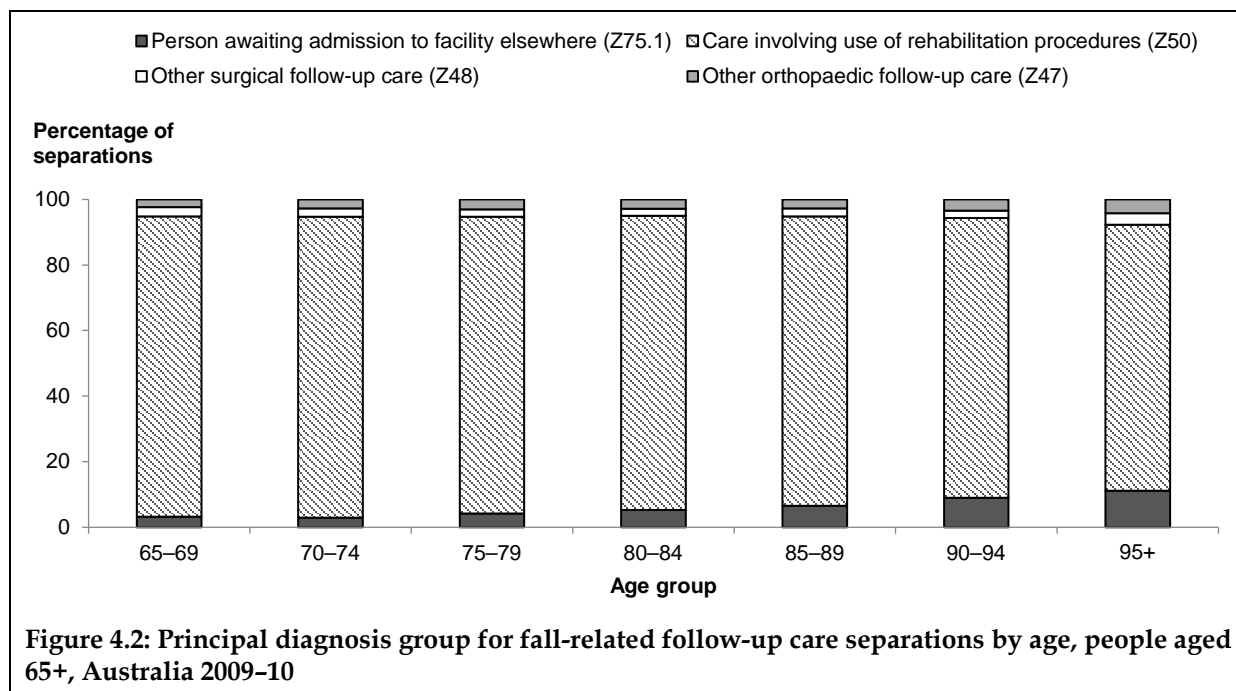


Table 4.1 describes the specific principal diagnoses for fall-related follow-up care separations for people aged 65 and older in 2009-10. Most of these separations (85%,  $n = 28,728$ ) had a principal diagnosis of Z50.9 (care involving use of rehabilitation procedures, unspecified). This was 4,195 (17%) more Z50.9 separations than in 2008-09, and accounted for nearly all of the increase observed for fall-related follow-up care separations as a whole.

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 1,727 records accounted for 5% of fall-related follow-up care separations in 2009-10, a similar number as observed in 2008-09.

**Table 4.1: Principal diagnosis for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009-10**

| Principal diagnosis   | Men        |            | Women      |            | People     |            |
|---|------------|------------|------------|------------|------------|------------|
|   | Count      | Per cent   | Count      | Per cent   | Count      | Per cent   |
| Follow-up care involving removal of fracture plate and other internal fixation device (Z47.0) | n.p.       | 0.0        | n.p.       | 0.0        | 7          | 0.0        |
| Other specified orthopaedic follow-up care (Z47.8)  | 125        | 1.2        | 430        | 1.8        | 555        | 1.6        |
| Orthopaedic follow-up care, unspecified (Z47.9)   | 115        | 1.1        | 319        | 1.3        | 434        | 1.3        |
| <i>Total other orthopaedic follow-up care (Z47)</i>   | <i>242</i> | <i>2.4</i> | <i>754</i> | <i>3.2</i> | <i>996</i> | <i>2.9</i> |
| Attention to surgical dressings and sutures (Z48.0)   | 5          | 0.0        | 5          | 0.0        | 10         | 0.0        |
| Other specified surgical follow-up care (Z48.8)   | 245        | 2.4        | 546        | 2.3        | 791        | 2.3        |
| Surgical follow-up care, unspecified (Z48.9)  | n.p.       | 0.0        | n.p.       | 0.0        | 11         | 0.0        |
| <i>Total other surgical follow-up care (Z48)</i>  | <i>253</i> | <i>2.5</i> | <i>559</i> | <i>2.4</i> | <i>812</i> | <i>2.4</i> |

(continued)

**Table 4.1 (continued): Principal diagnosis for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009–10**

| Principal diagnosis  | Men           |              | Women         |              | People        |              |
|--|---------------|--------------|---------------|--------------|---------------|--------------|
|  | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Cardiac rehabilitation (Z50.0)   | 7             | 0.1          | 9             | 0.0          | 16            | 0.0          |
| Other physical therapy (Z50.1)   | 155           | 1.5          | 423           | 1.8          | 578           | 1.7          |
| Psychotherapy, not elsewhere classified (Z50.4)                                      | 0             | 0.0          | n.p.          | 0.0          | n.p.          | 0.0          |
| Occupational therapy and vocational rehabilitation, not elsewhere classified (Z50.7) | 10            | 0.1          | 15            | 0.1          | 25            | 0.1          |
| Care involving use of other rehabilitation procedures (Z50.8)                        | 230           | 2.3          | 594           | 2.5          | 824           | 2.4          |
| Care involving use of rehabilitation procedure, unspecified (Z50.9)                  | 8,610         | 84.8         | 20,118        | 84.7         | 28,728        | 84.7         |
| <i>Total care involving use of rehabilitation procedures (Z50)</i>                   | <i>9,012</i>  | <i>88.7</i>  | <i>21,160</i> | <i>89.1</i>  | <i>30,172</i> | <i>89.0</i>  |
| Person awaiting admission to acute hospital (Z75.10)                                 | 5             | 0.0          | 13            | 0.1          | 18            | 0.1          |
| Person awaiting admission to residential aged care service (Z75.11)                  | 594           | 5.8          | 1,133         | 4.8          | 1,727         | 5.1          |
| Person awaiting admission to rehabilitation facility/unit (Z75.13)                   | 22            | 0.2          | 58            | 0.2          | 80            | 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)                     | 17            | 0.2          | 56            | 0.2          | 73            | 0.2          |
| Person awaiting admission to adequate facility elsewhere, unspecified (Z75.19)       | 10            | 0.1          | 14            | 0.1          | 24            | 0.1          |
| <i>Total person awaiting admission to adequate facility elsewhere (Z75.1)</i>        | <i>649</i>    | <i>6.4</i>   | <i>1,275</i>  | <i>5.4</i>   | <i>1,924</i>  | <i>5.7</i>   |
| <b>Total</b>   | <b>10,156</b> | <b>100.0</b> | <b>23,748</b> | <b>100.0</b> | <b>33,904</b> | <b>100.0</b> |

The first-listed community injury diagnosis (S00–T75, T79) for fall-related follow-up care separation records in 2009–10 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 (46%,  $n = 15,587$ ) and most of these injuries were fractures of the neck of the femur (39% of all fall-related follow-up care separations,  $n = 13,260$ ). 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 (8% of follow-up separations versus 20% of fall cases and 13% of inward transfers). Instead, and as in 2008–09, abdominal injuries were the second most common injury for fall-related follow-up care separations, accounting for about 1 in 7 such records (14%,  $n = 4,893$ ). This was a 22% increase in the number of such separations from the previous year.

**Table 4.2: First-listed injury diagnosis for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009–10**

| First injury diagnosis                                      | Men           |              | Women         |              | People        |             |
|---|---------------|--------------|---------------|--------------|---------------|-------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent    |
| Injuries to the head  | 1,322         | 13.0         | 1,329         | 5.6          | 2,651         | 7.8         |
| Injuries to the neck  | 161           | 1.6          | 225           | 0.9          | 386           | 1.1         |
| Injuries to the thorax                                      | 652           | 6.4          | 999           | 4.2          | 1,651         | 5.9         |
| Injuries to the abdomen, lower back, lumbar spine & pelvis  | 1,187         | 11.7         | 3,706         | 15.6         | 4,893         | 14.4        |
| Injuries to the shoulder & upper arm                        | 709           | 7.0          | 2,015         | 8.5          | 2,724         | 8.0         |
| Injuries to the elbow & forearm                             | 403           | 4.0          | 1,135         | 4.8          | 1,538         | 4.5         |
| Injuries to the wrist & hand                                | 149           | 1.5          | 239           | 1.0          | 388           | 1.1         |
| Hip fractures   | 3,588         | 35.3         | 9,672         | 40.7         | 13,260        | 39.1        |
| Other injuries to the hip & thigh                           | 738           | 7.3          | 1,589         | 6.7          | 2,327         | 6.9         |
| <i>Total injuries to the hip &amp; thigh</i>                | <i>4,326</i>  | <i>42.6</i>  | <i>11,261</i> | <i>47.4</i>  | <i>15,587</i> | <i>46.0</i> |
| Injuries to the knee & lower leg                            | 941           | 9.3          | 2,351         | 9.9          | 3,292         | 9.7         |
| Injuries to the ankle & foot                                | 128           | 1.3          | 260           | 1.1          | 388           | 1.1         |
| Injuries involving multiple body regions                    | 11            | 0.1          | 13            | 0.1          | 24            | 0.1         |
| Injuries to unspecified parts of trunk, limb or body region | 96            | 0.9          | 113           | 0.5          | 209           | 0.6         |
| Effects of foreign body entering through natural orifice    | n.p.          | 0.0          | n.p.          | 0.0          | n.p.          | 0.0         |
| Burns   | 5             | 0.0          | 13            | 0.1          | 18            | 0.1         |
| Frostbite   | n.p.          | 0.0          | n.p.          | 0.0          | n.p.          | 0.0         |
| Poisoning by drugs, medicaments & biological substances     | 6             | 0.1          | 6             | 0.0          | 12            | 0.0         |
| Other & unspecified effects of external causes              | n.p.          | 0.0          | n.p.          | 0.0          | 15            | 0.0         |
| Certain early complications of trauma                       | 55            | 0.5          | 71            | 0.3          | 126           | 0.4         |
| <b>Total</b>  | <b>10,156</b> | <b>100.0</b> | <b>23,748</b> | <b>100.0</b> | <b>33,904</b> | <b>100</b>  |

## External cause for fall-related follow-up care

Fall-related follow-up care separations are assigned to an external cause major group on the basis of the first-listed external cause in the range V00–Y89 for the record (see Appendix for further detail). For the vast majority of these separations in 2009–10, the first external cause was a *Falls* code W00–W19 (98%,  $n = 33,287$ ). The follow-up care separations that had a different type of external cause appearing before a fall code generally had a *Complications of medical and surgical care* code first in the record (Y40–Y84: 1%,  $n = 421$ ).

The first-appearing *fall* external cause for all fall-related follow-up care separations was identified for further analysis (Table 4.3). Similar to fall injury transfer separations, the most common external cause for fall-related follow-up care separations was ‘unspecified fall’ (W19, 40% of separations). As noted previously, this suggests that some detail regarding the circumstances of an injurious fall is lost from records after the original hospitalisation for the injury event (that is, the case separation).

