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Hip fracture injuries

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Key findings

Hospitalisations

- Cases were numerous and heavily concentrated in older age groups. 91% were aged 65 years and over, 40% were aged 80 and over.
- Overall, there were 2.6 times as many female cases as male cases. The age-adjusted rate for females was 107.8 per 100,000 population compared with 65.0 per 100,000 for males.
- The neck of femur was the most common location for fractures of the hip.
- Rates of hip fracture were fairly similar for all states and territories.
- For those aged 65 and over, hip fractures most commonly occurred at home (males and females 44%) or in a residential institution (males 22%, females 27%).
- Most fractures of the hip were associated with falling (91%). The next most common external cause of hip fractures was transport which accounted for 3% of cases.
- The most common mechanism of falling was a fall on the same level from slipping, tripping and stumbling. For those aged 65 years and over, this accounted for 36% of cases.
- Hip fractures impose a heavy cost burden on the community, both in terms of acute care and rehabilitation.

Deaths

- Cases were heavily concentrated in the oldest age groups. 59% were aged 85 years an over, 98% were aged 65 years and over.
- Overall, there were 1.7 times as many female cases as male cases. The age-adjusted rate for males was 8.0 per 100,000 population compared with 7.6 per 100,000 for females.
- The pattern for deaths due to hip fractures by jurisdiction differs from that observed for hospitalisations. For all but the Northern Territory, there was little variation between male and female rates. In general, rates were fairly similar for all states and territories with the exception of the Northern Territory which had a substantially higher rate for males.
- In 99% of cases, the hip fracture involved the neck of femur
- 87% of hip fracture deaths were certified by a medical practitioner rather than a coroner. This contrasts with other types of injury where converse proportions are the norm.
- In only 39% of cases was a definite or probable fall coded as the underlying cause of death. The next most commonly coded underlying cause of death was a disease of the circulatory system (31%).

This report examines hip fractures leading to hospitalisations and deaths in Australia during the year 2002–03.

Hip fractures

The incidence of hip fractures is rising and projected to further increase in Australia due to the population growth in the oldest age groups, where hip fractures are the most common form of fracture (Sanders et al. 1999). Hip fractures result in a large economic burden due to health expenditure in most industrialised countries (Hollingworth et al. 1996) and, hence, understanding the nature of hip fracture related hospitalisations and deaths is important.

Case definition and selection

For the purposes of this report hip fractures were defined as fractures of the head, neck, pertrochanteric, and subtrochanteric regions of the femur. This definition includes cases with ICD-10-AM codes S72.0, S72.1 and S72.2 (Boufous et al. 2004).

Hospitalisations Australia, 2002–03

Australian hospitalisations data records episodes of care. Some patients may have more than one episode of care subsequent to their initial admission to hospital. A total of 21,886 episodes of care with a principal diagnosis of hip fracture were identified for the period 2002–03. Records that had a mode of admission that was coded as a transfer from another acute care hospital were excluded from the main analyses to minimise the multiple counting of cases resulting from hospital transfers relating to the same hip fracture (n=3,270). However, these records were included in analyses of patient-days in hospital to provide a more complete picture of the burden of care for hip fractures.

The main analyses of hospitals data were conducted using incident cases with a primary diagnosis recorded as a hip fracture. However, further analyses were conducted using records with a principal diagnosis code of rehabilitation (ICD-10-AM Z48, Z50) and the presence of a hip fracture code in the additional diagnoses, and records where the principal diagnosis was neither rehabilitation nor a hip fracture, but where a hip fracture code appeared among the additional diagnoses.

Analyses

The method described above leads to an estimate of 18,616 people hospitalised due to hip fracture during the period 1 July 2002 to 30 June 2003. This equates to a rate of 91.3 hip fractures per 100,000 population.

Nature of Hip Fracture

The most common types of hip fracture were femoral neck fractures (54%) and subtrochanteric fractures (41%).

Table 1: Location of hip fracture by gender

		Males		Females		Persons	
Nature of injury	**ICD-10 Code**	**Count**	**Rate**	**Count**	**Rate**	**Count**	**Rate**
Fracture of neck of femur							
Fracture of neck of femur, part unspecified	S72.00	735	9.2	1,834	14.8	2,569	12.6
Fracture of intrascapular section of femur	S72.01	45	0.5	113	1.0	158	0.8
Fracture of epiphysis (separation) (upper) of femur	S72.02	29	0.3	16	0.2	45	0.2
Fracture of subcapital section of femur	S72.03	1,527	19.2	4,616	37.4	6,143	30.1
Fracture of midcervical section of femur	S72.04	193	2.4	418	3.5	611	3.0
Fracture of base of neck of femur	S72.05	86	1.1	208	1.7	294	1.5
Fracture of other parts of neck of femur	S72.08	108	1.3	187	1.6	295	1.5
Pertrochanteric fracture							
Fracture of trochanteric section of femur, unspecified	S72.10	769	9.6	1,737	13.8	2,506	12.3
Fracture of intertrochanteric section of femur	S72.11	1,439	18.1	3,728	29.5	5,167	25.3
Subtrochanteric fracture	S72.20	282	3.3	546	4.5	828	4.1
Total		**5,213**	**65.0**	**13,403**	**107.8**	**18,616**	**91.3**

Age and sex

Cases were heavily concentrated in older age groups (Figure 1). 40.3% (n=7,510) of cases were aged 85 years and over. The age-specific rate for this age group was 2,677.5 cases per 100,000 population. 91.1% (n=16,967) of cases were aged 65 years and over.

Only 119 cases involved children aged between 0 and 14 years.

Overall, there were 2.6 times as many female cases (n=13,403) as male cases (n=5,213). The age-adjusted rate for females was 107.8 per 100,000 population compared with 65.0 per 100,000 for males.

