

## BRIEF REPORT

# Hospital admissions following presentations to emergency departments for a fracture in older people

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The aim of this paper is to estimate the proportion of older people who are hospitalised following a presentation to an emergency department for hip, pelvic and wrist fractures. The findings indicate that hospitalisation data do not accurately reflect the incidence of low-trauma fractures, particularly wrist and pelvic fractures, in older people.

Fractures in older people continue to impose a considerable burden on communities around the world, partly as a result of rapid population ageing.<sup>1–5</sup> In addition to the demand for healthcare services, the short- and long-term disabling consequences of various fracture types in older people are well documented.<sup>6–8</sup> For example, only half of the people who have a hip fracture, one of the most frequent and debilitating fractures in older people, will regain the same level of mobility that they had before their fracture.<sup>9</sup>

Hospital discharge data are widely used in various industrialised countries to monitor the trends in fracture rates to inform policy and injury prevention strategies and to allocate healthcare resources. However, it is argued that hospitalisations represent only the tip of the iceberg, and many people presenting to emergency departments (EDs) with a fracture are not hospitalised.<sup>8</sup> There are few published reports on the proportion of older people who are admitted to hospital after presentation to EDs for various fractures. This information is important for assessing the extent to which hospitalisation rates reflect the incidence of fractures in the community, which, in turn, has wider implications for prevention and planning purposes.

In this paper, we estimate the proportion of older people who are hospitalised following presentation to an ED for three common fractures—hip, pelvic and wrist fractures. These three fracture types were selected because of their high prevalence and their greater burden on the community compared with other injuries in older people. We also examined changes in this proportion over time and potential differences according to the fracture type, gender and age group.

## METHODS

Data were obtained from the Victorian Emergency Minimum Dataset (VEMD), a component of the longstanding injury surveillance system administered by the Victorian Injury Surveillance Unit in Australia.<sup>10</sup> The VEMD records details of injuries treated at the EDs of all Victorian public hospitals with a 24 h ED, thereby capturing 80% of Victorian ED presentations.<sup>11</sup> Demographic and clinical information, as well as data relating to the circumstance of the injury event, are collected and coded according to the Australian National Data Standards for Injury Surveillance. The data covered a financial 6-year period, from 1999–2000 to 2004–2005. This period was selected because of consistency in the data collection and coding of various fracture types.

Information regarding the diagnoses of injury was coded using the *International classifications of diseases*, 10th revision. Cases selected for this study included all patients aged  $\geq 50$  years who presented to a VEMD ED with a primary/principal diagnosis of hip fracture (S72.0–S72.2), pelvic fracture (S32.3–S32.5, S32.81, S32.83 and S32.89) or wrist fracture, including the lower end of the radius and ulna (S52.50–S52.6, S62.0–S62.19).

Discharge information in the VEMD was used to compute lower and upper bound estimates for the proportion of ED visits resulting in hospital admissions. The lower bound is the proportion of cases “admitted to a hospital ward” divided by the total number of emergency presentations. The upper bound was calculated by dividing the sum of those “admitted to a hospital ward” and “transferred to another hospital” by the total number of emergency presentations. The upper bound assumes that transfers to other hospitals were subsequently admitted to a hospital ward, whereas the lower bound assumes that all these cases were later discharged without admission. The proportions of hospital admissions are provided by fracture type, gender and age group. Poisson regression was used to test for the significance of the observed trends in the proportion of ED visits resulting in hospital admissions over the period of the study and across age groups. This was applied to men and women separately. All analyses were carried out using SAS V.9.1.

## RESULTS

Tables 1–3 present the total number of presentations to VEMD EDs and the proportion of subsequent hospital admissions by gender and age group for hip, pelvic and wrist fractures, respectively. During the 6-year study period, there were 12 810 emergency presentations for hip fractures, 1717 for pelvic fractures and 7966 for wrist fractures.

The proportion of hospital admissions varied according to the fracture type. Hip fractures had the highest proportion of hospital admissions (86.5–96.1%), followed by pelvic fractures (67.8–82.6%) and wrist fractures (26.2–28.9%). For all fracture types and for both men and women, these proportions did not change significantly between 1999–2000 and 2004–2005. Similarly, there were no significant differences, in the proportion of hospitalisations, between men and women during the same period for all fracture types.

The proportion of ED presentations resulting in hospitalisation increased with age, particularly for wrist and pelvic fractures. However, this increase was only statistically significant for women presenting to ED department with a wrist fracture.