**Table 4.3: First-listed fall external cause for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009–10**

| First fall external cause   | Men           |              | Women         |              | People        |              |
|---|---------------|--------------|---------------|--------------|---------------|--------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Fall on same level involving ice & snow                                       | 0             | 0.0          | 15            | 0.1          | 15            | 0.0          |
| Fall on same level from slipping  | 620           | 6.1          | 1,810         | 7.6          | 2,430         | 7.2          |
| Fall on same level from tripping  | 1,315         | 12.9         | 4,040         | 17.0         | 5,355         | 15.8         |
| Fall on same level from stumbling   | 394           | 3.9          | 763           | 3.2          | 1,157         | 3.4          |
| <i>Total fall on same level from slipping, tripping &amp; stumbling</i>       | <i>2,329</i>  | <i>22.9</i>  | <i>6,613</i>  | <i>27.8</i>  | <i>8,942</i>  | <i>26.4</i>  |
| Fall involving pedestrian conveyances   | 51            | 0.5          | 76            | 0.3          | 127           | 0.4          |
| Other fall on same level due to collision with, or pushing by, another person | 36            | 0.4          | 57            | 0.2          | 93            | 0.3          |
| Fall while being carried or supported by other persons                        | n.p.          | 0.0          | n.p.          | 0.0          | 10            | 0.0          |
| Fall involving wheelchair   | 67            | 0.7          | 77            | 0.3          | 144           | 0.4          |
| Fall involving bed  | 425           | 4.2          | 676           | 2.8          | 1,101         | 3.2          |
| Fall involving chair  | 266           | 2.6          | 550           | 2.3          | 816           | 2.4          |
| Fall involving other furniture  | 9             | 0.1          | 20            | 0.1          | 29            | 0.1          |
| Fall on & from stairs & steps   | 644           | 6.3          | 1,474         | 6.2          | 2,118         | 6.2          |
| Fall on & from ladder   | 278           | 2.7          | 148           | 0.6          | 426           | 1.3          |
| Fall on & from scaffolding  | 6             | 0.1          | 0             | 0.0          | 6             | 0.0          |
| Fall from, out of or through building or structure                            | 170           | 1.7          | 41            | 0.2          | 211           | 0.6          |
| Fall from tree  | n.p.          | 0.0          | n.p.          | 0.0          | n.p.          | 0.0          |
| Fall from cliff   | 35            | 0.3          | 8             | 0.0          | 43            | 0.1          |
| Diving or jumping into water causing injury other than drowning or submersion | n.p.          | 0.0          | n.p.          | 0.0          | n.p.          | 0.0          |
| Other fall from one level to another  | 113           | 1.1          | 113           | 0.5          | 226           | 0.7          |
| Other fall on same level  | 1,729         | 17.0         | 4,358         | 18.4         | 6,087         | 18.0         |
| Unspecified fall  | 3,994         | 39.3         | 9,509         | 40.0         | 13,503        | 39.8         |
| <b>Total</b>  | <b>10,156</b> | <b>100.0</b> | <b>23,748</b> | <b>100.0</b> | <b>33,904</b> | <b>100.0</b> |

## 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). 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.

A larger proportion of fall-related follow-up care separations was ascribed an 'unspecified place of occurrence' than for fall injury cases (30% versus 17%, respectively). Again, this highlights a lack/loss of detail in hospital records generated later in a series for the same injury event.

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 2009–10 (46%,  $n = 15,623$ ). A smaller proportion of follow-up separations were recorded as having occurred in aged care facilities (7%, compared with 22% of fall injury cases). Of note, a larger proportion of fall-related



follow-up care separations were recorded as having occurred in a health service area (9%, compared with 1% of fall injury cases). It is possible 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 data items flagging whether the condition was present on admission to hospital or not, collected nationally since July 2008, become available for analysis (see AIHW 2011a).

**Table 4.4: Place of occurrence for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009–10**

| Place of occurrence   | Men          |             | Women         |             | People        |             | Per cent specified |
|---|--------------|-------------|---------------|-------------|---------------|-------------|--------------------|
|   | Count        | Per cent    | Count         | Per cent    | Count         | Per cent    |                    |
| Driveway to home  | 134          | 1.3         | 154           | 0.6         | 288           | 0.8         | 1.2                |
| Outdoor areas   | 582          | 5.7         | 1,215         | 5.1         | 1,797         | 5.3         | 7.6                |
| Garage  | 51           | 0.5         | 86            | 0.4         | 137           | 0.4         | 1.6                |
| Bathroom  | 413          | 4.1         | 1,093         | 4.6         | 1,506         | 4.4         | 6.3                |
| Kitchen   | 242          | 2.4         | 886           | 3.7         | 1,128         | 3.3         | 4.7                |
| Bedroom   | 330          | 3.2         | 859           | 3.6         | 1,189         | 3.5         | 5.0                |
| Laundry   | 12           | 0.1         | 73            | 0.3         | 85            | 0.3         | 0.4                |
| Indoor living areas, n.e.c.   | 210          | 2.1         | 643           | 2.7         | 853           | 32.5        | 3.6                |
| Other & unspecified place in home                                       | 2,401        | 23.6        | 6,239         | 26.3        | 8,640         | 2.5         | 36.3               |
| <i>Total home</i>   | <i>4,375</i> | <i>43.1</i> | <i>11,248</i> | <i>47.4</i> | <i>15,623</i> | <i>46.1</i> | <i>65.7</i>        |
| Aged care facilities  | 487          | 4.8         | 1,943         | 8.2         | 2,430         | 7.2         | 10.2               |
| Various other residential institutions                                  | 22           | 0.2         | 50            | 0.2         | 72            | 0.2         | 0.3                |
| <i>Total residential institution</i>                                    | <i>509</i>   | <i>5.0</i>  | <i>1,993</i>  | <i>8.4</i>  | <i>2,502</i>  | <i>7.4</i>  | <i>10.5</i>        |
| Health service area   | 1,313        | 12.9        | 1,721         | 7.2         | 3,034         | 8.9         | 12.8               |
| Various other specified institution & public administrative area        | 63           | 0.6         | 104           | 0.4         | 167           | 0.5         | 0.7                |
| <i>Total school, other institution &amp; public administrative area</i> | <i>1,376</i> | <i>13.5</i> | <i>1,825</i>  | <i>7.7</i>  | <i>3,201</i>  | <i>9.4</i>  | <i>13.5</i>        |
| Sports & athletics area   | 26           | 0.3         | 75            | 0.3         | 101           | 0.3         | 0.4                |
| Roadway   | 29           | 0.3         | 114           | 0.5         | 143           | 0.4         | 1.6                |
| Footpath  | 160          | 1.6         | 403           | 1.7         | 563           | 1.7         | 2.4                |
| Other & unspecified public highway, street or road                      | 27           | 0.3         | 98            | 0.4         | 125           | 0.4         | 0.5                |
| <i>Total public highway, street or road</i>                             | <i>216</i>   | <i>2.1</i>  | <i>615</i>    | <i>2.6</i>  | <i>831</i>    | <i>2.5</i>  | <i>3.5</i>         |

(continued)

**Table 4.4 (continued): Place of occurrence for fall-related follow-up care separations, men, women and people aged 65+, Australia 2009–10**

| Place of occurrence   | Men           |              | Women         |              | People        |              | Per cent specified |
|---|---------------|--------------|---------------|--------------|---------------|--------------|--------------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |                    |
| Trade & service area  | 269           | 2.6          | 708           | 3.0          | 977           | 2.9          | 4.1                |
| Industrial & construction area                                      | n.p.          | 0.1          | n.p.          | 0.0          | 12            | 0.0          | 0.1                |
| Farm  | n.p.          | 0.4          | n.p.          | 0.0          | 47            | 0.1          | 0.2                |
| Other specified place of occurrence                                 | 163           | 1.6          | 333           | 1.4          | 496           | 1.5          | 2.1                |
| Unspecified place of occurrence or place of occurrence not reported | 3,178         | 31.3         | 6,936         | 29.2         | 10,114        | 29.8         | ..                 |
| <b>Total</b>  | <b>10,156</b> | <b>100.0</b> | <b>23,748</b> | <b>100.0</b> | <b>33,904</b> | <b>100.0</b> |                    |

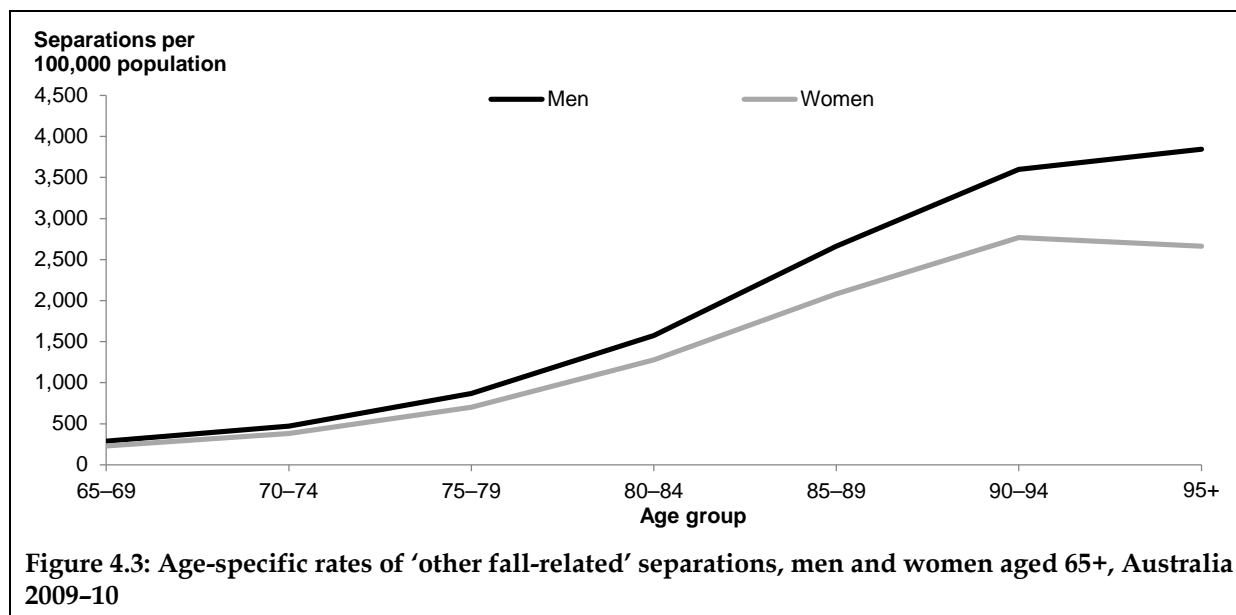
## ‘Other fall-related’ separations

A fourth class of fall-related separations is identified for people aged 65 and older, additional to those types already discussed above. These ‘other fall-related’ separations do not meet the criteria specified for fall injury cases, fall injury inward transfers or fall-related follow-up care separations, but 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 scenarios for such episodes of care 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 2011a).

An additional 25,431 episodes of hospital care involving people aged 65 and older were identified as ‘other fall-related’ separations in 2009–10; 1,407 (6%) more separations than identified in 2008–09 (Bradley 2012b). As in previous years, these separations represent 0.8% of the total number of hospital separations for people aged 65 and older in 2009–10 and a lower proportion of ‘other fall-related’ separations involved women than observed for the classes of fall injury separations considered thus far (53%,  $n = 13,532$ ).

The age-standardised rate of ‘other fall-related’ separations was 815 per 100,000 population in 2009–10. 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’ separations was higher for men than women: 927 per 100,000 compared with 737 per 100,000, respectively. The rate-ratio was 1.3 ‘other fall-related’ separations for men for every such separation for women. Further, the age-specific rates for men were higher than those for women for every age group (Figure 4.3).



The majority of 'other fall-related' separations did not have an injury code of any type as the principal diagnosis (97% of 'other fall-related' separations, see Table 4.5).

One in 5 'other fall-related' separations (20%,  $n = 5,102$ ) had a principal diagnosis from Chapter IX of the ICD-10-AM (*Diseases of the circulatory system*) and a similar number had a principal diagnosis from Chapter XVIII (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*: 17%,  $n = 4,266$ ). As in previous years, the two most common specific principal diagnoses in the *Symptoms, signs* group were R55 (syncope and collapse; 48% of these separations,  $n = 2,037$ ) and R29.6 (tendency to fall, not elsewhere classified; 14%,  $n = 586$ ).