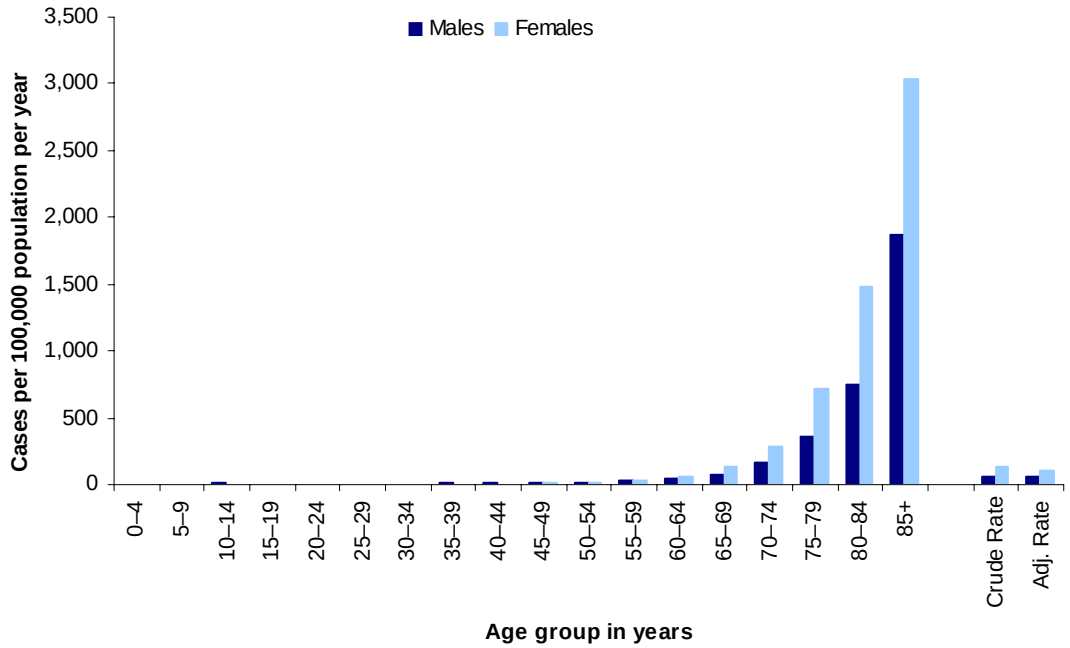

Figure 1: Hip fracture hospitalisations by age and sex 2002–03

Figure 2 shows the pattern of age-specific rates for the age groups between 0–4 and 60–64 years (older age groups are omitted here, to enable the pattern of rates at younger ages to be seen). Male age-specific rates exceeded those of females for all age groups between 10–14 and 54–59 years. Male to female rate ratios for this age range were between 1.2 and 8.1.) There was a small peak in the male rate in the 10–14 year age group. In the older age groups (65 years and over) female to male rate ratios ranged from 1.7 to 2.0.

Rates rose gradually across age groups up to the age of 70, after which they increased more steeply.

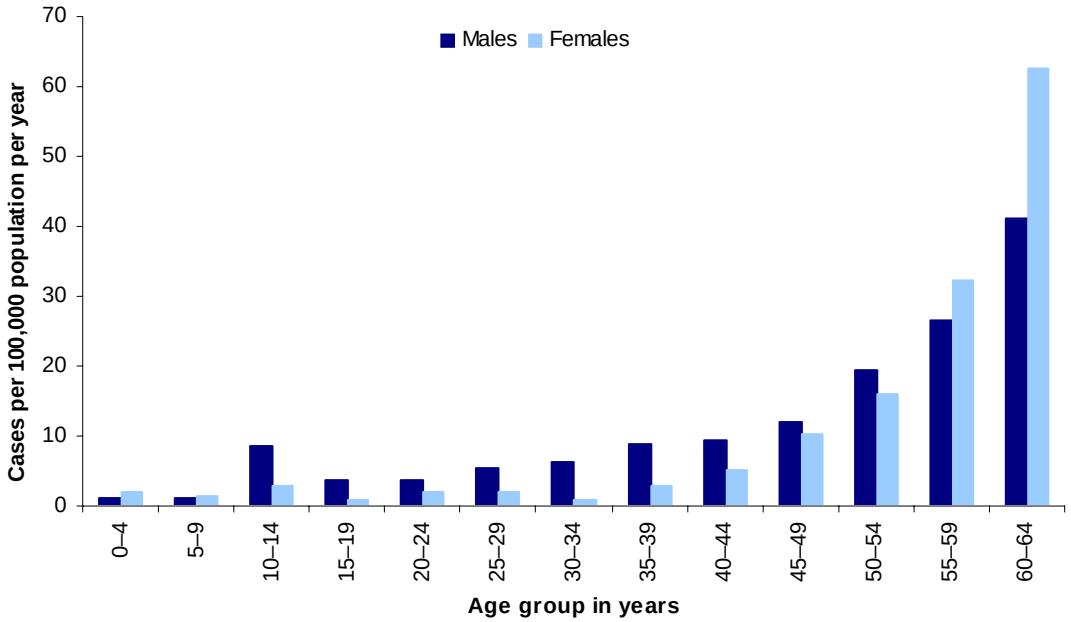

Figure 2: Hip fracture hospitalisations by age and sex 2002–03 (restricted to ages 0–64)

States and territories

Rates of hip fracture were fairly similar for all states and territories. A notable aspect of Figure 3 is that the rate for the Northern Territory, although higher than for other jurisdictions, is not considerably so, as is the case with many other types of injury.

For all states and territories, the male rate was substantially lower than that for females.

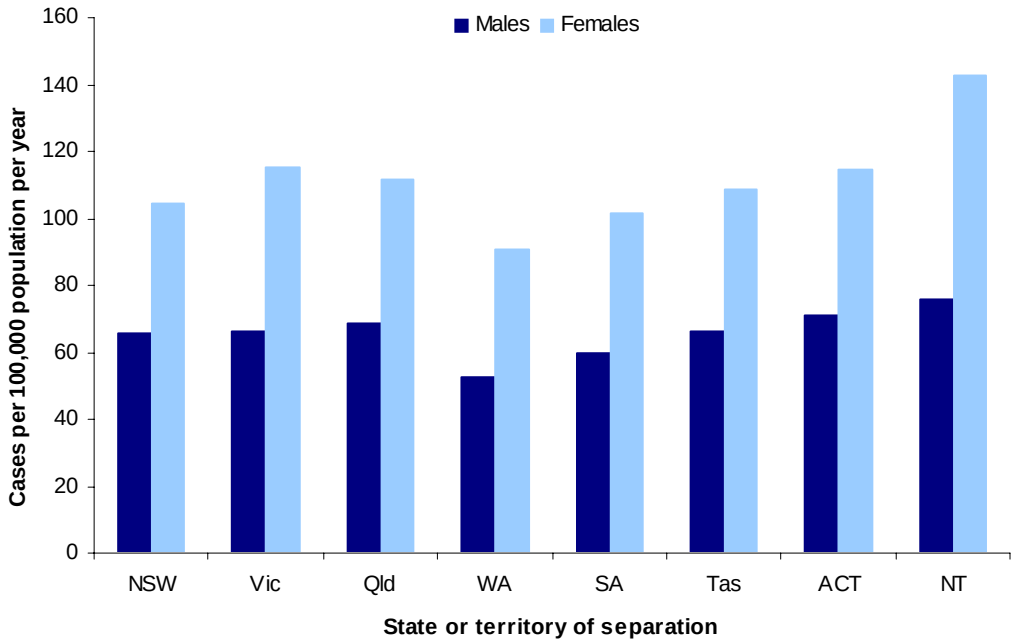

Figure 3: Hip fracture injuries by state or territory of hospitalisation

Remoteness

Rates of hospitalisation for hip fracture were fairly similar between remoteness zones. Rates for females were consistently higher than those for males. The male to female rate ratio of 0.5 for the very remote zone was somewhat below those for the other zones.