**Abbreviations:** ED, emergency department; VEMD, Victorian Emergency Minimum Dataset

**Table 1** Proportions of hospital admissions resulting from emergency department presentations for hip fractures by gender and age group, from 1999–2000 to 2004–2005

	Number of all ED presentations for hip fracture	Lower bound for the % of ED presentations resulting in hospital admission (95% CI)	Upper bound for the % of ED presentations resulting in hospital admission (95% CI)
<b>Men (years)</b>			
50–59	153	86.3 (80.8 to 91.7)	94.1 (90.4 to 97.8)
60–69	318	89.6 (86.3 to 93.0)	95.3 (93.0 to 97.6)
70–79	904	86.3 (84.0 to 88.5)	96.7 (95.5 to 97.8)
≥80	1867	85.0 (83.4 to 86.6)	96.6 (95.8 to 97.4)
Total	3242	85.9 (84.7 to 87.1)	96.4 (95.7 to 97.0)
<b>Women (years)</b>			
50–59	176	81.8 (76.1 to 87.5)	94.3 (90.9 to 97.7)
60–69	557	87.8 (85.1 to 90.5)	97.1 (95.7 to 98.5)
70–79	2218	87.0 (85.6 to 88.4)	97.4 (96.8 to 98.1)
≥80	6617	86.7 (85.9 to 87.5)	95.5 (94.9 to 96.0)
Total	9568	86.7 (86.1 to 87.4)	96.0 (95.6 to 96.4)
<b>Overall (years)</b>			
50–59	329	83.9 (79.9 to 87.9)	94.2 (91.7 to 96.7)
60–69	875	88.5 (86.3 to 90.6)	96.5 (95.2 to 97.7)
70–79	3122	86.8 (85.6 to 88.0)	97.2 (96.6 to 97.8)
≥80	8484	86.3 (85.6 to 87.0)	95.7 (95.3 to 96.1)
Total	12 810	86.5 (85.9 to 87.1)	96.1 (95.8 to 96.4)

ED, emergency department.

**DISCUSSION**

Our study shows that ED presentations for hip fractures in older people were more likely to result in hospital admission than pelvic and wrist fractures. This reflects both the functional consequences of the different injuries and the approaches to medical intervention. Hip fractures have an immediate impact on function, and the majority require operative intervention, thus the high proportion of hospitalised cases (mid-90%). Pelvic fractures do not usually require surgical intervention, but the pain and associated functional disability often lead to a period of hospitalisation. Wrist fractures are less likely to lead to a functional disability sufficient to preclude returning home with support and only a relatively small number receive operative intervention.

Although anecdotal evidence indicates that practically all hip fractures in older people presenting to EDs are subsequently

admitted to hospital,<sup>4</sup> and that the majority of wrist fracture cases are not,<sup>12</sup> there has been little empirical analysis of this. One study that did examine this in some detail is the Geelong Osteoporosis Study, where all women aged ≥35 years resident in a Statistical Division in Australia and who sustained a fracture during a 2-year period were identified using radiological reports from the two radiological centres in the region.<sup>8</sup> The study found that 95%, 67% and 19% of women with hip, pelvic and wrist fractures respectively, were admitted to hospital. Although these figures are comparable to those found in our study, it is important to highlight that the Geelong Study included younger women and that the number of fractures examined was much smaller than in our study (hip 50, pelvic 15 and wrist 95).

Our findings show no significant differences between men and women in the proportion of hospital admissions following ED presentation, for any fracture type studied. Although

**Table 2** Proportions of hospital admissions resulting from emergency department presentations for pelvic fractures by gender and age group, from 1999–2000 to 2004–2005

	Number of all ED presentations for pelvic fracture	Lower bound for the % of ED presentations resulting in hospital admission (95% CI)	Upper bound for the % of ED presentations resulting in hospital admission (95% CI)
<b>Men (years)</b>			
50–59	34	55.9 (39.2 to 72.6)	64.7 (48.6 to 80.8)
60–69	47	80.9 (69.6 to 92.1)	91.5 (83.5 to 99.5)
70–79	92	72.8 (63.7 to 81.9)	82.6 (74.9 to 90.4)
≥80	151	68.9 (61.5 to 76.3)	82.8 (76.8 to 88.8)
Total	324	70.4 (65.4 to 75.3)	82.1 (77.9 to 86.3)
<b>Women (years)</b>			
50–59	43	44.2 (29.3 to 59.0)	53.5 (38.6 to 68.4)
60–69	81	56.8 (46.0 to 67.6)	72.8 (63.2 to 82.5)
70–79	322	68.6 (63.6 to 73.7)	82.6 (78.5 to 86.7)
≥80	947	68.6 (65.7 to 71.6)	84.9 (82.6 to 87.2)
Total	1393	67.2 (64.7 to 69.7)	82.7 (80.7 to 84.7)
<b>Overall (years)</b>			
50–59	77	49.4 (38.2 to 60.5)	58.4 (47.4 to 69.4)
60–69	128	65.6 (57.4 to 73.9)	79.7 (72.7 to 86.7)
70–79	414	69.6 (65.1 to 74.0)	82.6 (79.0 to 86.3)
≥80	1098	68.7 (65.9 to 71.4)	84.6 (82.5 to 86.7)
Total	1717	67.8 (65.6 to 70.0)	82.6 (80.8 to 84.4)

ED, emergency department.