Of the 3% 'other fall-related' separations that had an injury code as the principal diagnosis, half (49%  $n = 401$ ) were 'complications of surgical and medical care'. As in previous years, the two most common diagnoses were T81.41 (wound infection following a procedure, 17%) and T84.0 (mechanical complication of internal joint prosthesis, 15%).

**Table 4.5: ICD-10-AM chapter of principal diagnosis for 'other fall-related' separations, men, women and people aged 65+, Australia 2009-10**

| Principal diagnosis   | Men   |          | Women |          | People |          |
|---|-------|----------|-------|----------|--------|----------|
|   | Count | Per cent | Count | Per cent | Count  | Per cent |
| Certain infectious & parasitic diseases   | 415   | 3.5      | 469   | 3.5      | 884    | 3.5      |
| Neoplasms   | 1,133 | 9.5      | 753   | 5.6      | 1,886  | 7.4      |
| Diseases of the blood & blood-forming organs & certain disorders involving the immune mechanism | 129   | 1.1      | 172   | 1.3      | 301    | 1.2      |
| Endocrine, nutritional & metabolic diseases   | 503   | 4.2      | 650   | 4.8      | 1,153  | 4.5      |
| Mental & behavioural disorders  | 736   | 6.2      | 836   | 6.2      | 1,572  | 6.2      |
| Diseases of the nervous system  | 576   | 4.8      | 488   | 3.6      | 1,064  | 4.2      |
| Diseases of the eye & adnexa  | 17    | 0.1      | 29    | 0.2      | 46     | 0.2      |
| Diseases of the ear & mastoid process   | 27    | 0.2      | 46    | 0.3      | 73     | 0.3      |

(continued)

**Table 4.5 (continued): ICD-10-AM chapter of principal diagnosis for 'other fall-related' separations, men, women and people aged 65+, Australia 2009–10**

| Principal diagnosis   | Men           |              | Women         |              | People        |              |
|---|---------------|--------------|---------------|--------------|---------------|--------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Diseases of the circulatory system                                | 2,357         | 19.8         | 2,745         | 20.3         | 5,102         | 20.1         |
| Diseases of the respiratory system                                | 1,355         | 11.4         | 1,140         | 8.4          | 2,495         | 9.8          |
| Diseases of the digestive system                                  | 538           | 4.5          | 579           | 4.3          | 1,117         | 4.4          |
| Diseases of the skin & subcutaneous tissue                        | 307           | 2.6          | 430           | 3.2          | 737           | 2.9          |
| Diseases of the musculoskeletal system & connective tissue        | 545           | 4.6          | 822           | 6.1          | 1,367         | 5.4          |
| Diseases of the genitourinary system                              | 537           | 4.5          | 968           | 7.2          | 1,505         | 5.9          |
| Symptoms, signs & abnormal clinical & laboratory findings, n.e.c. | 1,951         | 16.4         | 2,315         | 17.1         | 4,266         | 16.8         |
| Injury, poisoning & certain other consequences of external causes | 389           | 3.3          | 437           | 3.2          | 826           | 3.2          |
| Factors influencing health status & contact with health services  | 382           | 3.2          | 651           | 4.8          | 1,033         | 4.1          |
| <b>Total*</b>   | <b>11,899</b> | <b>100.0</b> | <b>13,532</b> | <b>100.0</b> | <b>25,431</b> | <b>100.0</b> |

\*Totals include four separations from a chapter with a total case count too small to publish.

## Place of occurrence for 'other fall-related' separations

Table 4.6 presents the place of occurrence recorded for 'other fall-related' separations in 2009–10. A much smaller proportion of 'other fall-related' separations were ascribed an unspecified place of occurrence (14%) than either fall-related inward transfers (23%) or follow-up care separations (30%). Instead, 'other fall-related' separations are much more like fall injury cases in this regard (17% unspecified place).

Unlike the fall-related separations considered thus far, a 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 39% of 'other fall-related' separations ( $n = 9,811$ ), rising to 45% when only the 'other fall-related' separations with a *specified* place of occurrence were considered. It is likely that many of the fall injuries noted in these separations were in-hospital falls. Analysis of national presence on admission flag data will prove essential to understand more about the incidence and circumstances of these falls (AIHW 2011a). As observed in previous years, 'other fall-related' separations occurring in health service areas were proportionately more common for men than women (43% versus 34%, respectively).

**Table 4.6: Place of occurrence for 'other fall-related' separations, men, women and people aged 65+, Australia 2009–10**

| Place of occurrence   | Men           |              | Women         |              | People        |              | Per cent specified |
|---|---------------|--------------|---------------|--------------|---------------|--------------|--------------------|
|   | Count         | Per cent     | Count         | Per cent     | Count         | Per cent     |                    |
| Driveway to home  | 48            | 0.4          | 32            | 0.2          | 80            | 0.3          | 0.4                |
| Outdoor areas   | 329           | 2.8          | 328           | 2.4          | 657           | 2.6          | 3.0                |
| Garage  | 31            | 0.3          | 14            | 0.1          | 45            | 0.2          | 0.2                |
| Bathroom  | 505           | 4.2          | 757           | 5.6          | 1,262         | 5.0          | 5.8                |
| Kitchen   | 198           | 1.7          | 327           | 2.4          | 525           | 2.1          | 2.4                |
| Bedroom   | 359           | 3.0          | 493           | 3.6          | 852           | 3.4          | 3.9                |
| Laundry   | 17            | 0.1          | 20            | 0.1          | 37            | 0.1          | 0.2                |
| Indoor living areas, n.e.c.   | 235           | 2.0          | 332           | 2.5          | 567           | 2.2          | 2.6                |
| Other & unspecified place in home                                       | 1,805         | 15.2         | 2,518         | 18.6         | 4,323         | 17.0         | 19.8               |
| <i>Total home</i>   | <i>3,527</i>  | <i>29.6</i>  | <i>4,821</i>  | <i>35.6</i>  | <i>8,348</i>  | <i>32.8</i>  | <i>38.3</i>        |
| Aged care facilities  | 839           | 7.1          | 1,631         | 12.1         | 2,470         | 9.7          | 11.3               |
| Various other residential institutions                                  | 21            | 0.2          | 36            | 0.3          | 57            | 0.2          | 0.3                |
| <i>Total residential institution</i>                                    | <i>860</i>    | <i>7.2</i>   | <i>1,667</i>  | <i>12.3</i>  | <i>2,527</i>  | <i>9.9</i>   | <i>11.6</i>        |
| Health service area   | 5,174         | 43.5         | 4,637         | 34.3         | 9,811         | 38.6         | 45.0               |
| Various other specified institution & public administrative area        | 22            | 0.2          | 30            | 0.2          | 52            | 0.2          | 0.2                |
| <i>Total school, other institution &amp; public administrative area</i> | <i>5,196</i>  | <i>43.7</i>  | <i>4,667</i>  | <i>34.5</i>  | <i>9,863</i>  | <i>38.8</i>  | <i>45.2</i>        |
| Sports & athletics area   | 19            | 0.2          | 17            | 0.1          | 36            | 0.1          | 0.2                |
| Street & highway  | 261           | 2.2          | 189           | 1.4          | 450           | 1.8          | 2.1                |
| Trade & service area  | 207           | 1.7          | 199           | 1.5          | 406           | 1.6          | 1.9                |
| Farm  | 20            | 0.2          | 5             | 0.0          | 25            | 0.1          | 0.1                |
| Other specified place of occurrence                                     | 95            | 0.8          | 66            | 0.5          | 161           | 0.6          | 0.7                |
| Unspecified place of occurrence or place of occurrence not reported     | 1,709         | 14.4         | 1,901         | 14.0         | 3,610         | 14.2         | ..                 |
| <b>Total</b>  | <b>11,899</b> | <b>100.0</b> | <b>13,532</b> | <b>100.0</b> | <b>25,431</b> | <b>100.0</b> |                    |

## 'Tendency to fall' separations

The diagnosis code R29.6 (tendency to fall, not elsewhere classified) 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).

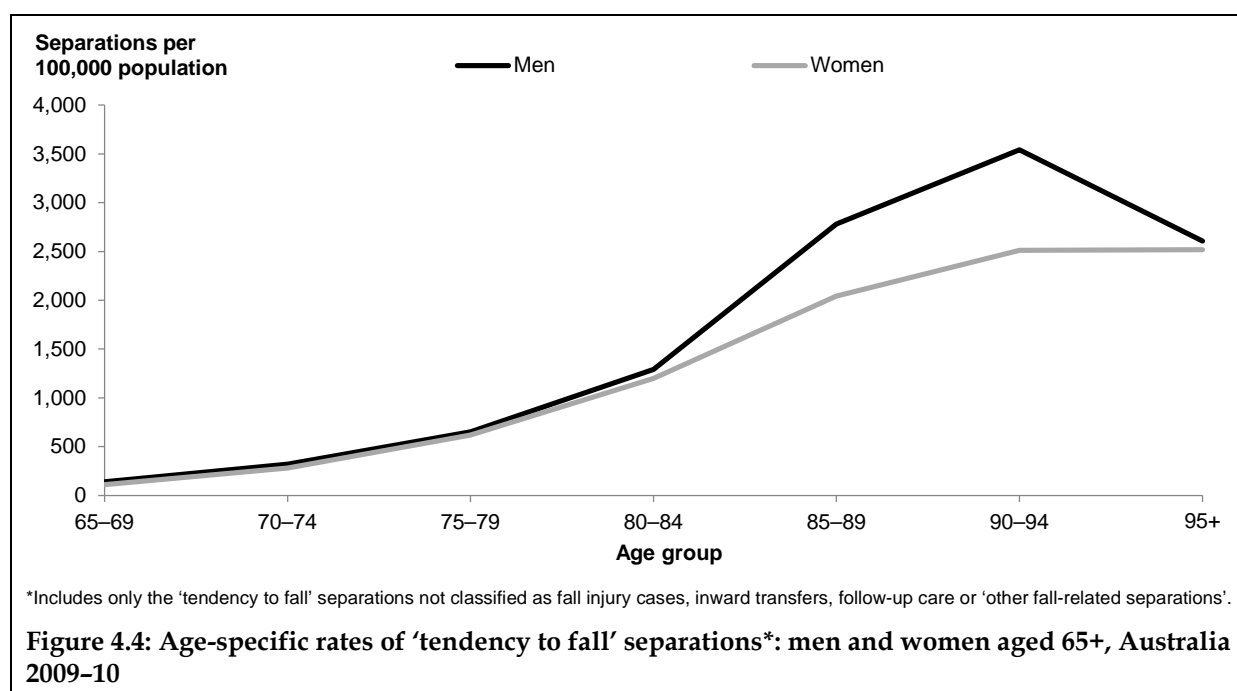
A total of 28,152 hospital separations for people aged 65 and older in 2009–10 included the 'tendency to fall' diagnosis code R29.6. Small numbers of these records have already been discussed in this report as fall injury cases, inward transfers, follow-up care or 'other

fall-related' separations (see Table 4.7). There were 21,607 other separations containing a 'tendency to fall' diagnosis—a 12% increase on the number in 2008–09. 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,  $n = 751$ ) or an external cause signifying a fall (W00–W19,  $n = 365$ ).

**Table 4.7: Records containing a diagnosis of 'tendency to fall' (R29.6) by separation type: men, women and people aged 65+, Australia 2009–10**

| Separation type  | Men           | Women         | People        | Per cent of type |
|--|---------------|---------------|---------------|------------------|
| Fall injury case (with R29.6 additional diagnosis)   | 885           | 1,618         | 2,503         | 3.0              |
| Fall injury inward transfer (with R29.6 additional diagnosis)  | 99            | 237           | 336           | 3.5              |
| Fall-related follow-up care (with R29.6 additional diagnosis)  | 633           | 1,278         | 1,911         | 5.6              |
| Other fall-related separation (with R29.6 additional diagnosis)  | 871           | 924           | 1,795         | 7.1              |
| 'Tendency to fall' diagnosis in record (without both community injury diagnosis and fall external cause) | 9,678         | 11,929        | 21,607        | 100.0            |
| <b>Total</b>   | <b>12,166</b> | <b>15,986</b> | <b>28,152</b> | <b>..</b>        |

Of the 21,607 'tendency to fall' separations for people aged 65 and older in 2009–10, slightly more than half (55%,  $n = 11,929$ ) involved women. This is a lower proportion than that noted for most other types of fall-related separation in this report (all but 'other fall-related' separations). Further, the age-standardised rate of R29.6 separations was higher for men (759 per 100,000 population) than for women (638 per 100,000). The age-standardised rate of 'tendency to fall' separations for all people aged 65 and older was 685 per 100,000 population. Age-specific rates of 'tendency to fall' separations for men were higher than those for women for those aged 85–94 (Figure 4.4).