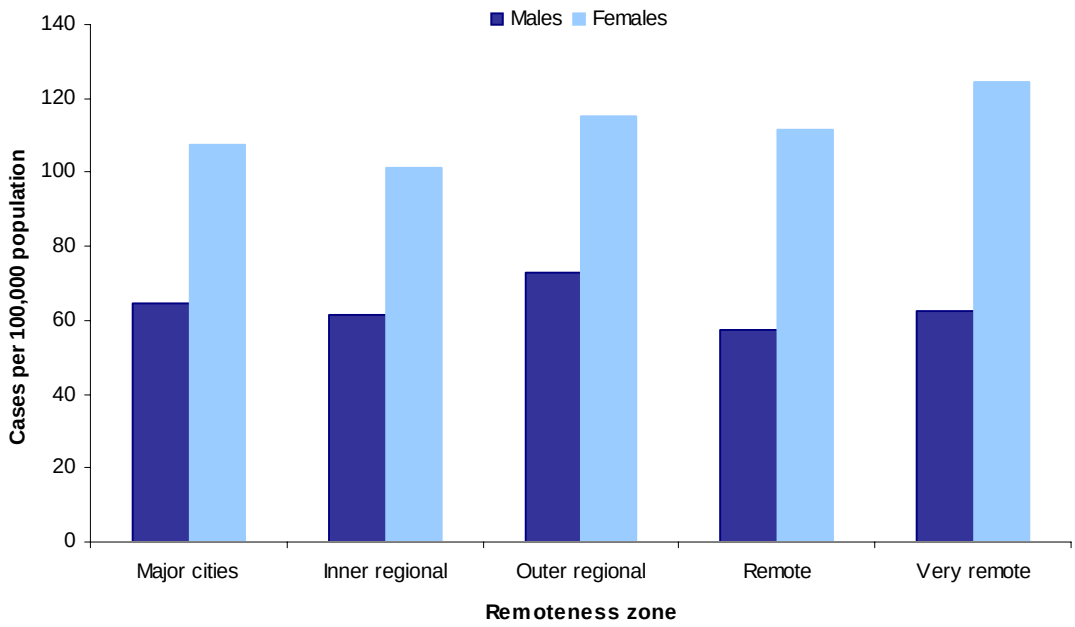

Figure 4: Hip fracture injuries by remoteness zones, 2002–03

Length of stay in hospital

The total length of stay associated with hip fracture provides an indication of the burden this type of injury imposes on individuals and the community. In Table 3, length of stay has been calculated for three different types of hospital episode:

1. Episodes of acute care where the principal diagnosis at time of separation from hospital was a hip fracture
2. Episodes of care where the principal diagnosis was rehabilitation and the presence of a hip fracture code among the additional diagnoses suggests that the episode followed a prior acute care episode for a hip fracture
3. Episodes of care where the principal diagnosis was neither a hip fracture nor rehabilitation, but where a hip fracture code appeared among the additional diagnoses.

The categories defined above are intended to provide an estimate of the scope of hospital separations associated with hip fracture cases. Work done at NISU using linked unit record data from Western Australia suggests that the sum of the episodes associated with each of the above categories provides a reasonably complete estimate of the total number and duration of hospital episodes related to the acute care and rehabilitation of hip fractures in Australia.

Table 3: Length of stay by gender and age group

Total length of stay based on episodes of acute care in hospital: Principal diagnosis of hip fracture (S72.0, S72.1 or S72.2)

	Males			Females		
Age group in years	Episodes	Total occupied bed days	Mean length of stay (days)	Episodes	Total occupied bed days	Mean length of stay (days)
0–4	11	82	5.9	19	193	9.7
5–9	11	78	7.3	13	145	11.1
10–14	76	334	4.2	23	76	3.1
15–19	32	247	5.6	5	18	3.6
20–24	32	254	8.0	16	95	5.6
25–29	45	375	8.1	13	138	10.6
30–34	55	383	7.4	7	50	7.5
35–39	74	678	8.1	22	174	8.1
40–44	82	669	8.5	43	314	7.5
45–49	100	846	8.8	86	676	7.9
50–54	151	1,146	7.3	120	1,075	9.0
55–59	181	1,782	10.5	204	1,654	8.0
60–64	222	2,334	10.1	321	2,824	8.7
65–69	350	3,605	9.5	576	5,587	9.7
70–74	578	6,788	11.9	1,104	11,836	10.5
75-79	987	11,707	11.7	2,494	26,580	10.4
80–84	1,281	16,411	12.6	3,728	42,918	11.3
85+	1,922	23,022	11.6	6,902	79,084	11.2
Sub-Total	**6,190**	**70,741**	**11.2**	**15,696**	**173,437**	**10.8**

continued

Table 3 (continued): Length of stay by gender and age group

Total length of stay based on episodes of rehabilitation in hospital: Principal diagnosis of rehabilitation (Z48 or Z50) and presence of a hip fracture (S72.0, S72.1 or S72.2) among the additional diagnoses

	Males			Females		
Age group in years	Episodes	Total occupied bed days	Mean length of stay (days)	Episodes	Total occupied bed days	Mean length of stay (days)
0–4	0	0	0.0	0	0	0.0
5–9	1	5	5.0	1	33	33.0
10–14	1	27	27.0	0	0	0.0
15–19	2	41	20.5	1	4	4.0
20–24	6	204	34.0	5	60	12.0
25–29	11	219	19.9	2	15	7.5
30–34	10	465	46.5	5	86	17.2
35–39	13	207	15.9	2	46	23.0
40–44	11	272	24.7	6	132	22.0
45–49	22	816	37.1	21	386	18.4
50–54	42	984	23.4	66	580	8.8
55–59	69	1,459	21.1	84	907	10.8
60–64	81	1,504	18.6	119	1,988	16.7
65–69	137	3,142	22.9	229	4,200	18.3
70–74	251	4,666	18.6	489	9,782	20.0
75-79	493	9,496	19.3	1,202	22,661	18.9
80–84	592	13,376	22.6	1,654	36,018	21.8
85+	758	17,163	22.6	2,851	64,906	22.8
Sub-Total	**2,500**	**54,046**	**21.6**	**6,737**	**141,804**	**21.0**

continued

Table 3 (continued): Length of stay by gender and age group

Total length of stay based on other episodes of care suggestive of being associated with a hip fracture: Principal diagnosis was NEITHER rehabilitation NOR a hip fracture, but where a hip fracture (S72.0, S72.1 or S72.2) appeared among the additional diagnoses

