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State of origin: Australian states use widely different resources for hospital management of hip fracture, but achieve similar outcomes*

Anthony W. Ireland[1,2,3] MBBS, DipPH, FRACP, Medical Adviser

Patrick J. Kelly[2] PhD, Associate Professor

Robert G. Cumming[2] PhD, Professor

[1]Department of Veterans' Affairs, 300 Elizabeth Street, Sydney, NSW 2000, Australia.
[2]Sydney School of Public Health, Edward Ford Building (27), The University of Sydney, NSW 2006, Australia.
Email: p.kelly@sydney.edu; Robert.g.cumming@sydney.edu
[3]Corresponding author. Email: Tony.Ireland@dva.gov.au

Abstract

Objective. Hospital management of hip fracture varies widely with regard to length of stay, delivery of post-surgical care and costs. The present study compares the association between hospital utilisation and costs and patient outcomes in the six Australian states.

Methods. The present study was a retrospective cohort study of linked administrative databases for 2530 Australian veterans and war widows aged ≥65 years, hospitalised for hip fracture in 2008–09. Department of Veterans' Affairs datasets for hospital episodes, residential aged care admissions and date of death were linked. Patient characteristics, hospital utilisation and process data, rates of mortality and residential care placement and delivery of community services were compared for patients from each of the states.

Results. There were no significant differences in fracture incidence, patient demographics or fracture type among the states. Adjusted total mean length of hospital stay ranged from 24.7 days (95% confidence interval (CI) 22.3–27.5 days) to 35.0 days (95% CI 32.6–37.6 days; $P < 0.001$) and adjusted total hospital cost ranged between A$24 792 (95% CI A$22 191–A$27 700) and A$35 494 (95% CI A$32 853–A$38 343; $P < 0.001$). Rates of referral to rehabilitation ranged from 31.7% to 50.4% ($P = 0.003$). At 1 year, there were no significant differences between states for key outcome determinants of mortality ($P = 0.71$) or for the proportion of patients who retained their independent living status ($P = 0.66$).

Conclusion. Hospital resources for management of hip fracture differ substantially among the Australian states. Key medium-term patient outcomes do not show significant differences. A potential for substantial cost-efficiencies without increased risk to patient welfare is suggested.

What is known about this topic? Hospital resources deployed in the initial management of hip fracture differ widely between countries, regions and individual hospitals. Patient outcomes also vary widely, but are inconsistently associated with resource outlays.
What does this paper add? The paper describes the different resource outlays for management of hip fracture in six Australian jurisdictions and the absence of equivalent differences in medium-term patient outcomes.
What are the implications for practitioners? Efficiencies in hospital management of hip fracture may be achievable without negative consequences for patients. The elements of models of care should be examined for their contribution to early and later patient outcomes.

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Introduction

The management of hip fracture is complex and costly, and patient outcomes for both survival and function are less than ideal.[1–3] Comparisons of duration and content of hospital management at national, regional and facility levels show wide diversity.[1,4,5] Across the world, duration of hospital stay for hip fracture ranges from as little as 5 days[6] to more than 6 weeks.[1] These variations are mostly the result of different approaches to the provision of post-acute hospital services.[4,7,8]

Between 2.7% and 16% of subjects are treated without surgical repair.[9,10] Post-fracture rehabilitation can differ in both overall rate (21%–67%) and manner of delivery across

*The opinions stated in this paper are entirely those of the authors and do not necessarily reflect the views of the Department of Veterans' Affairs.

regions.[4,8,11] Because of the wide differences in duration and content of the primary hospital admission, mortality rates at 30 days are mostly accepted to better represent the safety and effectiveness of hospital management. Reported values range from 2.7% to 14%.[12,13]

In the past 20 years, several management protocols have been created that involve various combinations of orthopaedic, geriatric and rehabilitation services. These 'orthogeriatric' models mostly result in speedier passage through the acute wards, reduction of short-term complications and sometimes in lower rates of in-hospital or 30-day mortality.[14–16] However, evidence for an association between orthogeriatric acute care and longer-term benefits is inconsistent.[12,17,18]