One in every 3 'tendency to fall' separations (36%,  $n = 7,677$ ) 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). 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 (80%,  $n = 6,157$ ). The code Z75.11 (person awaiting admission to residential aged care service) was also a relatively frequent principal diagnosis for this group (9%,  $n = 693$ ).

Principal diagnoses from Chapter XVIII (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*) of the ICD-10-AM were also relatively common for 'tendency to fall' separations, accounting for about 1 in 5 of these records (23%,  $n = 4,921$ ). Of these records, most (69%,  $n = 3,385$ ) had R29.6 as the principal diagnosis.

As expected, a very large proportion of 'tendency to fall' separations in 2009–10 did not have any place of occurrence recorded (87%,  $n = 18,853$ ), largely due to the low number of injury and/or external cause codes in these records. (Few other conditions require place of occurrence or activity to be coded, see NCCH 2008.) Of interest, however, was the observation that 'health service area' was the first-occurring place of occurrence code for three-quarters of 'tendency to fall' separations that had a *specified* place of occurrence (75%,  $n = 1,712$ ). Again, analysis of national presence on admission flag data will be necessary to learn more about these episodes of hospital care (AIHW 2011a).

**Table 4.8: ICD-10-AM chapter of principal diagnosis for 'tendency to fall' separations\*: men, women and people aged 65+, Australia 2009–10**

| ICD-10-AM Chapter   | Men   |          | Women |          | People |          |
|---|-------|----------|-------|----------|--------|----------|
|   | Count | Per cent | Count | Per cent | Count  | Per cent |
| Certain infectious & parasitic diseases   | 158   | 1.6      | 181   | 1.5      | 339    | 1.6      |
| Neoplasms   | 426   | 4.4      | 259   | 2.2      | 685    | 3.2      |
| Diseases of the blood & blood-forming organs & certain disorders involving the immune mechanism | 58    | 0.6      | 67    | 0.6      | 125    | 0.6      |
| Endocrine, nutritional & metabolic diseases   | 229   | 2.4      | 289   | 2.4      | 518    | 2.4      |
| Mental & behavioural disorders  | 469   | 4.8      | 589   | 4.9      | 1,058  | 4.9      |
| Diseases of the nervous system  | 389   | 4.0      | 306   | 2.6      | 695    | 3.2      |
| Diseases of the eye & adnexa  | 5     | 0.1      | 7     | 0.1      | 12     | 0.1      |
| Diseases of the ear & mastoid process   | 16    | 0.2      | 18    | 0.2      | 34     | 0.2      |
| Diseases of the circulatory system  | 790   | 8.2      | 814   | 6.8      | 1,604  | 7.4      |
| Diseases of the respiratory system  | 591   | 6.1      | 492   | 4.1      | 1,083  | 5.0      |
| Diseases of the digestive system  | 209   | 2.2      | 214   | 1.8      | 423    | 2.0      |
| Diseases of the skin & subcutaneous tissue  | 125   | 1.3      | 172   | 1.4      | 297    | 1.4      |
| Diseases of the musculoskeletal system & connective tissue                                      | 350   | 3.6      | 622   | 5.2      | 972    | 4.5      |

(continued)

**Table 4.8 (continued): ICD-10-AM chapter of principal diagnosis for 'tendency to fall' separations\*: men, women and people aged 65+, Australia 2009–10**

| ICD-10-AM Chapter   | Men          |              | Women         |              | People        |              |
|---|--------------|--------------|---------------|--------------|---------------|--------------|
|   | Count        | Per cent     | Count         | Per cent     | Count         | Per cent     |
| Diseases of the genitourinary system                              | 302          | 3.1          | 623           | 5.2          | 925           | 4.3          |
| Symptoms, signs & abnormal clinical & laboratory findings, n.e.c. | 2,097        | 21.7         | 2,824         | 23.7         | 4,921         | 22.8         |
| Injury, poisoning & certain other consequences of external causes | 110          | 1.1          | 125           | 1.0          | 235           | 1.1          |
| Factors influencing health status & contact with health services  | 3,352        | 34.6         | 4,325         | 36.3         | 7,677         | 35.5         |
| <b>Total**</b>  | <b>9,678</b> | <b>100.0</b> | <b>11,929</b> | <b>100.0</b> | <b>21,607</b> | <b>100.0</b> |

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

\*\*Totals include four separations from a chapter with a case count too small to publish.



## 5 Procedures

NHMD unit records contain information regarding the health interventions ('procedures') involved in the episode of hospital care. The *National Health Data Dictionary* (NHDD) 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 2010a). Multiple procedure codes can be listed in the hospital separation but the first code should relate to treatment of the principal diagnosis, with codes relating to the additional diagnoses and diagnostic/exploratory procedures following this (AIHW 2011a).

In this chapter we present analyses of the procedure codes found within the records for each type of fall-related separation considered by the report.

### Fall injury case separations

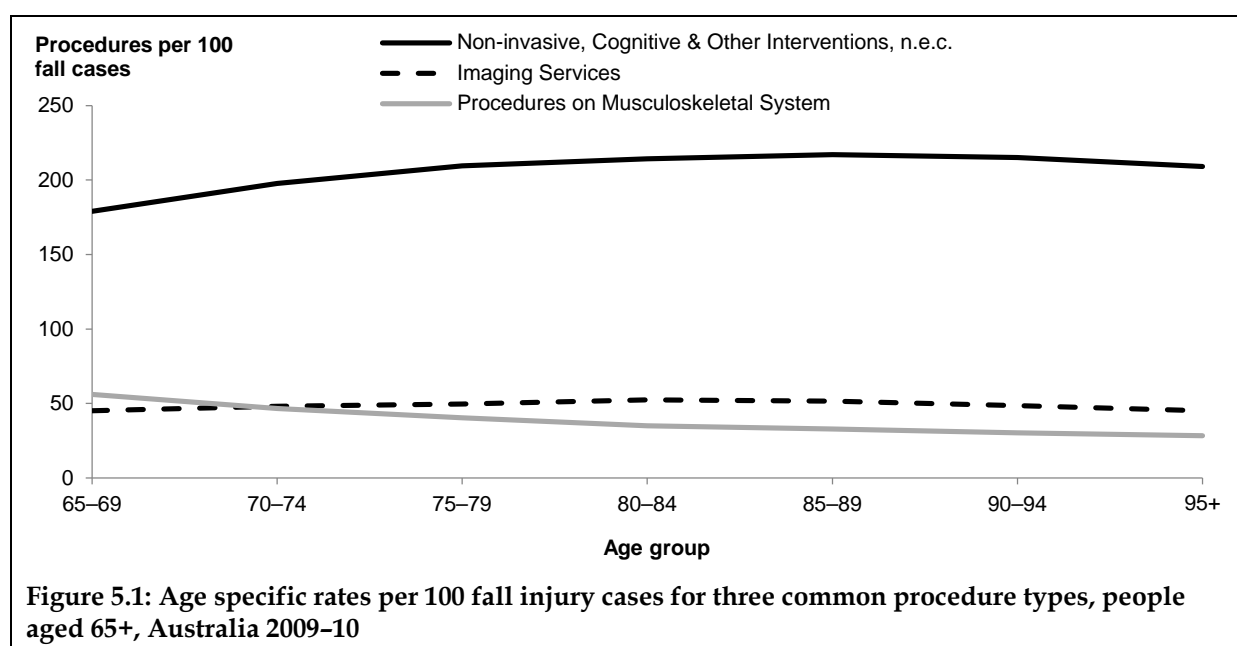
There were 263,136 procedures listed in the 83,768 fall injury case separations for people aged 65 and older in 2009–10. The number of procedures per fall injury case separation ranged from 0 (17%,  $n = 14,249$ ) to 50 ( $n = 1$ ). There was a mean of 3.1 procedures per fall injury case separation. There was little difference in the number of procedures recorded for men and women or for the different age groups (data not shown). The most common procedure types listed in fall injury cases for both men and women were from the Australian Classification of Health Interventions (ACHI) chapters 'non-invasive, cognitive and other interventions, not elsewhere classified' (67% of all procedures), imaging services (16%) and procedures on the musculoskeletal system (12%, see Table 5.1). These results are similar to those observed in previous analyses (Bradley 2012b; Bradley & Pointer 2009).

'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 209 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 (50 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 and rates reduced with age.

**Table 5.1: Total number of procedures listed in fall injury case separations for people aged 65+, Australia 2009–10**

| ACHI procedure groups                                 | Men           |              | Women          |              | People         |              |
|---|---------------|--------------|----------------|--------------|----------------|--------------|
|   | Sum           | Per cent     | Sum            | Per cent     | Sum            | Per cent     |
| Procedures on Nervous System                          | 626           | 0.8          | 699            | 0.4          | 1,325          | 0.5          |
| Procedures on Endocrine System                        | 0             | 0.0          | 7              | 0.0          | 7              | 0.0          |
| Procedures on Eye & Adnexa                            | 86            | 0.1          | 115            | 0.1          | 201            | 0.1          |
| Procedures on Ear & Mastoid process                   | 63            | 0.1          | 52             | 0.0          | 115            | 0.0          |
| Procedures on Nose, Mouth & Pharynx                   | 151           | 0.2          | 238            | 0.1          | 389            | 0.1          |
| Dental Services                                       | 11            | 0.0          | 26             | 0.0          | 37             | 0.0          |
| Procedures on Respiratory System                      | 805           | 1.0          | 656            | 0.4          | 1,461          | 0.6          |
| Procedures on Cardiovascular System                   | 683           | 0.8          | 923            | 0.5          | 1,606          | 0.6          |
| Procedures on Blood & Blood-Forming Organs            | 25            | 0.0          | 28             | 0.0          | 53             | 0.0          |
| Procedures on Digestive System                        | 381           | 0.5          | 548            | 0.3          | 929            | 0.4          |
| Procedures on Urinary System                          | 689           | 0.9          | 768            | 0.4          | 1,457          | 0.6          |
| Procedures on Male Genital Organs                     | 24            | 0.0          | 0              | 0.0          | 24             | 0.0          |
| Gynaecological Procedures                             | 0             | 0.0          | 12             | 0.0          | 12             | 0.0          |
| Obstetric Procedures                                  | 0             | 0.0          | 0              | 0.0          | 0              | 0.0          |
| Procedures on Musculoskeletal System                  | 7,775         | 9.6          | 23,764         | 13.0         | 31,539         | 12.0         |
| Dermatological & Plastic Procedures                   | 2,893         | 3.6          | 4,363          | 2.4          | 7,256          | 2.8          |
| Procedures on Breast                                  | n.p.          | 0.0          | n.p.           | 0.0          | 18             | 0.0          |
| Radiation Oncology Procedures                         | n.p.          | 0.0          | n.p.           | 0.0          | 15             | 0.0          |
| Non-invasive, Cognitive & Other Interventions, n.e.c. | 51,882        | 64.1         | 123,139        | 67.6         | 175,021        | 66.5         |
| Imaging Services                                      | 14,838        | 18.3         | 26,833         | 14.7         | 41,671         | 15.8         |
| <b>Total</b>  | <b>80,936</b> | <b>100.0</b> | <b>182,200</b> | <b>100.0</b> | <b>263,136</b> | <b>100.0</b> |



Of the fall injury case separations that had at least one procedure recorded, computerised tomography of brain (imaging services) was the most common first-listed procedure for men and the second most common for women (Table 5.2). The most common procedure for women was ‘allied health intervention, physiotherapy’ (non-invasive, cognitive and other interventions, not elsewhere classified). Of note, reduction procedures for wrist fractures were markedly more common for women than for men.

