



Falls resulting in injury in Queensland Hospital Admitted Patient Data, 2007-08

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Key points

- During 2007-08, there were 2,205 falls resulting in patient injury in public and private hospitals in Queensland, the majority of which were adults aged over 65 years (80%).
- Of these in-hospital falls, around 16% resulted in a fracture and around 84% resulted in non-fracture injuries.
- The rate of in-hospital falls among adults aged 65 years and over in Queensland was 3.19 per 1,000 separations, or 0.79 per 1,000 patient days.
- A conservative cost estimate for treating in-hospital falls resulting in fractures in Queensland is around \$2.8 million per annum.

Introduction

Clinical incidents are adverse events that can occur during the provision of health care services to patients. Over 57,000 incidents were voluntarily reported into Queensland Health's PRIME Clinical Incidents (CI) reporting system during 2007-08, the most common of which were falls and medication incidents.¹ Although PRIME CI captures reported falls in hospitals, it cannot be used to determine the true number of in-hospital falls given that it is not a mandatory requirement.

Another source of information of fall-related incidents occurring in hospital is the Queensland Hospital Admitted Patient Data Collection (QHAPDC), which collects all public and private hospital patient coded data and is sourced from clinical information within patient charts by coding experts.

This chapter reports results relating to in-hospital falls resulting in injury extracted from the QHAPDC and explores its potential use as a patient safety and quality indicator.

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Methodology and data capture

In May 2010, the Patient Safety and Quality Improvement Service extracted from QHAPDC the number of separations for in-hospital falls resulting in injury, defined using the following ICD-10-AM codes:

- Patients separated during 2007-08
- Falls as an external cause of injury = W01-W19 (excluding W020-W026; W09; W11-W12; W14-W16)
- Condition onset flag = 2 (condition arising during the episode of care)
- Place of occurrence = Y92.22 (in a health service area)
- Injury = S00 to S99, T00, T01, T03, T04, T05, T06, T07, T09, T11, T13 or T14

The data excluded boarders, organ procurement, unqualified newborns, and injuries from intentional self-harm (X60 - X84). The data does include incidents occurring in public psychiatric hospitals.

In-hospital falls resulting in injury were further categorised into the following injury categories:

- Fracture injuries = S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T08, T10, T12 or T142
- Non-fracture injuries = [S00 to s99 - excluding the fracture codes listed above] or [T00, T01, T03, T04, T05, T06, T07, T09, T11, T13, T14]
- Any injury = all fracture and non-fracture injuries

The rates of in-hospital falls resulting in injury are presented in two ways: per 1,000 separations and per 1,000 total patient days. The denominators for these rates are based on the number of separations and total patient days for all cause admissions for the corresponding time periods, locations and age groups.

Individual hospital data was only available for Queensland public hospitals. To make more meaningful comparisons between hospitals, where capabilities and patient populations vary, hospitals were clustered according to location, type and size into 3 groups: [1] principal referral and specialised, [2] large, and [3] medium and small, according to Health Statistics Centre peer grouping criteria adopted from AIHW.

Technical data notes

There are a number of issues to consider when reporting in-hospital falls resulting in injury using the QHAPDC. Falls will only be captured in the QHAPDC if clinicians have documented a fall in the medical record and the fall has caused an injury requiring an increase in clinical care or monitoring. Therefore the number of falls may underestimate the true number of in-hospital falls given falls not documented in patient charts or falls that did not result in the patient requiring further clinical treatment will not be included. However, the definition of in-hospital falls resulting in injury restricts the place of occurrence to "health service area" being

the lowest denominator which is not specific just to hospitals, so may over-report the true number of in-hospital falls resulting in injury.

As patient data is entered into QHAPDC following hospital discharge, or separation, the data presented will not include patients who fell during 2007-08 if they were discharged in subsequent years. However, it will include patients who fell at any time during their episode of care, including earlier years, but were discharged during 2007-08.

The condition onset flag only became mandatory for national collection in 2008-09, although Queensland public hospitals have been using this onset flag since 1 July 2006. As such, the 2007-08 data may under-report incidents, particularly in facilities where onset flag coding was not strictly enforced, such as private hospitals.

This report presents data as a count of hospital separations involving one or more falls, rather than count of falls. There are restrictions in assigning external cause codes in QHAPDC, therefore the count of falls may under-report the true number of in-hospital falls resulting in injury, particularly when multiple falls have the same external cause code. There is also limited ability to examine outcomes relating to falls resulting in injury, for example mortality, morbidity and increased length of stay.