The acute phase of care is coming under particularly close scrutiny in national audit programs that document compliance with recommended process elements and report comparative rates of short-term outcomes. Performances are compared between health services or, more commonly, between individual hospitals.[5,11] Repeated feedback of audit results is associated with increased compliance with recommended 'best practice' and results in reduced time in hospital, lower costs and improved short-term outcomes.[5,11]

The Australia and New Zealand Hip Fracture Registry[19] has commenced reporting availability of key service components for a majority of registered hospitals, but to date has not yet reported patient-level performance data. The Registry and other agencies within Australasia have also produced recommended care pathways or guidelines for hip fracture management.[19,20]

The present study describes the variations in hospital utilisation for management of hip fractures among six jurisdictions within Australia and their corresponding medium-term outcomes. This is the first Australian study to link hospital utilisation, key process elements and patient outcomes in a national dataset.

Methods

The present study was a retrospective cohort study. The study comprises all Department of Veterans' Affairs (DVA) treatment beneficiaries aged 65 years or older who were hospitalised for hip fracture (International Code of Diseases, 10th Revisions, Australian Modification (ICD10-AM) codes S720–S722 inclusive) between 1 July 2008 and 30 June 2009. A universal identification number for each patient allowed linking of all hospital episodes continuous with the index admission, together with records of admissions into residential aged care (RAC) facilities and the DVA mortality index. Data items included patient age, sex, fracture type, prefracture residential status (as RAC or 'community') up to 16 diagnosis codes, operation type, episode separation codes, date of death, hospital type, itemised costs and the state in which the treating hospital was located. Additional details of the record linkage processes have been described previously.[21] Dates of service for community nursing and Veterans' Home Care (VHC) services, up to 1 year following fracture, were also collected. The VHC provides a wide range of personal and domestic supports for entitled veterans, war widows and their carers, including institutional or in-home respite.

The outcomes of interest were hip fracture incidence, total length of stay (LOS) and total cost for the index hospitalisation, new RAC admission and deaths within 1 year, total time spent in RAC for hospital survivors and time from index admission to death. These outcomes were analysed for each of the six Australian states. Data for hospitals in the Australian Capital Territory were reported with data from New South Wales, and data from the Northern Territory were included within data for South Australia.

For calculation of hip fracture incidence, age and sex distributions in each state were standardised to the distributions within the complete study population. The hospital period defined as 'acute phase' included all episodes coded as hip fractures that were continuous with the index admission. Rehabilitation LOS was the total duration of one or more episodes with a principal diagnosis of rehabilitation (ICD10-AM codes Z508–Z509) included within total hospitalisation period. Total hospital stay was the concatenated value of all episodes, however coded, that were continuous with the index admission. These included episodes for management of complications and comorbidities and for subacute and non-acute care. Hospital cost was the total of charges for accommodation, theatre and prosthesis costs plus fees for medical, allied health, pathology and diagnostic imaging services approved and paid by the DVA in respect of the total hospitalisation period.

Comorbidity was assessed by Quan-modified Charlson comorbidity index scores[22] for patients from the community only, this being the relevant group for all outcome measures applied in the study.

Several different subpopulations are described and analysed. Post-hospital community services can only be provided to patients who have been discharged alive and are not in RAC. The denominator for the proportion of people in RAC is the surviving population at the specified time point. Community nursing and VHC services can only be provided to people not in RAC. Patients surviving in the community without resource to community nursing or VHC services were also identified.

One-way analysis of variance was used to assess the significance of differences between mean values for continuous variables, whereas the significance of differences between proportions of categorical variables was analysed by Pearson's Chi-squared test. To assess the significance of differences in outcomes between states, age, sex and comorbidity scores were included in multivariate models regardless of significance, together with the other variables listed above that achieved $P < 0.25$ in univariate regression. Continuous outcomes were analysed using negative binomial regression and binary outcomes were analysed using logistic regression.