**Table 5.2: First-listed procedures – 10 most common for fall injury case separations, men and women aged 65+, Australia 2009–10**

| Men  |                         | Women  |                         |
|--|-------------------------|--|-------------------------|
| ACHI procedure name  | Per cent of separations | ACHI procedure name  | Per cent of separations |
| Computerised tomography of brain   | 15.3                    | Allied health intervention, physiotherapy                                | 14.3                    |
| Allied health intervention, physiotherapy                                  | 12.7                    | Computerised tomography of brain   | 11.6                    |
| Internal fixation of fracture of trochanteric or subcapital femur          | 7.7                     | Internal fixation of fracture of trochanteric or subcapital femur        | 10.0                    |
| Hemiarthroplasty of femur  | 4.2                     | Hemiarthroplasty of femur  | 5.0                     |
| Repair of wound of skin & subcutaneous tissue of other site, superficial   | 3.6                     | Allied health intervention, occupational therapy                         | 3.1                     |
| Allied health intervention, occupational therapy                           | 2.9                     | Closed reduction of fracture of distal radius                            | 2.9                     |
| Repair of wound of skin & subcutaneous tissue of face or neck, superficial | 1.6                     | Open reduction of fracture of distal radius with internal fixation       | 2.7                     |
| Allied health intervention, social work                                    | 1.6                     | Repair of wound of skin & subcutaneous tissue of other site, superficial | 2.4                     |
| Computerised tomography of pelvis  | 1.3                     | Computerised tomography of limb  | 1.5                     |

Note: Shading indicates that the procedure does not feature in the 10 most common list for the opposite sex.

As noted above, 17% of case separations did not have any procedure recorded. Of interest, a much larger proportion of these separations were discharged on the same day as admission (48% compared to 11% for fall injury cases with one or more procedure recorded) and a higher proportion of these separations had a mode of separation indicating an outbound transfer (for example, to another acute hospital or to an aged care facility) than cases with one or more procedure recorded (42% compared with 30%, respectively). Unsurprisingly, the mean length of stay for the fall injury case separations that did not have any procedure recorded was shorter than for those with one or more procedure recorded (1.8 days compared with 8.1 days, respectively).

## Fall injury inward transfer separations

There were 37,984 procedures listed in fall injury inward transfer separations for people aged 65 and older in 2009–10. The number of procedures per fall injury inward transfer separation ranged from 0 (8%,  $n = 753$ ) to 41 ( $n = 1$ ). Of interest, the proportion of inward transfer separations without any procedure recorded was much lower than for fall injury cases.

The mean number of procedures per inward transfer separation was 4.0 and men underwent slightly higher numbers of procedures on average (4.2) than women (3.8). However, there was little difference in the number of procedures recorded for the different age groups. 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’ (77% of all procedures,  $n = 29,261$ ), imaging services (8%,  $n = 2,957$ ) and procedures on the musculoskeletal system (11%,  $n = 4,020$ ). Note that for inward transfers, unlike fall injury cases, procedures on the musculoskeletal system were proportionately more common than imaging services.

Table 5.3 describes the 10 most common first-listed procedures for inward separations. ‘Allied health intervention, physiotherapy’ (non-invasive, cognitive and other interventions, not elsewhere classified) was the most common procedures for both men and women. Of note, drainage of intracranial haemorrhage (procedures on the nervous system) was a much more common procedure for men than for women. Conversely, and as for case separations, open reduction of fracture of distal radius with internal fixation was a more common procedure for women (procedures on the musculoskeletal system).

**Table 5.3: First-listed procedures – 10 most common for fall injury inward transfer separations, men and women aged 65+, Australia 2009–10**

| Men   |                         | Women  |                         |
|---|-------------------------|--|-------------------------|
| ACHI procedure name   | Per cent of separations | ACHI procedure name  | Per cent of separations |
| Allied health intervention, physiotherapy                         | 22.2                    | Allied health intervention, physiotherapy                          | 25.2                    |
| Internal fixation of fracture of trochanteric or subcapital femur | 10.6                    | Internal fixation of fracture of trochanteric or subcapital femur  | 11.3                    |
| Hemiarthroplasty of femur   | 6.2                     | Allied health intervention, occupational therapy                   | 6.2                     |
| Computerised tomography of brain                                  | 6.2                     | Hemiarthroplasty of femur  | 6.2                     |
| Allied health intervention, occupational therapy                  | 4.6                     | Allied health intervention, dietetics                              | 4.7                     |
| Allied health intervention, dietetics                             | 4.4                     | Computerised tomography of brain                                   | 3.7                     |
| Drainage of intracranial haemorrhage                              | 2.6                     | Allied health intervention, social work                            | 2.9                     |
| Allied health intervention, social work                           | 2.3                     | Open reduction of fracture of femur with internal fixation         | 2.0                     |
| Allied health intervention, speech pathology                      | 1.3                     | Open reduction of fracture of distal radius with internal fixation | 1.8                     |
| Open reduction of fracture of femur with internal fixation        | 1.2                     | Total arthroplasty of hip, unilateral                              | 1.5                     |

Note: Shading indicates that the procedure does not feature in the 10 most common list for the opposite sex.

## Fall-related follow-up care separations

There were 101,299 procedures listed in fall-related follow-up care separations for people aged 65 and older in 2009–10. The number of procedures per separation ranged from 0 (4%,  $n = 1,523$ ) to 21 ( $n = 1$ ). While this range is smaller than for both fall injury cases and inward transfer separations, a larger proportion of follow-up care separations had at least one procedure listed (96%, compared with 83% and 92% for cases and inward transfers, respectively). The mean number of procedures per fall-related follow-up care separation was 3.0 and, as for fall injury cases, there was little difference in the number of procedures recorded for men and women 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 96% of all procedures in these records ( $n = 96,864$ ). 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% of the total ( $n = 2,953$ ).

The 10 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 men and women, being the first-listed procedure for more than half of all follow-up care separations (59%,  $n = 19,884$ ). 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) and bladder catheterisation (procedures on the urinary system).

**Table 5.4: First-listed procedures – 10 most common for fall-related follow-up care separations, men and women aged 65+, Australia 2009–10**

| Men  |                         | Women  |                         |
|--|-------------------------|--|-------------------------|
| ACHI procedure name                              | Per cent of separations | ACHI procedure name                              | Per cent of separations |
| Allied health intervention, physiotherapy        | 56.9                    | Allied health intervention, physiotherapy        | 59.4                    |
| Allied health intervention, occupational therapy | 13.2                    | Allied health intervention, occupational therapy | 15.5                    |
| Allied health intervention, social work          | 5.3                     | Allied health intervention, dietetics            | 4.5                     |
| Allied health intervention, dietetics            | 4.4                     | Allied health intervention, social work          | 4.2                     |
| Computerised tomography of brain                 | 2.7                     | Computerised tomography of brain                 | 1.8                     |
| Allied health intervention, speech pathology     | 1.7                     | Allied health intervention, speech pathology     | 0.9                     |
| Administration of packed cells                   | 1.1                     | Administration of packed cells                   | 0.9                     |
| Exercise therapy, total body                     | 0.8                     | Hydrotherapy                                     | 0.5                     |
| Bladder catheterisation                          | 0.6                     | Allied health intervention, pharmacy             | 0.5                     |
| Hydrotherapy                                     | 0.5                     | Exercise therapy, total body                     | 0.5                     |

Note: Shading indicates that the procedure does not feature in the 10 most common list for the opposite sex.

## ‘Other fall-related’ separations

There were 97,139 procedures listed in ‘other fall-related’ separations for people aged 65 and older in 2009–10. The number of procedures per ‘other fall-related’ separation ranged from 0 (11%,  $n = 2,855$ ) to 47 ( $n = 1$ ). The mean number of procedures per ‘other fall-related’ separation was 3.8, and men underwent a slightly higher number of procedures on average (4.0) than women (3.7). The mean number of procedures per separation decreased slightly with age, from 4.1 for people aged 65–69 to 3.2 for people aged 95 and older.

The most common procedure types listed in ‘other fall-related’ separations for both men and women were ‘non-invasive, cognitive and other interventions, not elsewhere classified’ (68% of all procedures,  $n = 65,801$ ) and imaging services (18%,  $n = 17,647$ ). As in previous years, and unlike fall injury cases and inward transfer separations, procedures on the musculoskeletal system were relatively uncommon (2% of procedures,  $n = 2,137$ ). Instead, procedures on the cardiovascular system were the third most common type of procedure coded for ‘other fall-related’ separations in 2009–10 (3%,  $n = 3,176$ ).

As observed in 2008–09, computerised tomography of brain (imaging services) was the most common procedure for ‘other fall-related’ separations, being the first-listed in 1 of every 5 of these separations in 2009–10 (Table 5.5). Seven of the remaining procedures in Table 5.5 were from the ‘non-invasive, cognitive and other interventions, not elsewhere classified’ group for both men and women.

**Table 5.5: First-listed procedures – 10 most common for ‘other fall-related’ separations, men and women aged 65+, Australia 2009–10**

| Men  |                         | Women  |                         |
|--|-------------------------|--|-------------------------|
| ACHI procedure name  | Per cent of separations | ACHI procedure name  | Per cent of separations |
| Computerised tomography of brain   | 18.1                    | Computerised tomography of brain   | 20.0                    |
| Allied health intervention, physiotherapy                                | 14.7                    | Allied health intervention, physiotherapy  | 17.9                    |
| Allied health intervention, occupational therapy                         | 3.8                     | Allied health intervention, occupational therapy   | 4.5                     |
| Allied health intervention, social work                                  | 3.4                     | Allied health intervention, social work  | 3.7                     |
| Administration of packed cells   | 3.3                     | Administration of packed cells   | 2.9                     |
| Allied health intervention, dietetics                                    | 2.5                     | Allied health intervention, dietetics  | 2.4                     |
| Repair of wound of skin & subcutaneous tissue of other site, superficial | 1.7                     | Repair of wound of skin & subcutaneous tissue of other site, superficial                 | 1.4                     |
| Allied health intervention, speech pathology                             | 1.5                     | Allied health intervention, speech pathology   | 1.3                     |
| Insertion of cardiac pacemaker generator                                 | 1.0                     | Allied health intervention, pharmacy   | 1.0                     |
| Allied health intervention, pharmacy                                     | 1.0                     | Spiral angiography by computerised tomography of chest, with intravenous contrast medium | 0.9                     |

Note: Shading indicates that the procedure does not feature in the 10 most common list for the opposite sex.

## ‘Tendency to fall’ separations

There were 63,915 procedures listed in the 21,607 ‘tendency to fall’ separations not accounted for in the other classes of fall-related separation. The number of procedures per ‘tendency to fall’ separation ranged from 0 (10%,  $n = 2,181$ ) to 44 ( $n = 1$ ). The mean number of procedures per ‘tendency to fall’ separation was 3.0. There was little difference in the number of procedures recorded for men and women but there was a slight decrease in the mean number of procedures undertaken as age increased (from a mean of 3.3 procedures for people aged 65–69 to a mean of 2.7 procedures at age 95 and older).

As for all other types of fall-related separation, procedures grouped as ‘non-invasive, cognitive and other interventions, not elsewhere classified’ were most common for ‘tendency to fall’ separations (84%  $n = 53,428$ ). Imaging services accounted for a further 12% of procedures but very few procedures on the musculoskeletal system featured (<1%,  $n = 7643$ ). Table 5.6 lists the the 10 most common first-listed procedures for ‘tendency to fall’ separations, ‘allied health intervention, physiotherapy’ being overwhelmingly the most common for both men and women.