Patient days are calculated by summing the entire length of stay for patients discharged during 2007-08, and may including stays periods prior to 2007-08. As such, long-stay patients separated during 2007-08 will elevate the total patient day count, while patients staying in hospitals during 2007-08 but discharged in subsequent years will not be included.

Results

During 2007-08, there were 2,205 separations where in-hospital falls resulting in injury occurred in public and private hospitals across Queensland. Around 80% of these falls involved patients aged 65 years and over, and more so for falls resulting in fractures (87%), shown in Figure 1. The majority of falls resulted in non-fracture injuries (around 84%), and were comparable between public and private facilities (see Figure 2).

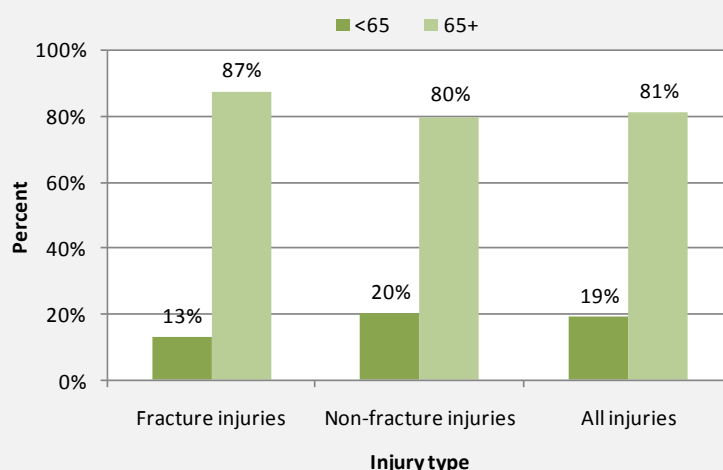


Figure 1: Percentage of in-hospital falls resulting in injury, by age and injury type, in Queensland hospitals, 2007-08

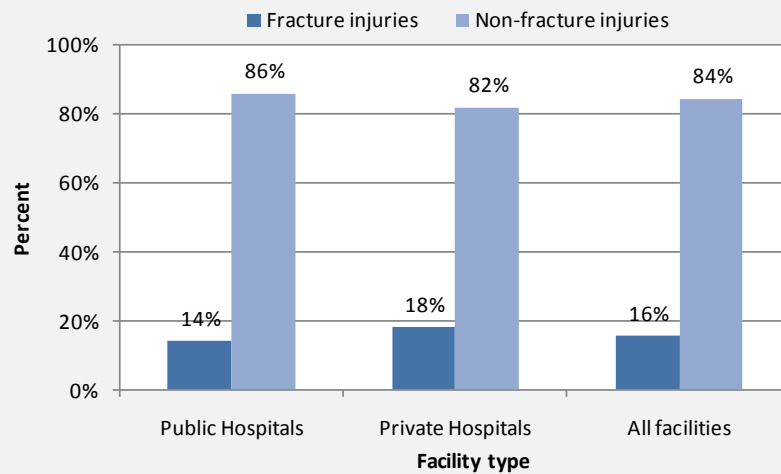


Figure 2: Percentage of in-hospital falls resulting in injury, by injury type and facility, in Queensland hospitals, 2007-08

The statewide rate of falls resulting in harm among all separations was 1.37 per 1,000 separations, or 0.45 per 1,000 patient days (Table 1). The rates were considerably higher when analysis was confined to persons aged 65 years and over – 3.19 per 1,000 separations or 0.79 per 1,000 patient days. When comparing facilities, the rate of falls among older adults was higher among public hospitals (4.47 per 1,000 separations or 0.94 per 1,000 patient days) compared to private hospitals (2.11 per 1,000 separations or 0.62 per 1,000 patient days), as shown in Table 2. The rate of falls according to facility size was inconsistent. Small to medium facilities had the highest rate of falls per separation (6.11 per 1,000), but the lowest rate per patient days (0.85 per 1,000). This may be due to longer stay patients in these facilities elevating the total patient day values. As such, these rates should be interpreted with caution, particularly due to the data issues discussed.

The rate of in-hospital falls for individual Queensland public hospitals, with more than 200 separations and at least one in-hospital fall, is presented in Figures 3 and 4. The falls rate varies considerably, ranging from 0.97 to 23.16 per 1,000 separations, and from 0.13 to 3.57 per 1,000 patient days.