	Males			Females		
Age group in years	Episodes	Total occupied bed days	Mean length of stay (days)	Episodes	Total occupied bed days	Mean length of stay (days)
0–4	0	0	0.0	0	0	0.0
5–9	0	0	0.0	3	7	2.3
10–14	4	29	7.3	0	0	0.0
15–19	9	98	10.9	2	14	7.0
20–24	13	267	20.5	2	7	3.5
25–29	15	410	27.3	4	120	30.0
30–34	17	359	21.1	6	140	23.3
35–39	14	232	16.6	5	110	22.0
40–44	17	333	19.6	5	63	12.6
45–49	16	326	20.4	7	144	20.6
50–54	24	600	25.0	12	315	26.3
55–59	34	415	12.2	23	212	9.2
60–64	34	747	22.0	25	541	21.6
65–69	52	1,092	21.0	54	2,896	53.6
70–74	82	2,845	34.7	114	2,444	21.4
75-79	141	5,153	36.5	278	6,205	22.3
80–84	197	4,949	25.1	377	11,253	29.8
85+	260	5,061	19.5	794	16,907	21.3
Sub-Total	**929**	**22,916**	**24.7**	**1,711***	**63,154**	**36.9**
TOTAL	**9,619**	**147,703**	**19.2**	**24,144**	**378,395**	**22.9**

* 1 episode has been omitted due to an erroneous value for length of stay in hospital.

Figure 5 shows the length of stay in hospital for the types of episode of care associated with hip fractures that are presented in Table 3. Total bed days increased with age. This increase is particularly steep after the age of 70. While the highest number of bed days were associated with episodes of acute care, the bed days for episodes or rehabilitation were also high (Table 4).

Due to small case numbers in younger age groups, Figure 5 has been restricted to ages 65 years and older.

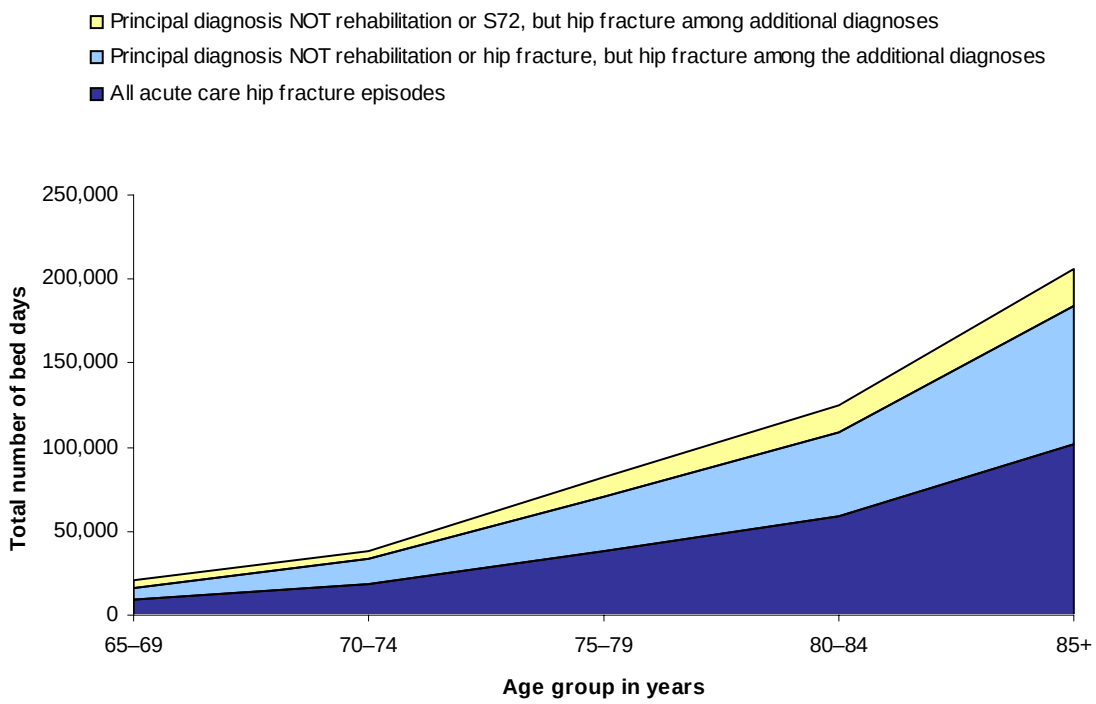

Figure 5: Total Length of Stay by age group for hospital episodes of acute care and rehabilitation of hip fracture and other episodes of hospitalisation likely to be associated with hip fracture, Australia 2002–03, ages 65 years and over

Table 4: Type of hip fracture hospitalisation episode by total number of bed days

Type of case	Total bed days
Episodes where principal diagnosis was hip fracture	244,178
Episodes where principal diagnosis was rehabilitation and hip fracture was among the additional diagnoses	195,850
Episodes where principal diagnosis was NOT rehabilitation, but hip fracture was among the additional diagnoses	88,709
Total	**528,737**

Additional diagnoses

A total of 2,641 hospitalisation episodes where the principal diagnosis was neither a hip fracture nor rehabilitation for a hip fracture, but where a hip fracture was present among the additional diagnoses were selected from hospitalisations that occurred during the year 2002–03. These episodes most frequently involved older age groups, particularly females aged 75 years and over (Figure 5).