**Table 5.6: First-listed procedures – 10 most common for ‘tendency to fall’ separations, men and women aged 65+, Australia 2009–10**

| Men  |                         | Women  |                         |
|--|-------------------------|--|-------------------------|
| ACHI procedure name                              | Per cent of separations | ACHI procedure name                              | Per cent of separations |
| Allied health intervention, physiotherapy        | 36.5                    | Allied health intervention, physiotherapy        | 42.0                    |
| Computerised tomography of brain                 | 14.2                    | Computerised tomography of brain                 | 13.5                    |
| Allied health intervention, occupational therapy | 6.7                     | Allied health intervention, occupational therapy | 7.0                     |
| Allied health intervention, social work          | 5.6                     | Allied health intervention, social work          | 5.1                     |
| Allied health intervention, dietetics            | 3.2                     | Allied health intervention, dietetics            | 3.2                     |
| Allied health intervention, speech pathology     | 2.1                     | Allied health intervention, speech pathology     | 1.5                     |
| Administration of packed cells                   | 1.8                     | Administration of packed cells                   | 1.3                     |
| Magnetic resonance imaging of brain              | 0.9                     | Allied health intervention, other                | 0.9                     |
| Bladder catheterisation                          | 0.8                     | Allied health intervention, pharmacy             | 0.8                     |
| Allied health intervention, other                | 0.8                     | Magnetic resonance imaging of brain              | 0.7                     |

Note: Shading indicates that the procedure does not feature in the 10 most common list for the opposite sex.

## 6 Length of stay

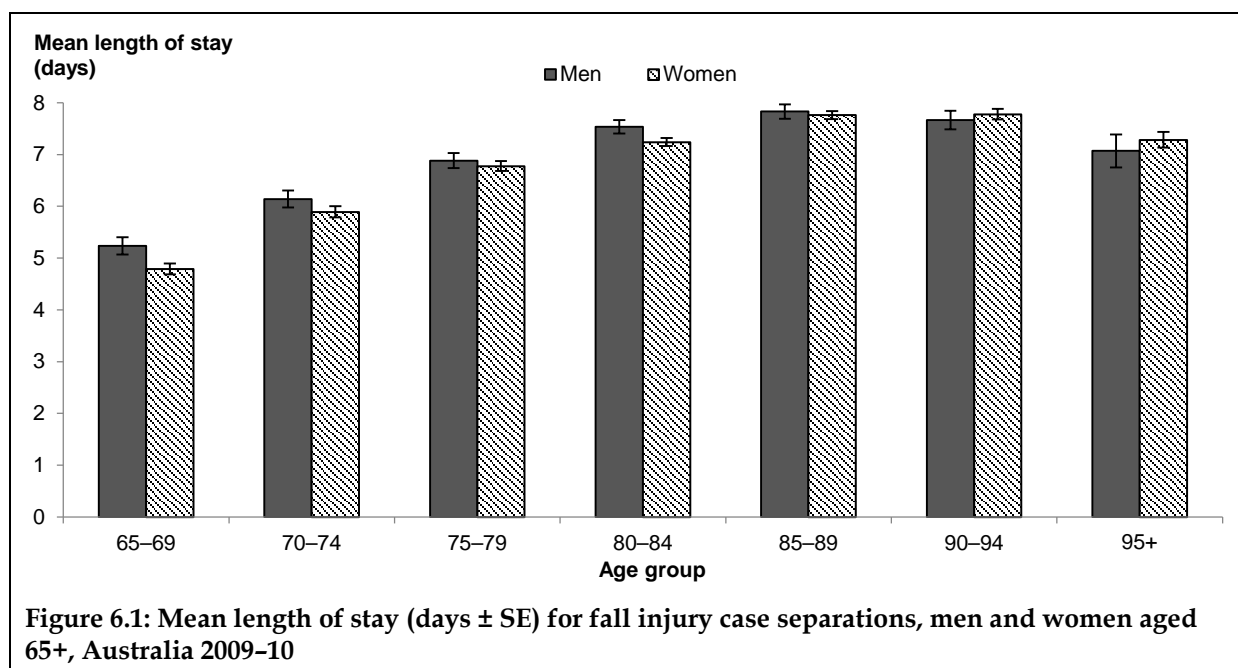
This chapter provides information on the average and total admitted patient care days due to fall-related hospital care.

### Fall injury case separations

The 83,768 fall injury case separations for people aged 65 and older in 2009–10 accounted for 589,655 patient days in this period. This represents 5% of all patient days for hospitalisations for this age group for the year. This is an increase of about 2% on the number of patient days used in 2008–09 ( $n = 10,395$  more days).

The length of stay per fall injury case separation ranged from one day (35%,  $n = 28,917$ ) to more than 150 days ( $n = 3$ ). About 17% of case separations were discharged on the same day as they were admitted ( $n = 14,635$ ). Same-day admissions were most common for cases with a principal diagnosis of injury to the head or injury to the wrist and hand (29% and 31% of such injuries, respectively). The very long stays of a number of years seen in some of our previous reports (for example Bradley 2012b; Bradley & Harrison 2007; Bradley & Pointer 2009) were not observed in 2009–10. In all, less than 0.1% of fall injury case separations had a length of stay of 100 days or more ( $n = 32$ ).

The mean length of stay for all fall injury case separations was the same for both men and women (7.0 days). As observed in previous reports, the mean length of stay for fall injury case separations increased with age for both men and women, although some decrease 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 2009–10 (38%,  $n = 223,725$  days). Injuries to the abdomen, lower back, lumbar spine and pelvis accounted for a further 14% of patient days, and injuries to the head another 12%.

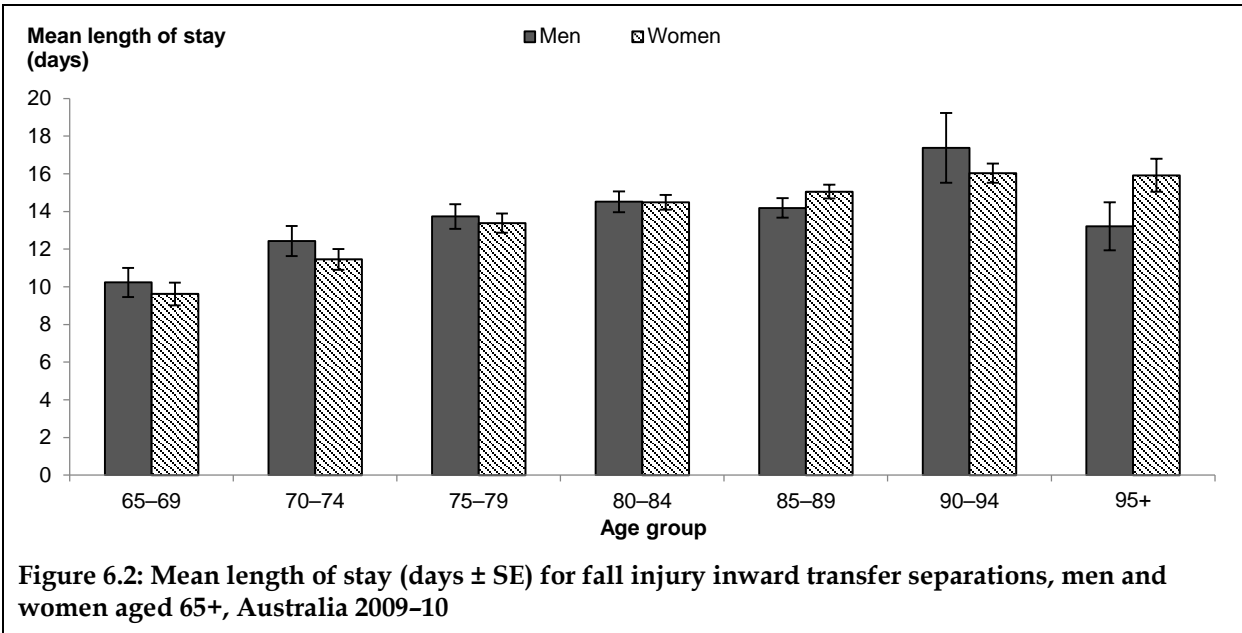
The three most common causes of fall injury cases – falls due to tripping, slipping and stumbling, ‘other falls on the same level’ and unspecified falls – consumed patient days commensurate with the proportion of cases due to these causes. Together, these falls accounted for 83% of the patient days for case separations in 2009–10 ( $n = 489,435$  days).

### Fall injury transfer separations

Fall injury inward transfer separations for people aged 65 and older ( $n = 9,623$ ) accounted for 135,295 patient days in 2009–10, 1% of all patient days for hospitalisations for this age group. This was an increase of 7,838 days (6%) since 2008–09.

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 (7% versus 35%, respectively) and very few transfer separations were same-day admissions (2%, compared to 17% of case separations). Similarly, a larger proportion of inward transfer separations had a length of stay of 100 days or more compared with case separations (0.27% versus 0.04%, respectively). Accordingly, the mean length of stay for fall injury inward transfer separations was substantially longer than for fall injury case separations (14.1 days). Similar to fall injury case separations, lengths of stay for fall injury inward transfers were similar for men and women and increased with age (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 2009–10 (39%,  $n = 52,799$  days) and days due to injuries to the abdomen, lower back, lumbar spine, pelvis and head were numerous.

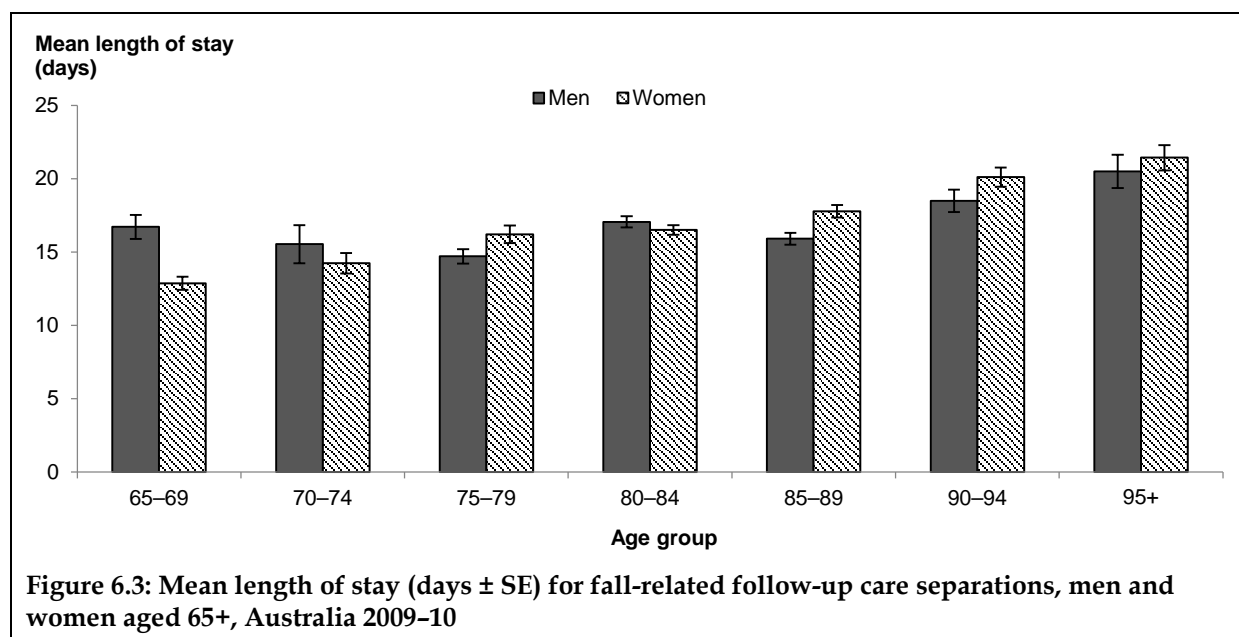


## Fall-related follow-up care separations

The 33,904 fall-related follow-up care separations for people aged 65 and older in 2009–10 accounted for 569,871 patient days – 34,383 (6%) more patient days than in 2008–09. These half-million patient days for fall-related follow-up care were almost as numerous as those for case separations and accounted for 5% of all patient days for hospitalisations for people aged 65 and older in 2009–10.

About 1 in every 4 fall-related follow-up care separations had a length of stay of one day (25%,  $n = 8,370$ ) and most of these were episodes of care where the patient was discharged on the same day as admitted ( $n = 7,787$ ). A larger proportion of follow-up care separations had a length of stay of more than 100 days compared with case and transfer separations (0.5%,  $n = 176$  separations) and a number of these reported hospital stays of more than one year ( $n = 18$ ).