Table 1: Number and rate of falls resulting in injury in Queensland Hospital Admitted Patient Data, all ages, 2007-08

Hospital Type	Injury Type	Age group	No. of separations with in-hospital fall injury	No. of separations, all causes	No. of patient days, all causes	Rate per 1000 separations	Rate per 1000 patient days
QLD Public Hospitals	Fracture injuries	< 65	33	569,147	1,749,997	0.06	0.02
		65 +	179	256,504	1,219,014	0.70	0.15
		Total	212	825,651	2,969,011	0.26	0.07
	Non-fracture injuries	< 65	303	569,147	1,749,997	0.53	0.17
		65 +	967	256,504	1,219,014	3.77	0.79
		Total	1,270	825,651	2,969,011	1.54	0.43
	All injuries	< 65	336	569,147	1,749,997	0.59	0.19
		65 +	1,146	256,504	1,219,014	4.47	0.94
		Total	1,482	825,651	2,969,011	1.79	0.50
	QLD Private Hospitals	Fracture injuries	< 65	11	479,143	917,612	0.02
65 +			120	300,958	1,030,366	0.40	0.12
Total			131	780,101	1,947,978	0.17	0.07
Non-fracture injuries		< 65	78	479,143	917,612	0.16	0.09
		65 +	514	300,958	1,030,366	1.71	0.50
		Total	592	780,101	1,947,978	0.76	0.30
All injuries		< 65	89	479,143	917,612	0.19	0.10
		65 +	634	300,958	1,030,366	2.11	0.62
		Total	723	780,101	1,947,978	0.93	0.37
All QLD hospitals		Fracture injuries	< 65	44	1,048,290	2,667,609	0.04
	65 +		299	557,462	2,249,380	0.54	0.13
	Total		343	1,605,752	4,916,989	0.21	0.07
	Non-fracture injuries	< 65	381	1,048,290	2,667,609	0.36	0.14
		65 +	1,481	557,462	2,249,380	2.66	0.66
		Total	1,862	1,605,752	4,916,989	1.16	0.38
	All injuries	< 65	425	1,048,290	2,667,609	0.41	0.16
		65 +	1,780	557,462	2,249,380	3.19	0.79
		Total	2,205	1,605,752	4,916,989	1.37	0.45

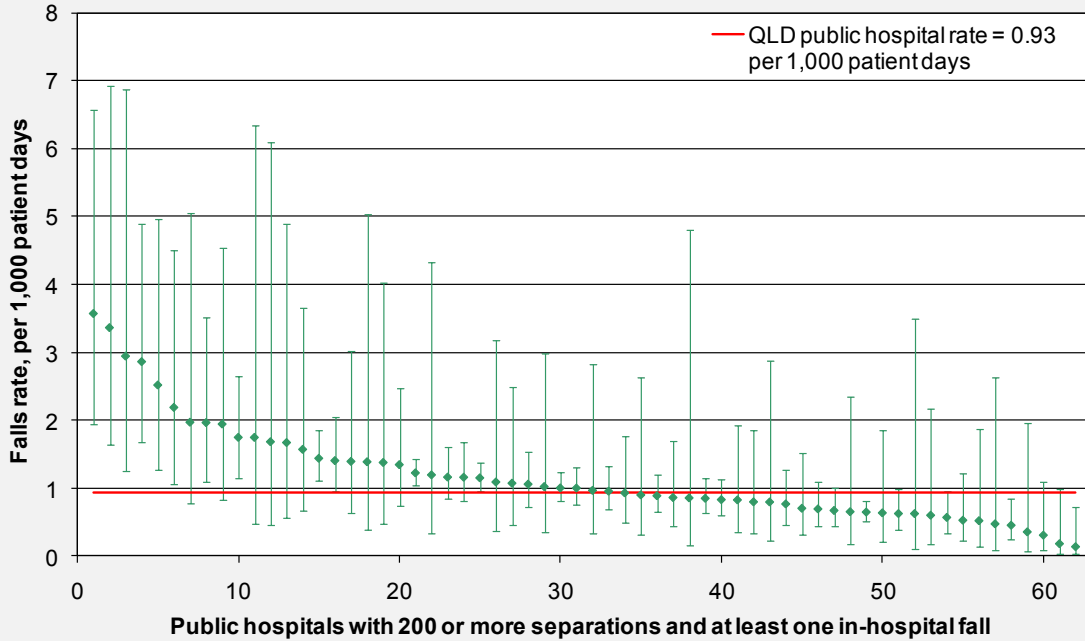


Figure 3: Rate of in-hospital falls resulting in injury, per 1,000 patient days (with 95% confidence intervals), in Queensland public hospitals, persons 65+, 2007-08