**Table 3** Proportions of hospital admissions resulting from emergency department presentations for wrist fractures by gender and age group, from 1999–2000 to 2004–2005

	Number of all ED presentations for wrist fracture	Lower bound for the % of ED presentations resulting in hospital admission (95% CI)	Upper bound for the % of ED presentations resulting in hospital admission (95% CI)
<b>Men (years)</b>			
50–59	495	24.0 (20.3 to 27.8)	26.5 (22.6 to 30.4)
60–69	417	18.2 (14.5 to 21.9)	19.7 (15.8 to 23.5)
70–79	277	24.9 (19.8 to 30.0)	26.7 (21.5 to 31.9)
≥80	170	27.6 (20.9 to 34.4)	32.9 (25.9 to 40.0)
Total	1359	22.9 (20.7 to 25.1)	25.2 (22.9 to 27.5)
<b>Women (years)</b>			
50–59	1309	19.9 (17.8 to 22.1)	21.5 (19.2 to 23.7)
60–69	1600	21.4 (19.4 to 23.4)	22.6 (20.5 to 24.6)
70–79	1949	25.6 (23.7 to 27.5)	28.2 (26.2 to 30.2)
≥80	1749	32.3 (30.1 to 34.5)	36.8 (34.6 to 39.1)
Total	6607	27.0 (25.1 to 28.1)	29.7 (28.5 to 30.8)
<b>Overall (years)</b>			
50–59	1804	21.1 (19.2 to 22.9)	22.8 (20.9 to 24.8)
60–69	2017	20.8 (19.0 to 22.5)	22.0 (20.2 to 23.8)
70–79	2226	25.5 (23.7 to 27.3)	28.0 (26.2 to 29.9)
≥80	1919	31.9 (29.8 to 34.0)	36.5 (34.3 to 38.6)
Total	7966	26.2 (25.2 to 27.2)	28.9 (27.8 to 29.9)

ED, emergency department.

hospital admission policies for various injuries during the period of the study might have changed slightly, this was not reflected in our findings, which indicate no significant change in the proportion of hospitalised cases for all fractures over the 6-year period.

An obvious limitation to the study is that the outcome of those transferred to other hospitals was not known, necessitating estimation of the proportion of cases admitted to hospital. This proportion is more likely to be closer to the upper bound as it is assumed that those transferred to another hospital are more likely to be admitted. Linkage of the emergency data to hospital discharge data would overcome this limitation by determining the exact number of cases who are hospitalised after transfer to another hospital.

It is important to note that unlike hospital data, where trained coders assign diagnosis codes, in emergency rooms the coding is carried out by the treating health professional. It is difficult to assess the accuracy of this coding, particularly when about a quarter of cases do not have a procedure code (ie, x rays) to support the diagnosis.

It is also important to note that figures for various fractures cannot be used to calculate “incidence” rates across the state of Victoria, as only cases attending the VEMD hospitals are recorded in the database. Many injuries are treated at other Victorian hospitals or clinics. However, this is likely to have minimal implications on our aim of estimating the proportion of hospitalisations resulting from ED presentations for various fractures in older people as the hospitals included in the study represent most (80%) of the EDs in the state.

Finally, it is difficult to know to what extent the findings of this study can be generalised to other industrialised countries with different patient management practices and hospital admission policies. However, the study provides valuable information on the use of hospital data to quantify the burden of fractures in older people, which has implications on efforts to prevent this type of injury. Similar studies from other countries to complement the findings of this study will be beneficial.

## CONCLUSIONS

Our study provides evidence that hospitalisation data do not accurately reflect the incidence of three of the most common fractures in older people and grossly underestimate the burden

## Key points

- The proportion of hospital admissions following an emergency department (ED) visit of people aged ≥50 years varied according to the fracture type.
- Hip fractures had the highest proportion of hospital admissions (86.5–96.1%).
- Around three-quarters of pelvic fractures were admitted to hospitals following an ED visit.
- Only about one-third of wrist fractures presenting to EDs were subsequently admitted.
- Overall, hospitalisation data do not accurately reflect the incidence of low-trauma fractures in older people.

of these fractures. This is particularly true for wrist fractures where less than one-third of ED presentations are admitted to hospital. For pelvic fractures, just over three-quarters of presentations are admitted to hospital, which indicates that hospital data underestimate the incidence of these fractures. The picture is different for hip fractures, with our estimates showing a proportion of hospital admissions of around 90% of cases, with an upper bound of just over 96%, reflecting the severity of this fracture type. These findings have implications for the monitoring of fractures in the community, particularly with respect to adequate service provision for the future.

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