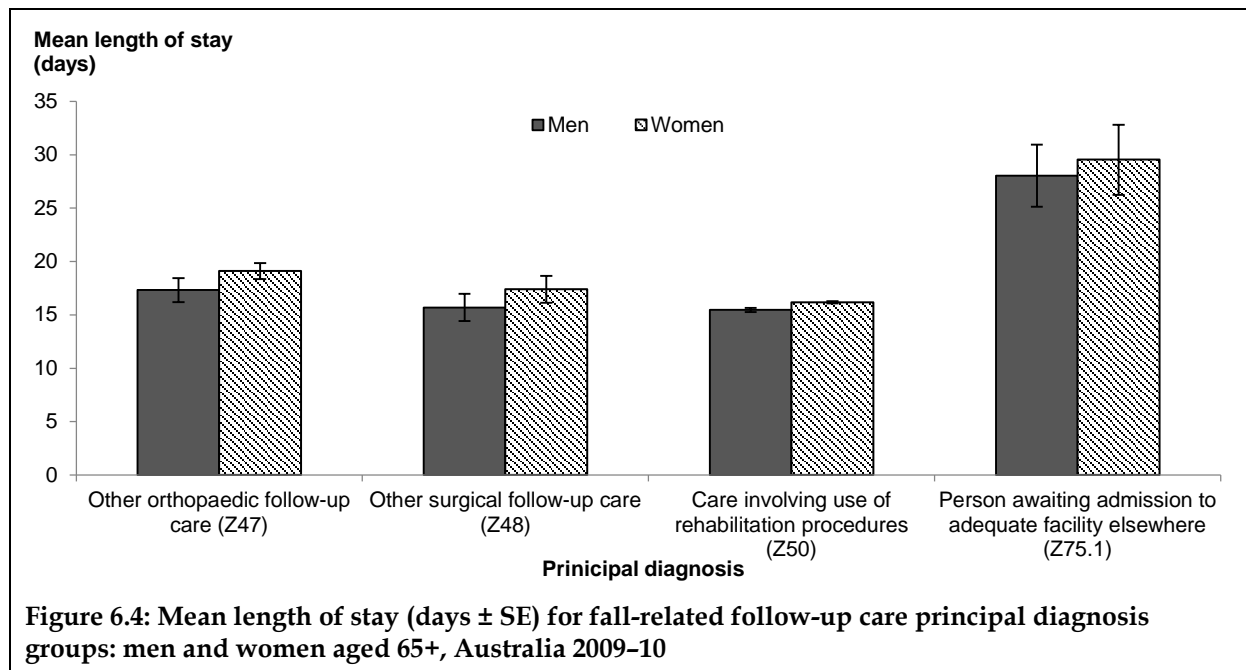
Overall, the mean length of stay for fall-related follow-up care separations was 16.8 days. This is substantially longer than the means for both fall injury case separations and fall injury inward transfers. The mean length of stay for follow-up care separations was similar for men and women and mean lengths of stay were generally longer for the older age groups, although this pattern was more marked for women than for men (Figure 6.3).



As observed in 2008–09, the most common type of fall-related follow-up care separation in 2009–10, those with a principal diagnosis of Z50 (care involving use of rehabilitation procedures), accounted for most patient days (85%,  $n = 481,733$  days). Although a small proportion of the total, the follow-up care separations with a principal diagnosis of Z75.1 (person awaiting admission to adequate facility elsewhere) accounted for a greater proportion of patient days (10%,  $n = 55,845$  days) than expected from separation counts (6%).

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 (16–19 days) while separations with a principal diagnosis describing 'person awaiting admission to adequate facility elsewhere' had a much longer mean length of stay (29.0 days).



## ‘Other fall-related’ and ‘tendency to fall’ separations

A further 618,583 patient days in 2009–10 were attributed to ‘other fall-related’ separations ( $n = 359,292$  days) and separations including the diagnosis ‘tendency to fall’ ( $n = 259,291$  days). There were 15,286 more patient days (3%) than in 2008–09, and a number more like that observed in 2007–08 ( $n = 614,741$  days). Together, ‘other fall-related’ and ‘tendency to fall’ separations accounted for 5% of all patient days for hospitalisations for people aged 65 and older in 2009–10.

The mean length of stay for ‘other fall-related’ separations was 14.1 days, 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 men (14.6 days) was about a day longer than that for women (13.7 days) and lengths of stay were similar for all age groups. About 13% ( $n = 3,262$ ) of ‘other fall-related’ separations had a length of stay of only one day, while 0.6% ( $n = 151$ ) had a recorded stay of longer than 100 days. As in 2008–09, 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 (18%,  $n = 64,170$  patient days).

The mean length of stay for R29.6 (tendency to fall) separations was 12.0 days. This is substantially longer than the mean for fall injury case separations (but similar to some other types of fall-related separations). Mean lengths of stay were similar for both men and women (12.4 days and 11.7 days, respectively). As in 2008–09, mean lengths of stay for ‘tendency to fall’ separations varied inconsistently with age, but were nonetheless relatively similar for all age groups. About 24% ( $n = 5,150$ ) of ‘tendency to fall’ separations had a length of stay of

only one day, while 0.4% ( $n = 81$ ) had a recorded stay of longer than 100 days. As in 2008–09, separations with principal diagnoses describing factors influencing health status and contact with health services (Chapter XXI of the ICD-10-AM) accounted for the largest proportion of patient days for ‘tendency to fall’ separations (37%,  $n = 95,262$  patient days).

## 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 2009–10 was 1,294,821 (Table 6.1). This figure represents 10% of all patient days for this population in this period and more than 52,600 additional patient days than in 2008–09 (a 4% increase).

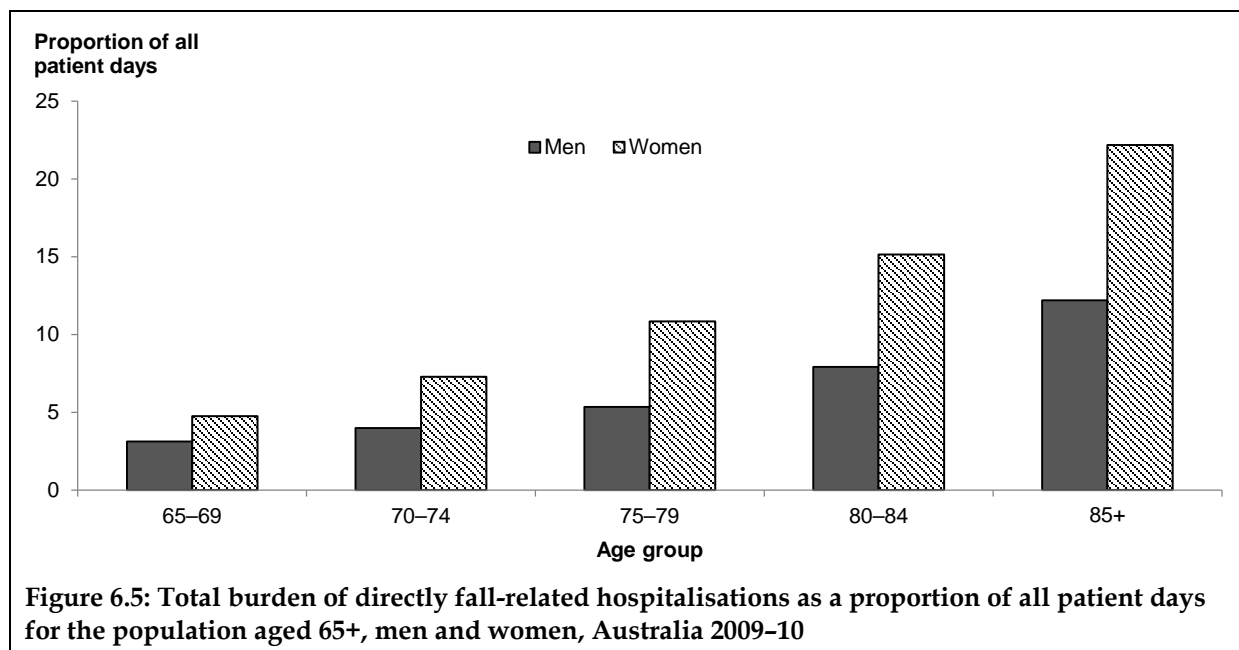
The additional 618,583 patient days attributable to ‘other fall-related’ and ‘tendency to fall’ separations brings the total number of patient days for fall-related separations for people aged 65 and older in 2009–10 to more than 1.9 million. However, as the relationship between the injurious fall and 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.

The 127,295 episodes of hospital care 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 2009–10 accounted for 7% of all patient days for men and 14% of patient days for women. These proportions are slightly higher than those observed in previous years (see Bradley 2012a, 2012b; Bradley & Pointer 2012).

As observed in previous reports, the patient days for fall-related separations in 2009–10, as a proportion of all patient days for any cause, increased with age for both men and women (Figure 6.5). For people aged 85 and older, fall-related separations accounted for nearly one-fifth of the total number of patient days for this population (18%).

**Table 6.1: Total patient days for fall-related hospitalisations: men, women and people aged 65+, Australia 2009–10**

| Separation type                         | Men            | Women          | People           | Per cent of directly fall-related | Per cent of all patient days aged 65+ |
|---|----------------|----------------|------------------|-----------------------------------|---------------------------------------|
| Fall injury case separations            | 179,757        | 409,898        | 589,655          | 45.5                              | 4.7                                   |
| Fall injury inward transfer separations | 41,062         | 94,233         | 135,295          | 10.4                              | 1.1                                   |
| Fall-related follow-up care separations | 165,751        | 404,120        | 569,871          | 44.0                              | 4.6                                   |
| <b>Total</b>                            | <b>386,570</b> | <b>908,251</b> | <b>1,294,821</b> | <b>100.0</b>                      | <b>10.4</b>                           |



## 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 4 are typically preceded by an initial episode for acute care (the cases of Chapters 2 and 3). 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 2009-10 ( $n = 83,768$ ) was 15.5 days. This estimate is very similar to that reported for falls hospitalised in the previous few years (Bradley 2012a, 2012b; Bradley & Pointer 2012).

## 7 Discussion

Falls are common among older people and often result in fractures or other serious injuries (McClure et al. 2005; Rubenstein 2006; Sattin 1992; Tinetti et al. 1988). About 1 in 3 older people living at home experience a fall annually (for example, Dolinis et al. 1997; Gill et al. 2005; Lord et al. 1993; NSW Health 2010) and nearly 3 in 4 hospitalised injuries involving older Australians are due to falls (Bradley & Harrison 2008; Kreisfeld & Harrison 2010). Australia's older population is increasing both in size and proportion relative to the rest of the population (see ABS 2008), so the number of people at risk of injurious falls is growing rapidly. 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, 127,295 hospital separations were identified as being directly related to injurious falls by people aged 65 and older in 2009–10, including 83,768 fall injury case separations, 9,623 inward transfers and 33,904 fall-related follow-up care separations. These directly fall-related records represent 4% of all hospital separations for any cause for this population. Further, these fall-related hospitalisations accounted for 1.3 million patient days in 2009–10, 10% of all hospital patient days for the population aged 65 and older. Falls account for a greater proportion of both separations and patient days in 2009–10 than in 2008–09, which suggests that the upward trends observed for fall-related hospital care are continuing (for example Bradley 2012b).

A further 47,038 hospital separations were identified as being in some way due to falls by older Australians in 2009–10. There were 25,431 'other fall related' separations (having a fall-related injury in the record, but not as the principal diagnosis) and 21,607 '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 (5%) to the burden on 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 2009–10 was 83,768; some 5,000 (7%) more cases than estimated for the previous year. The age-standardised rate of fall injury cases in 2009–10 was marginally higher than in 2008–09; 2,663 per 100,000 population compared with 2,573 per 100,000, respectively (a 4% increase – higher than the increases noted previously).

As in previous years, and reflective of the general population aged 65 and older, women made up a higher proportion of fall-related hospitalisations in 2009–10. Similarly, the age-standardised rate of injurious falls was again higher for women than for men. Again, the age-standardised rate of falls for women aged 65 and older was observed to be more than 3,000 per 100,000 population in 2009–10, compared with a rate of about 2,000 per 100,000 for men.