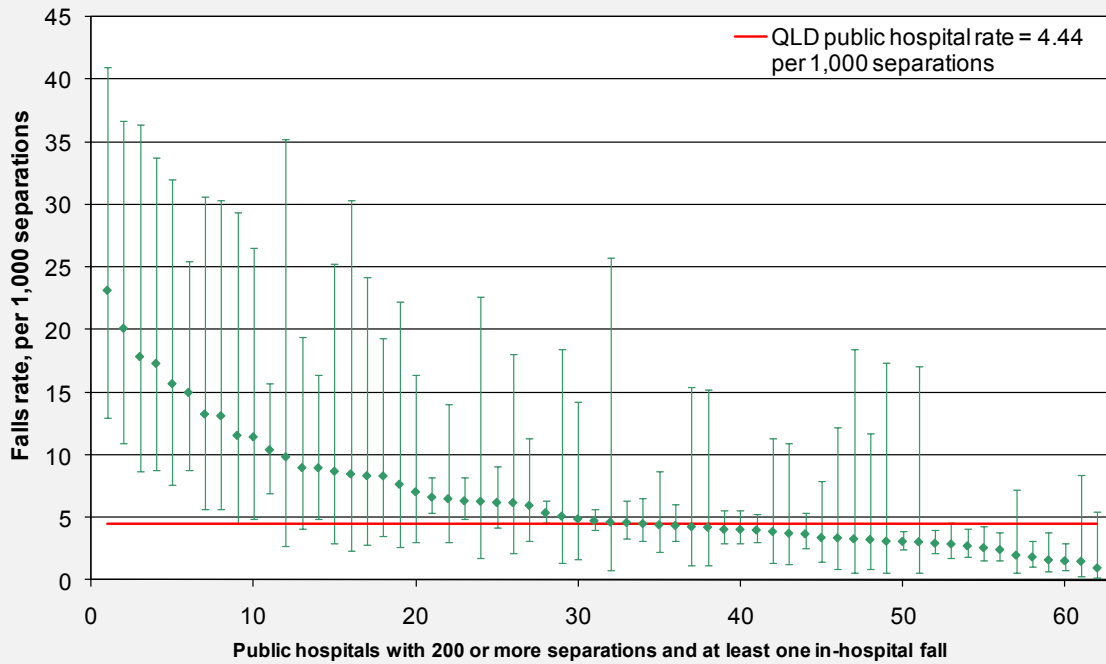


Figure 4: Rate of in-hospital falls resulting in injury, per 1,000 separations (with 95% confidence intervals), in Queensland public hospitals, persons 65+, 2007-08

Injuries from in-hospital falls

The number and rate of in-hospital falls resulting in fracture or intracranial injuries during 2007-08 are presented in Table 3. In all aged, the most frequent injury was fractured femur (n=131), followed by fractured lumbar spine and pelvis (n= 54). The majority of these injuries occurred among those aged 65 years and over (87%). There were 6 intracranial injuries resulting from an in-hospital fall for all ages.

Table 1: Injuries from in-hospital falls, by age, in all Queensland hospitals

Injury type (ICD-10-AM code)	Less than 65 years		65 years and over		All ages	
	Count	Rate, per 1,000 separations*	Count	Rate, per 1,000 separations*	Count	Rate, per 1,000 separations*
Fracture of femur (S72)	9	0.009	122	0.219	131	0.082
Fracture of lumbar spine and pelvis (S32)	5	0.005	49	0.088	54	0.034
Fracture of forearm (S52)	6	0.006	32	0.057	38	0.024
Fracture of shoulder and upper arm (S42)	8	0.008	29	0.052	37	0.023
Fracture of ribs, sternum and thoracic spine (S22)	3	0.003	28	0.050	31	0.019
Fracture of lower leg, including ankle (S82)	3	0.003	18	0.032	21	0.013
Fracture of skull and facial bones (S02)	6	0.006	13	0.023	19	0.012
Fracture at wrist and hand level (S62)	3	0.003	10	0.018	13	0.008
Fracture of foot, except ankle (S92)	2	0.002	9	0.013	11	0.006
Intracranial injury (S06)	2	0.002	4	0.007	6	0.004
Fracture of neck (S12)	0	0.000	3	0.005	3	0.002
Total	47		317		364	

* These rates are injury specific, as patients may experience multiple injuries. Rates are calculated from the statewide age-specific number of separations for all causes.

Estimated cost of in-hospital falls

The key costs associated with in-hospital falls resulting in harm are the additional length of hospital stay, beyond the expected stay for the presenting condition, and costs associated with treating the fall-related injuries. As the date of in-hospital incidents are not collected in QHADPC, and patients are admitted to hospital for a wide range of conditions, it is difficult to calculate the additional length of stay. Hill et al² examined resource utilisation of patients who fell within an acute metropolitan Australian hospital, by comparing length of stay between fallers and non-fallers matched by diagnosis related groups. The average length of stay was higher, between 4.4 and 11.4 days, for patients who fell during their hospital stay, particularly in those with respiratory, stroke and delirium conditions.