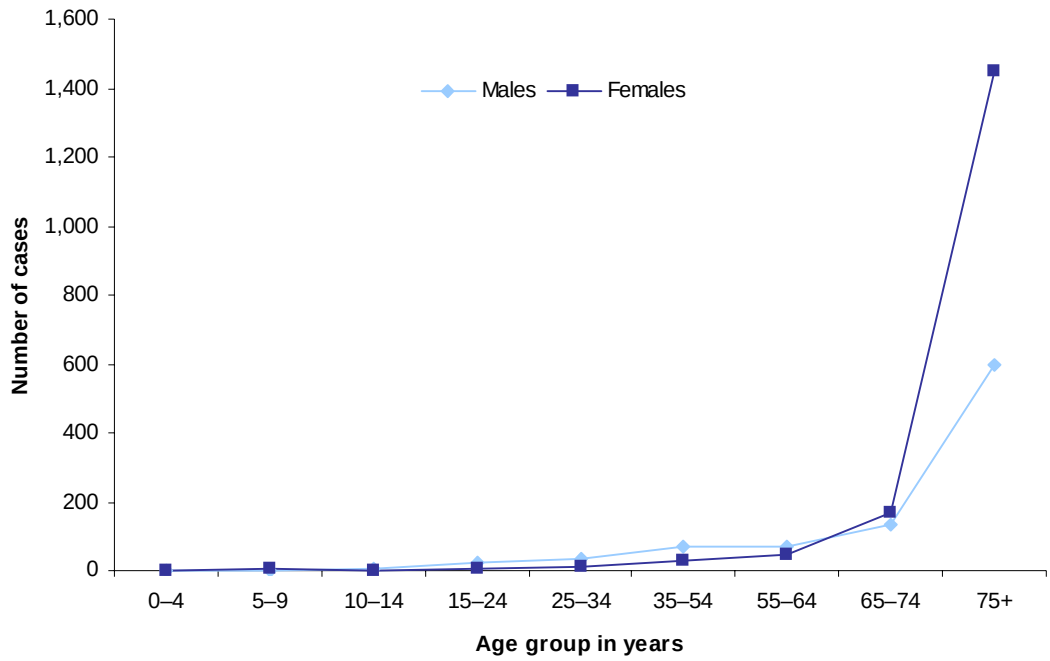

Figure 5: Cases of hospitalisation where the principal diagnosis was neither a hip fracture nor rehabilitation for a hip fracture, but where a hip fracture was present among the additional diagnoses (cases by age and sex)

Among males in this group (n=929), the most common principal diagnosis, up to the age of 65, was an injury code. At older ages, there was a greater variety in the type of principal diagnoses. While injury and poisoning were still common as a principal diagnosis, so were *Diseases of the circulatory and respiratory systems*, *Neoplasms*, and *Factors influencing health status and contact with health services* (Table 2).

Among females (n=1,712), the most common principal diagnosis for the selected episodes, at ages less than 65 years, was an injury code. As for males, a more diverse range of principal diagnoses was found in female cases at ages 65 years and over, the most common being from the ranges for injury & poisoning, *Diseases of the circulatory and respiratory systems*, *Neoplasms*, *Mental & behavioural disorders*, *Musculoskeletal disorders* and *Factors influencing health status and contact with health services* (Table 3).

Research into the process of certifying deaths associated with falls suggests that for elderly patients, who often have a number of co-morbidities, there is a tendency for medical practitioners to choose a 'natural' cause of death (e.g. diseases of the circulatory or respiratory systems) over an external cause, such as a fall (Goldacre 1993; Goldacre et al. 2002). Perhaps that this tendency also applies to the choice of principal diagnosis for elderly patients.

There is a clear association between conditions such as musculoskeletal disorders and neoplasms, and femoral fractures—musculoskeletal disorders, including osteoporosis (Gardner et al. 2005) and neoplasms (Stewart et al. 1978; Swanson et al. 2000) and their treatment (Small & Kachnic 2005) are risk factors for pathological fractures and increased likelihood of a fracture in the event of a fall.

Table 2: Cases of hospitalisation where the principal diagnosis was neither a hip fracture nor rehabilitation for a hip fracture, but where a hip fracture was present among the additional diagnoses

Males

	Age group in years																	
	0–4		5–9		10–14		15–24		25–34		35–54		55–64		65–74		75+	
Principal diagnosis	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Infectious diseases	0	0.0	0	0.0	0	0.0	0	0.0	**	**	0	0.0	**	**	**	**	15	2.5
Neoplasms	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	8	11.8	13	9.7	39	6.5
Endocrine	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	6	4.5	12	2.0
Mental & behavioural disorders	0	0.0	0	0.0	0	0.0	**	**	**	**	**	**	6	8.8	6	4.5	30	5.0
Diseases of the nervous system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	8	6.0	15	2.5
Diseases of the circulatory system	0	0.0	0	0.0	0	0.0	0	0.0	1	3.1	**	**	5	7.4	7	5.2	70	11.7
Diseases of the respiratory system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	13	9.7	42	7.0
Diseases of the digestive system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	7	5.2	24	4.0
Diseases of the musculoskeletal system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	6	4.5	17	2.8
Diseases of the genitourinary system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	**	**	21	3.5
Symptoms, signs & abnormal clinical and laboratory findings, nec.	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	0	0.0	0	0.0	32	5.4
Injury & poisoning	0	0.0	0	0.0	**	**	20	90.9	27	84.4	47	66.2	23	33.8	31	23.1	58	9.7
Factors influencing health status and contact with health services	0	0.0	0	0.0	0	0.0	1	4.5	2	6.3	8	11.3	10	14.7	29	21.6	212	35.5
Other	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	11	1.8
Total	**0**	**0.0**	**0**	**0.0**	******	******	**22**	**100.0**	**32**	**100.0**	**71**	**100.0**	**68**	**100.0**	**134**	**100.0**	**598**	**100.0**

** For reasons of confidentiality, cell values of 4 or less have been suppressed.

continued

Table 2 (continued): Cases of hospitalisation where the principal diagnosis was neither a hip fracture nor rehabilitation for a hip fracture, but where a hip fracture was present among the additional diagnoses

Females

	Age group in years																	
	0–4		5–9		10–14		15–24		25–34		35–54		55–64		65–74		75+	
Principal diagnosis	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Infectious diseases	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	0	0.0	**	**	23	1.6
Neoplasms	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	17.2	3	6.3	12	7.1	40	2.8
Endocrine	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	7	4.2	20	1.4
Mental & behavioural disorders	0	0.0	0	0.0	0	0.0	**	**	0	0.0	1	3.4	0	0.0	12	7.1	81	5.6
Diseases of the nervous system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.1	7	4.2	31	2.1
Diseases of the circulatory system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	6.3	20	11.9	132	9.1
Diseases of the respiratory system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	6.3	12	7.1	66	4.6
Diseases of the digestive system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	**	**	40	2.8
Diseases of the musculoskeletal system	0	0.0	**	**	0	0.0	0	0.0	0	0.0	0	0.0	9	18.8	10	6.0	45	3.1
Diseases of the genitourinary system	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**	**	45	3.1
Symptoms, signs & abnormal clinical and laboratory findings, nec.	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	3.6	54	3.7
Injury & poisoning	0	0.0	**	**	0	0.0	**	**	9	90.0	16	55.2	14	29.2	28	16.7	183	12.6
Factors influencing health status and contact with health services	0	0.0	**	**	0	0.0	**	**	0	0.0	5	17.2	13	27.1	47	28.0	654	45.1
Other	0	0.0	0	0.0	0	0.0	0	0.0	1	10.0	0	0.0	0	0.0	**	**	35	2.4
Total	**0**	**0.0**	******	******	**0**	**0.0**	**5**	**100.0**	**10**	**100.0**	**29**	**100.0**	**48**	**100.0**	**168**	**100.0**	**1,449**	**100.0**