While injuries to the hip and thigh continued to be the most common principal diagnosis for a hospitalised fall injury case for both men and women in 2009–10, the proportion of all cases these injuries represent has fallen compared with that for previous years (and consistent with the trends reported in Bradley 2012b; see also Cassell & Clapperton 2012; Watson & Mitchell 2010). Further, a decreasing trend in the proportion of fall cases having any type of fracture

in the multiple diagnoses fields has also been noted over the ICD-10-AM period (despite a statistical increase in the rate of cases with non-hip fracture principal diagnoses, see Bradley 2012b; Bradley & Harrison 2007).

Conversely, a higher proportion of hospitalised falls resulted in head injuries; 20% in 2009–10 compared with 18–19% in previous years. While these figures give the impression that the observed increase is marginal, the increase in the rate of head injuries due to falls over the recent period has been estimated at about 7% per year (Bradley 2012b). 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 men than for older women 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 2009–10 was a fall on the same level due to slipping, tripping and stumbling, accounting for about one-third of cases for both men and women. The second- and third-most common types of fall injury case were ‘unspecified’ falls and ‘other fall on same level’. The proportion of cases accounted for by these external causes follows the patterns noted in previous reports in this series, with an increasing proportion of cases attributed to ‘other fall on same level’ (now 22%) while ‘unspecified’ falls remained stable at around 28% (Bradley 2012b; Bradley & Harrison 2007). These three types of fall were also the most commonly listed external causes for other groups of fall-related hospitalisations.

Current ICD-10-AM coding allows slips, trips and stumbles to be individually identified and, of the 27,347 such cases in 2009–10, nearly two-thirds ( $n = 17,348$ ) were attributed to trips. Unfortunately, and as noted previously, while the external cause code W18 ‘other fall on same level’ also has several specific subcategories (for example, W18.1, fall from or off toilet), the rather more vague ‘other specified’ and ‘unspecified’ subcategories are applied most frequently for this group of cases. These observations 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. Additionally, further work could address 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 and activity**

As in previous years, 7 out of 10 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 in 2009–10. As in 2008–09 we were able to differentiate falls occurring in different areas of the home, but again about half of these falls were coded to the ‘other and unspecified place in home’ subcategory. Of the remaining cases in this group, about 1 in 5 falls in the home (20%) happen in either the bathroom or the bedroom while a further 11% occur in ‘outdoor areas’. Further, falls involving men were more common in areas external to the home (the driveway, garage and outdoor areas) while falls involving women 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 2009–10 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 6 times that for the home in 2009–10, as it was in 2008–09. This is consistent with the findings from our previous analyses of trends in fall-related hospitalisations over the ICD-10-AM era (Bradley 2012b; Bradley & Pointer 2012). This disparity is particularly distinct for older men; rates of falls for males resident in aged care facilities were 7 times that of men falling in the home in 2009–10, while the equivalent comparison for women was ‘only’ 5 times higher. These results suggest that substantial effort needs to be put into interventions to prevent injurious falls for older males in aged care facilities as a matter of priority.

As in previous years, activity coding for fall injury cases was decidedly vague; 7 in every 10 cases were coded to ‘unspecified activity’ in 2009–10. Further, about half of the cases with a specified activity were assigned to the rather vague ‘resting, sleeping, eating or engaging in other vital activities’ code. This gives little to work with in terms of developing targeted interventions for particular activities. As discussed in the previous reports in this series, 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, Do It Yourself, gardening and volunteer work), much like the very detailed coding available for sporting activities (see Flood & Harrison 2006). Further, a category describing ‘while being taken care of’ or ‘while receiving hospital treatment’ (or similar) would be a very timely addition to the activity suite of the ICD-10-AM, particularly given the recent introduction of data items flagging whether the condition was present on admission to hospital or not (AIHW 2011a).

## 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 to the hospital system due to fall injury among people aged 65 and older in 2009–10. Fall injury inward transfers, omitted from our case estimates, accounted for just fewer than 10,000 separations while fall-related follow-up care separations in 2009–10 were almost 34,000. ‘Other fall-related’ and ‘tendency to fall’ separations added a further 47,000 episodes of hospital care to the total due, directly or indirectly, to falls. Of note, the number of fall-related follow-up care separations increased substantially in 2009–10 and contributed almost as many patient days as those for fall injury cases; 0.57 million days compared with 0.59 million days, respectively. This brought the total number of hospital patient days directly related to injurious falls by older Australians to 1.3 million days – 1 in every 10 days spent in hospital by this population group.

### 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, 33,904 fall-related follow-up care separations for people aged 65 and older were identified in 2009–10, a 14% increase on the number for the previous year (a 12% increase in the age-standardised rate). The principal diagnosis Z50.9 (care involving



use of rehabilitation procedure, unspecified) was again found to be the most common for this type of separation; about 6 in every 7 fall-related follow-up care separations had this principal diagnosis. A further 6% of 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).

### **‘Other fall-related’ separations**

Another class of fall-related separation that added to the burden on the hospital system due to falls was 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’ fall cases. This observation makes it vital that we be permitted to use the new national condition onset data (see AIHW 2011a) as soon as possible in order to better understand these groups.

As currently defined, ‘other fall-related’ separations contributed 25,431 episodes of hospital care and 0.4 million patient days for people aged 65 and older in 2009–10. As in previous years, about 1 in 5 ‘other fall-related’ separations (20%) 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 men than older women.

### **‘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 2009–10 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 21,607 separations in 2009–10 were identified as containing ‘only’ an R29.6 (tendency to fall) diagnosis, however. There were about 12% more such separations than in 2008–09. (The age-standardised rate of these ‘tendency to fall’ separations also increased, by about 3% on that for 2008–09). 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 men than for older women. Such observations may be related to injury risk. Older women with a ‘tendency to fall’ may be more likely to be injured

than older men, 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.

## Health interventions

The pattern of health interventions recorded in the fall-related hospitalisations in 2009–10 was quite similar to that observed for 2008–09. The most common procedure types listed in fall injury cases were ‘non-invasive, cognitive and other interventions, not elsewhere classified’, imaging services and procedures on the musculoskeletal system. While similar to findings in previous reports (Bradley & Harrison 2007; Bradley & Pointer 2009), we again observed that imaging services are more common for fall injury case separations than procedures on the musculoskeletal system. ‘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. Similarly, imaging services were the second-most common types of procedures for all other groups.

## Potential for improved surveillance

As discussed in the previous reports in this series, our surveillance of injurious falls is limited by the de-identification of the NHMD records. Our enumeration of injury events (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 1 of 4 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, if not conducted by the AIHW at the national level, 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 2011a). 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 required to be reported for each diagnosis, external cause, place of occurrence, and activity when injured variable. Condition onset data were 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 9% of follow-up care and 39% 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 collated by the AIHW (see AIHW 2011a). 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* (see ABS 2010a). Population estimates of residents of aged care facilities were obtained from the AIHW report series *Residential aged care in Australia* (AIHW 2010b, 2011b).

## 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 2009 and 30 June 2010 that met the following specifications:

- the patient was aged 65 or older
- the principal diagnosis was in the range S00–T75 or T79
- the first reported external cause code was in the range W00–W19 falls
- 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 (for example Bradley & Harrison 2008; Kreisfeld & Harrison 2010). Selection has been based on principal diagnosis because this refers to the condition “chiefly responsible for occasioning the episode of admitted patient care” (AIHW 2010a; NCCH 2008). The 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).

For data from 2008–09, the NISU has made a slight change to our method of identification of ‘first’ external cause. Records with a first external cause in the range Y90–Y98 (*Supplementary factors related to causes of morbidity and mortality classified elsewhere*) have had the next external cause V00–Y89 (if present) assigned as the ‘first’ external cause. (V00–Y89 includes unintentional falls and all other external cause codes; from *Transport Accidents* to *Sequelae of external causes of morbidity and mortality*). As a result, there were two extra records identified as fall injury cases in the 2009–10 data year. Under our previous method, these records would have been determined to be ‘other fall-related’ separations (see definition below).

Inward transfers from other hospitals were omitted from incidence estimates to reduce 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 results in two (otherwise unrelatable) unit records for the same health event. Further, readmissions 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 readmissions.

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 2009 and 30 June 2010 that met the following specifications:

- the patient was aged 65 or older
- the principal diagnosis was either Z47, Z48, Z50 or Z75.1
- at least one diagnosis variable contained a code in the range S00–T75 or T79
- at least one external cause code variable contained a code in the range W00–W19.

## **'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) which are not included in any of the groups above. This group includes NHMD unit records with a date of separation between 1 July 2009 and 30 June 2010 where:

- the patient was aged 65 or older
- at least one diagnosis variable contained a code in the range S00–T75 or T79
- at least one 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
- 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 first reported external cause.

## **‘Tendency to fall’ separations**

The sixth edition of the ICD-10-AM includes the diagnosis code R29.6 (tendency to fall, not elsewhere classified, 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 (for example 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 ( $n = 6,545$  in 2009–10); however, to avoid double-counting we have omitted records 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 2009 and 30 June 2010
- the patient was aged 65 or older
- at least one 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
- 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 (5-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 2009 (the mid-point of the financial year study period). These data were maintained by the AIHW and are similar to that presented in the *Australian demographic statistics* series (see ABS 2010a).

Population estimates according to the ASGC of remoteness are available from the ABS only for the year ending 30 June (see ABS 2010b). Values for 31 December were calculated using the mean of the population estimates for 2009 and 2010. Further, ASGC data are available only for age groups in 5-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 2010b, 2011b). The populations resident in aged care facilities as at 30 June 2009 and 30 June 2010 were averaged to estimate this population as at 31 December 2009, 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 sexes, 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 admitted patient 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 (for example, the population of NSW is more than 30 times as large as the Northern Territory 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.

## 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 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 2009–10**

| Separation type   | Men           | Women          | People         |
|---|---------------|----------------|----------------|
| <b>Fall injury cases:</b>   |               |                |                |
| Principal diagnosis is S00–T75 or T79,<br>First external cause is W00–W19, and<br>Mode of admission is not a transfer from another hospital                 | 25,597        | 58,171         | 83,768         |
| <b>Fall injury inward transfer separations:</b>   |               |                |                |
| Principal diagnosis is S00–T75 or T79,<br>First external cause is W00–W19, and<br>Mode of admission is a transfer from another acute hospital               | 2,960         | 6,663          | 9,623          |
| <b>Fall-related follow-up care separations:</b>   |               |                |                |
| Principal diagnosis is Z47, Z48, Z50 or Z75.1, and<br>Any external cause is W00–W19   | 10,156        | 23,748         | 33,904         |
| <b>'Other fall-related' separations:</b>  |               |                |                |
| Any diagnosis is S00–T75 or T79,<br>Any external cause is W00–W19,<br>Is not an incident case or inward transfer, and<br>Is not a follow-up care separation | 11,899        | 13,532         | 25,431         |
| <b>Tendency to fall separations:</b>  |               |                |                |
| Any diagnosis R29.6,<br>Is not an incident case or inward transfer,<br>Is not a follow-up care separation, and<br>Is not an 'other fall-related' separation | 9,678         | 11,929         | 21,607         |
| <b>Total number of fall-related separations in 2009–10</b>  | <b>60,290</b> | <b>114,043</b> | <b>174,333</b> |



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## Related publications

This report, *Hospitalisations due to falls by older people, Australia 2009–10*, is part of an annual series. The five earlier editions and any published subsequently can be downloaded for free from the AIHW website <<http://www.aihw.gov.au/injury/publications/>>. 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.
- 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.

This report is the sixth in a series on hospitalisations due to falls by Australians aged 65 and over, and focuses on 2009–10.

The estimated number of hospitalised injury cases due to falls in older people was 83,800—more than 5,100 extra cases than in 2008–09—and about 70% of these falls happened in either the home or an aged care facility.

One in every 10 days spent in hospital by a person aged 65 and older in 2009–10 was directly attributable to an injurious fall (1.3 million patient days over the year), and the average total length of stay per fall injury case was estimated to be 15.5 days.