The costs of treating admissions due to fall-related injuries in Queensland have been estimated previously.³ Using this information, a conservative estimate of hospital-acquired cost of falls can be calculated:

- In 2007-08, the average cost of fall-related hospitalisations was \$8,139 among adults aged over 65 years, most of which were fracture injuries. This cost estimate includes a range of services encountered during an episode of care (medical, nursing, allied-health, pharmacy, imaging and hotel services) and is likely to be similar for hospital-acquired fractures.
- This cost estimate can be applied to the 343 hospital-acquired fractures in Queensland hospitals during 2007-08, the majority of which were older adults.
- Therefore, a conservative estimate of the costs to treat in-hospital falls resulting in injury in Queensland in 2007-08 was around \$2.8 million. The true costs are likely to be even higher, as this estimate does not include costs associated with treating non-fracture injuries, which represent 80% of all in-hospital falls.

Indicators for in-hospital falls resulting in injury

Variable Life Adjusted Display (VLAD)

The Variable Life Adjusted Display (VLAD) methodology was explored as a technique for monitoring falls. VLADs are a type of statistical process control chart that plot the difference between a predicted and actual outcome for each patient over time. VLADs include control limits to enable flagging when the cumulative outcome varies from state average at pre-defined levels (50, 75 and 100% different to state average). In order to be statistically robust, the state average rate for the outcome being monitored by the VLAD should be at least 4%. This enables the flagging mechanism to detect facilities that are statistically different from the rest of the state (i.e. Level 1 flag at 6%, level 2 flag at 7%, and level 3 flag at 8%).

When the monitored outcome has a low rate, the flagging mechanism becomes less reliable at detecting outcomes that are genuinely different. That is, it becomes difficult to differentiate normal variation from special cause variation. Preliminary analysis of the coded data available indicated that the outcome rate for injuries arising from hospital-acquired falls is very low. Given that the rate of in-hospital falls resulting in injury is around 0.1% of separations for all

ages, and around 0.3% of separations for those aged 65 years and over, a VLAD is not the most appropriate means for monitoring injuries arising from falls in hospitals.

National Indicators

The Australian Institute of Health and Welfare recently developed recommendations for a set of 55 national indicators of safety and quality in health care.⁴ An indicator relating to falls resulting in patient harm in hospitals was recommended. This indicator could be based on data currently collected in the National Hospital Morbidity Database, using the condition onset flag to differentiate falls which occur during an episode of care.

Further work is required to refine these indicators. This includes the need to improve the identification of adverse events specific to hospitals, rather than the broad health service area code (Y92.22). There are also clinical coding limitations relating to reporting of external cause codes. In particular, only one external cause code-set can be assigned to injury complications, so multiple falls from the same external cause are coded as a single fall resulting in injury.

Classification of hospital-acquired diagnoses (CHADx)

Recently, a classification of hospital-acquired diagnoses (CHADx) was developed from the Victorian Admitted Episodes Dataset 2005-06.⁵ From over 2 million inpatient episodes examined, CHADx codes were allocated to three in-hospital fall incidents: falls with fractured neck of femur (code 3.1, n=201), falls with intracranial injury (code 3.2, n=67) and all other falls (code 3.3, n=3,149).

The development of the CHADx codes holds promise as a reporting tool across Queensland Health, at facility, district or statewide levels. Further work is required to refine these indicators, particularly the selection of:

- Indicators by injury type, e.g. any fractures, specific fractures (such as femur), intracranial injury;
- Denominators to be used, e.g. by separations or patient days; and
- Appropriate age-specific indicator, e.g. persons aged 65 years and over.

Suggested citation:

Black A, Dinh M & Sketcher-Baker K (2011). Falls resulting in injury in Queensland Hospital Admitted Patient Data, 2007-08. Queensland Health, Brisbane.

References

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2. Hill KD, Vu M, Walsh W. Falls in the acute hospital setting--impact on resource utilisation. *Aust Health Rev* 2007;31(3):471-7.
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5. Jackson TJ, Michel JL, Roberts RF, Jorm CM, Wakefield JG. A classification of hospital-acquired diagnoses for use with routine hospital data. *Med J Aust* 2009;191(10):544-8.

For additional information and resources on falls prevention, please visit Queensland Health's "Stay On Your Feet®" website at: www.health.qld.gov.au/stayonyourfeet

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