** For reasons of confidentiality, cell values of 4 or less have been suppressed.

Place of occurrence

The frequency of hip fractures in residential institutions (Table 6) was high in relation to the proportion of the population living in such settings*. This probably reflects the comparatively poor state of health and attendant frailty experienced by this sector of the community (Australian Institute of Health and Welfare 2005).

Table 6: Place where incident occurred

Place where injury occurred	Age group in years									
	0–14 yrs		15–24 yrs		25–65 yrs		65+ yrs		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
Males										
Home	12	15.8	**	**	223	29.4	1,871	43.3	2,109	40.5
Residential institution	0	0.0	0	0.0	31	4.1	954	22.1	985	18.9
School, other institution & public administration area	7	9.2	**	**	28	3.7	422	9.8	459	8.8
Sports and athletics area	14	18.4	7	13.5	33	4.3	25	0.6	79	1.5
Street and highway	4	5.3	14	26.9	116	15.3	169	3.9	303	5.8
Trade and service area	**	**	**	**	30	4.0	103	2.4	138	2.6
Industrial and construction area	0	0.0	0	0.0	20	2.6	5	0.1	25	0.5
Farm	**	**	**	**	11	1.4	24	0.6	38	0.7
Other specified place of occurrence	**	**	5	9.6	40	5.3	52	1.2	101	1.9
Unspecified place of occurrence	27	35.5	16	30.8	216	28.5	614	14.2	873	16.7
Place not reported/not applicable	**	**	**	**	11	1.4	87	2.0	103	2.0
Total	**76**	**100.0**	**52**	**100.0**	**759**	**100.0**	**4326**	**100.0**	**5,213**	**100.0**
Females										
Home	15	34.9	0	0.0	315	45.0	5,480	43.4	5,810	43.3
Residential institution	0	0.0	0	0.0	28	4.0	3,453	27.3	,3481	26.0
School, other institution & public administration area	**	**	0	0.0	33	4.7	1140	9.0	1176	8.8
Sports and athletics area	6	14.0	**	**	13	1.9	32	0.3	52	0.4
Street and highway	**	**	9	47.4	45	6.4	372	2.9	427	3.2
Trade and service area	0	0.0	**	**	32	4.6	309	2.4	342	2.6
Industrial and construction area	0	0.0	0	0.0	**	**	8	0.1	9	0.1
Farm	0	0.0	0	0.0	5	0.7	8	0.1	13	0.1
Other specified place of occurrence	0	0.0	**	**	35	5.0	121	1.0	158	1.2
Unspecified place of occurrence	16	37.2	6	31.6	182	26.0	1,516	12.0	1,720	12.8
Place not reported/not applicable	**	**	0	0.0	11	1.6	202	1.6	215	1.6
Total	**43**	**100.0**	**19**	**100.0**	**700**	**100.0**	**12641**	**100.0**	**13,403**	**100.0**

** For reasons of confidentiality, cell values of 4 or less have been suppressed.

* As at 30 June 2004, about 5% of people aged 65 years and over were permanent aged care residents. In addition, during the year ending 30 June 2004, there were 17 respite admissions into residential services per 1,000 people in the same age group.

External causes of injury

The three most common types of external causes of hip fracture were falls, transportation and complications of medical and surgical care. In these three categories, female rates were higher than male rates for falls and complications of medical and surgical care. The converse was the case for transportation (Table 7).

Falls were much the most commonly recorded external cause of hip fractures (91%). Transportation was also a common external cause of hip fractures, particularly for males. Table 7 lists *Complications of surgical and medical care* as an external cause for a notable number of hip fracture cases. Analyses of coroners data undertaken at NISU suggests that, in such cases, a person has sustained a hip fracture as the result of an external cause—typically a fall—and has subsequently died due to complications of a procedure to repair the fracture (Kreisfeld & Harrison 2006).

There was some variation between age groups. Falls were the most common external cause of hip fracture in children 0–14 years and from age 35 years. In the age range 15 and 34 years, transportation was the most common mechanism of hip fractures, though falls account for more than one-third of cases (Table 8).

Table 7: External cause of Hip Fracture hospitalisations by age group, Australia 2002–03

	Males		Females		Persons		Rate Ratio
External Cause	Count	Rate	Count	Rate	Count	Rate	(M:F)
Not an external cause	95	1.5	211	1.7	306	1.2	0.9
Transportation	326	2.6	194	1.8	520	3.5	1.4
Falls	4,518	83.1	12,440	99.8	16,958	57.0	0.8
Complications of surgical and medical care	144	2.4	351	2.7	495	1.9	0.9
Other Unintentional	109	1.3	194	1.6	303	1.5	0.8
Other Intentional	20	0.2	13	0.1	33	0.2	2.0
Undetermined intent	**	**	0	0.0	**	**	0.0
Total	**5,213**	**91.3**	**13,403**	**107.8**	**18,616**	**65.0**	**0.8**

** For reasons of confidentiality, cell values of 4 or less have been suppressed.

Table 8: Hip fracture by external cause and age (proportions)

Age group in years	Transportation %	Falls (including X59+fracture) %	Other unintentional* %	Complications of medical and surgical care %	Other %	Total %
0–4	0	85	5	0	10	100
5–9	6	61	22	0	11	100
10–14	19	52	21	0	9	100
15–24	61	34	3	0	3	100
25–34	53	38	3	2	5	100
35–54	21	69	5	1	3	100
55–64	7	86	3	2	2	100
65–74	3	91	2	2	1	100
75+	1	93	1	3	2	100

*The category ‘Other unintentional injury’ includes a wide variety of mechanisms of injury.

Mechanism of fall-related injury resulting in hip fracture

Because falls were by far the most frequent cause of hip fracture (91%), fall-related cases were further investigated to explore the specific mechanisms involved (Table 9).

Although not presented in Table 9, there was little difference between mechanisms as a function of gender.

Table 9: Mechanism of fall for injury hospitalisations by age group, Australia 2002–03

		0–14 yrs		15–24 yrs		25–64 yrs		65+ yrs		Total	
ICD-10-AM Code		No	%	No	%	No	%	No	%	No	%
W00	Fall on same level involving ice and snow	0	0.0	0	0.0	**	**	0	0.0	**	**
W01	Fall on same level from slipping, tripping and stumbling	5	9.1	**	**	435	41.7	5,676	37.4	6,119	37.6
W02	Fall involving ice-skates, skis, roller-skates or skateboards	**	**	**	**	19	1.8	**	**	24	0.1
W03	Other fall on same level due to collision with, or pushing by, another person	10	18.2	0	0.0	12	1.2	85	0.6	107	0.7
W04	Fall while being carried or supported by other persons	0	0.0	0	0.0	0	0.0	**	**	**	**
W05	Fall involving wheelchair	0	0.0	0	0.0	12	1.2	88	0.6	100	0.6
W06	Fall involving bed	**	**	0	0.0	30	2.9	791	5.2	823	5.1
W07	Fall involving chair	**	**	**	**	24	2.3	516	3.4	544	3.3
W08	Fall involving other furniture	**	**	0	0.0	7	0.7	19	0.1	28	0.2
W09	Fall involving playground equipment	6	10.9	0	0.0	**	**	0	0.0	8	0.0
W10	Fall on and from stairs and steps	6	10.9	0	0.0	56	5.4	559	3.7	621	3.8
W11	Fall on and from ladder	0	0.0	0	0.0	39	3.7	74	0.5	113	0.7
W12	Fall on and from scaffolding	0	0.0	0	0.0	5	0.5	0	0.0	5	0.0
W13	Fall from, out of or through building or structure	**	**	**	**	24	2.3	23	0.2	52	0.3
W14	Fall from tree	0	0.0	0	0.0	6	0.6	6	0.0	12	0.1
W15	Fall from cliff	0	0.0	**	**	**	**	**	**	7	0.0
W16	Diving or jumping into water causing injury other than drowning or submersion	0	0.0	0	0.0	**	**	**	**	**	**
W17	Other fall from one level to another	**	**	**	**	38	3.6	134	0.9	176	1.1
W18	Other fall on same level	5	9.1	**	**	123	11.8	2,743	18.1	2,872	17.6
W19	Unspecified fall	9	16.4	**	**	206	19.8	4,454	29.3	4,673	28.7
Total		55	100.0	16	100.0	1,043	100.0	15,177	100.0	16,291	100.0

** For reasons of confidentiality, cell values of 4 or less have been suppressed.

Deaths, Australia 2002–03

Case selection

Data reported here are for deaths that occurred during the financial year period 1 July 2002 to 30 June 2003 and had been registered by 31 December 2003.

Unlike hospitalisations data, deaths data are not assigned a Principal diagnosis code. Deaths data are assigned up to 20 Multiple causes of death (MCoD) codes, one of which is designated the Underlying cause of death (UCoD). Cases were selected for this report on the basis of the presence of one or more codes meeting the criteria for a hip fracture (S72.0, S72.1, S72.2) among the available MCoD.

Application of these selection criteria yielded 1,582 deaths due to hip fracture.

Age and sex

Overall, there were 1.7 times as many female cases (n=996) as male cases (n=586). As for hospitalisations, cases were heavily concentrated in the oldest age groups (59% of cases were aged 85 years and over, and 98% were aged 65 years and over). There were no cases under the age of 40 years. The age-adjusted rate for males was 8.0 per 100,000 population and the female rate was 7.6 per 100,000.

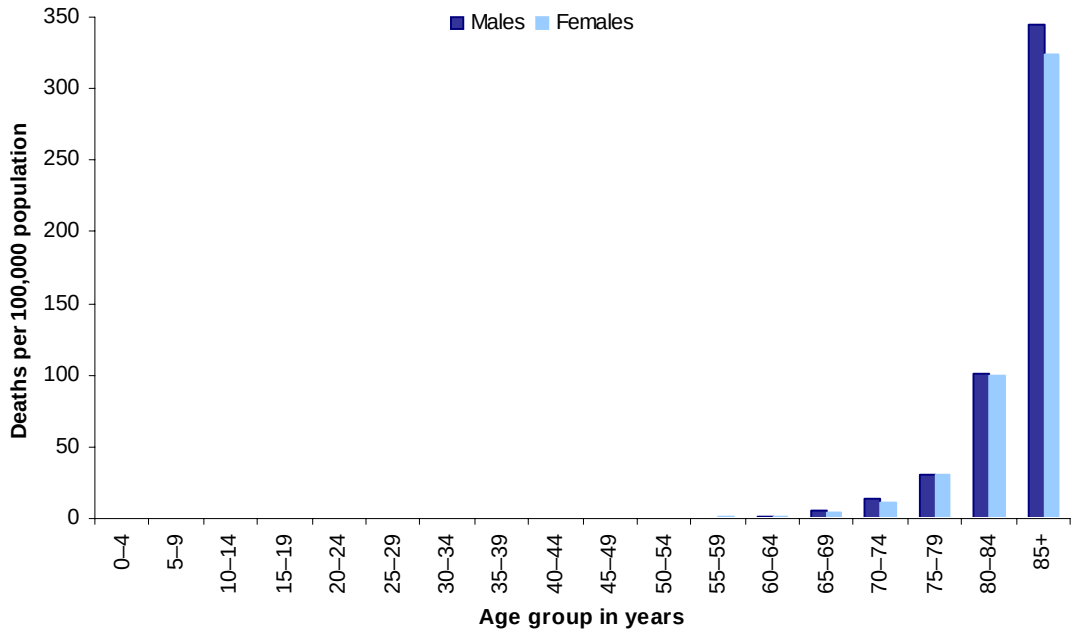

Figure 8: Hip fracture deaths by age and sex, 2002–03

State and territory differences

The pattern for deaths due to hip fractures differs from that observed for hospitalisations. For all but the Northern Territory, there is little variation between the rates for males and those for females. The peak shown in Figure 9 for males in the Northern Territory, which was not seen for rates of hospitalisation, is much more similar to the patterns observed for other major causes of injury.

Figure 9: Hip fracture deaths by state and territory, 2002–03

Diagnoses

By far the most common type of hip fracture reported involved the neck of femur (n= 1,560, 98.6%). 20 (1.3%) deaths involved pertrochanterich fractures, and the remainder (n=2, 0.1%) involved subtrochanteric fractures.

Underlying cause of death

In 612 (39%) of the 1,582 deaths, a definite fall (n=92) or probable fall* (n=520) was coded as the UCoD. The next most common UCoD were Diseases of the circulatory system (n=485, 31%), Neoplasms (n=121, 8%) and Diseases of the respiratory system (n=90, 6%). The high proportion of hip-fracture related deaths that were attributed to a 'natural cause' is consistent with the observation, by several researchers, that there is a tendency for a 'natural' cause to be chosen over an 'external' cause as the UCoD for elderly people (Pemberton 1988; Calder 1996; Roberts 1996; Maxwell 1986).

Certification of Death

Most hip fracture deaths were certified by a medical practitioner (n=1380, 87%) rather than a coroner (n=202, 13%). This contrasts with other types of injury where the converse is true. For example, data analyses undertaken at NISU showed that only 2% of transport-related deaths, 1% of suicides and 4% of deaths due to unintentional poisoning by drugs were certified by a medical practitioner in the twelve-month period 2002–03.

* n=520 cases were coded to X59 Exposure to unspecified factor. Previous work undertaken by NISU has established that most deaths coded to a combination of X59 *plus* a fracture at older ages involved a fall (Kreisfeld & Harrison, 2005. Injury deaths, Australia 1999).

Discussion

This report shows that older people are particularly vulnerable to hip fractures leading to both hospitalisation and death. The vast majority of these injuries are the result of a fall.

Females outnumber males among older people admitted to hospital or dying with hip fracture. This is partly due to the greater number of males than females in the age range at greatest risk, but females also have higher age-specific rates than males of hospitalisation for this cause.

Hip fractures impose a heavy burden on the health system. To illustrate this, length of stay in hospital for hip fractures was compared with that for head injury, another common injury outcome. The total number of bed days associated with acute care episodes for hip fractures was 244,178 days compared with 160,407, making it 1.5 times as costly in terms of its initial drain on hospital resources. The mean length of stay in hospital for hip fractures was 11.2 days compared with 2.7 days for head injuries.

In assessing the burden of hip fractures, it is also important to note that not only do episodes of acute care contribute to this burden, but so too do the many bed-days associated with rehabilitation.

The fact that most hip fractures affect the elderly, where co-morbidities are the norm, probably results in a significant underestimation of the extent of hip fracture hospitalisations and deaths. Work undertaken at NISU indicates that deaths associated with fall-related hip fractures are often attributed to other underlying causes. Perhaps similar processes affect the recording of hospitalisation. Further investigations are necessary to arrive at a more accurate estimate of the burden of hip fractures.

References

Australian Institute of Health and Welfare 2005. Australia's welfare 2005. Canberra: Australian Institute of Health and Welfare.

Boufous S, Finch C & Lord S 2004. Incidence of hip fracture in New South Wales: are our efforts having an effect? Medical Journal of Australia 180 (12):623–6.

Calder S, Anderson, GH, Gregg, PJ, 1996. Certification of cause of death in patients dying soon after proximal femoral fracture.[comment]. BMJ 312 (7045):1515.

Gardner M, Demetrakopoulos D, Shindle M, Griffith M & Lane J 2005. Prevention and treatment of osteoporotic fractures. Minerva Medica 95 (5):343–52.

Goldacre M 1993. Cause-specific mortality: understanding uncertain tips of the disease iceberg. Journal of epidemiology and community health 47 (6):491–6.

Goldacre M, Roberts S & Yeates D 2002. Mortality after admission to hospital with fractured neck of femur: database study. British Medical Journal 325:868–9.

Hollingworth W, Todd C & Parker M 1996. The cost of treating hip fractures in the twenty-first century: short report. Osteoporosis international 6 Supplement 2:13–5.

Kreisfeld R, Harrison J 2006. Use of multiple causes of death data for identifying and reporting injury mortality.

Kreisfeld R, Harrison, J, 2005. Injury deaths, Australia 1999.

Maxwell J 1986. Accuracy of death certification for alcoholic liver disease. Br J Addict 81:168–9.

Pemberton J 1988. Are hip fractures underestimated as a cause of death? The influence of coroners and pathologists on the death rate. Community medicine 10 (2):117–23.

Roberts I, Benbow, EW, 1996. Certification of cause of death in patients dying soon after proximal femoral fracture. Postmortem examination should always be carried out for deaths due to trauma.[comment]. BMJ 313 (7061):879; author reply—80.

Sanders K, Nicholson G, Ugoni A, Pasco J, Seeman E & Kotowicz M 1999. Health burden of hip and other fractures in Australia beyond 2000 projections based on the Geelong Osteoporosis Study. Medical Journal of Australia 170:467–70.

Small W, Kachnic L 2005. Postradiotherapy pelvic fractures: cause for concern or opportunity for future research? JAMA 294 (20):2635–7.

Stewart W, Gelberman R, Harrelson J & Seigler H 1978. Skeletal metastases of melanoma. Journal of Bone and Joint Surgery 60 (5):645–9.

Swanson K, Pritchard D & Sim F 2000. Surgical treatment of metastatic disease of the femur. Journal of the American Academy of Orthopaedic Surgeons 8 (1):56–65.

Data issues

Age adjustment

Most all-ages rates have been adjusted for age to overcome the effect of differences in the proportions of people of different ages (and different injury risks) in the populations that are compared. Direct standardisation was employed, taking the Australian population in 2001 as the standard. Changes in age composition are small within narrow age bands (e.g. 65–69 years) and adjustment has not been applied to five year age groups. Where crude rates are reported, this is noted.

Data quality

Deaths

Data are reported here for the one-year period commencing 1 July 2002 and ending 30 June 2003. The reliability of information about cause of death depends on the reliability of ICD codes provided by the ABS. This depends largely on the adequacy of the information provided to the ABS through Registrars of Births, Deaths and Marriages, and originating from coroners and medical practitioners. Little published information is available on the quality of the data resulting from this process, particularly as it applies to injury deaths. Centralisation of mortality coding in the Brisbane office of the ABS since the mid 1990s has reduced the potential for variation due to local differences in coding practice. However, factors affecting information recording, provision, or coding could affect data in different ways for different jurisdictions, periods or population groups. Hence, apparent differences should be interpreted with caution.

Hospitalisations

This report uses data collected from state and territory hospitals. After coding and collection from the states and territories, the data is 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 standard classifications and formal coding guidelines have been in place for some years.

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INJCAT 93