All analyses were performed using SAS 9.3 (SAS Institute, Cary, NC, USA) or Excel 2010 (Microsoft Corporation, Redmond, WA, USA).

Ethics approval was provided by the DVA Human Research Ethics Committee in December 2010 and renewed in December 2013 (Reference E010/030).

Results

There were 2530 patients aged $\geq$65 years admitted to hospitals in the study year. This was a relatively elderly population, with 71% being $\geq$85 years of age. The overall incidence of 12.0 per 1000 people aged $\geq$65 years was reduced to 5.6 per 1000 when the age–sex distribution was adjusted to that of other Australian hip fracture patients. The age- and sex-adjusted incidence of hip fracture was 9.9 per 1000 in Tasmania and 13.1 in Queensland, but this difference did not achieve significance in this sample (Table 1).

Table 1 shows that there were no significant differences between the states in terms of the age or sex distribution or the proportion of patients who had been in RAC before fracture.

Hospital process and utilisation

The proportion of patients treated surgically was similar between the states, but there were significant differences in the proportion of patients who received in-hospital rehabilitation ($P = 0.003$), with rates being highest in Victoria and New South Wales and lowest in Tasmania and Queensland. In the period immediately following the index hospitalisation, only 231 episodes of same day or day hospital rehabilitation, involving 27 patients, were further identified. All but six of these patients were from New South Wales. Rates of transfer into intensive care were also different between states, but numbers were relatively small: 172 in the entire sample (6.8%).

There were significant differences in the length of acute phase care (Fig. 1*a*) Mean values for the individual states ranged from 9.4 days in Tasmania to 14.6 days in Queensland. Values were similarly diverse for the length of total hospital stay with South Australia having the shortest (24.7 days) and Western Australia the longest (36.2 days) in adjusted models. The same two states had the shortest and longest values, respectively, for the duration of rehabilitation episodes, with the highest value being 52% above the lowest (Fig. 1*a–c*).

Mean total cost of the index hospitalisation was A$31 208 inclusive of accommodation, operating theatre and prosthesis costs and fees for medical, allied health, pathology and diagnostic services provided during the hospital period. There were significant differences among states in overall cost per occupied bed-day (range A$910–A$1147 per day; $P < 0.001$; Table 1) The highest state value for total hospital cost exceeded the lowest value by 51% (Fig. 1*d*). In each of the four utilisation analyses shown in Fig. 1, differences in mean values between states were significant and substantial.

Total cost of the index hospital admission was A$79 million. Application of the second lowest (state-specific) total LOS and the second lowest cost per bed-day (Table 1) across the complete national sample would result in a 22% reduction in the total hospital cost.

Private hospitals in total had lower bed-day charges for both surgical and rehabilitation episodes and were less costly overall, despite having equal or longer LOS. The national mean LOS for surgery was lower in public hospitals, but there was no difference with regard to rehabilitation (Table 2). The proportion of patients having surgical procedures and rehabilitation episodes in private hospitals showed state-specific profiles. Overall, 59% of operations to repair hip fractures were performed in public hospitals. In New South Wales, 82% of surgery was in the public sector, but more than two-thirds of operations were in private hospitals in Queensland and South Australia (Table 2; Fig. 2*a*). Private hospitals provided 56% of 1272 hospital episodes for rehabilitation (1159 patients). This value ranged from 81% in South Australia to 32% in Victoria (Table 2; Fig. 2*b*).

Table 1. Patient characteristics, service profiles and hip fracture incidence by state for 2530 patients aged ≥65 years, admitted to hospital 2008–09
NSW, New South Wales; Qld, Queensland; SA, South Australia; Tas., Tasmania; Vic., Victoria; WA, Western Australia; RAC, residential aged care; LOS, length of stay

	NSW ($n = 904$)	Qld ($n = 526$)	SA ($n = 194$)	Tas. ($n = 63$)	Vic. ($n = 643$)	WA ($n = 200$)	P-value
Incidence[A]	11.7	13.1	11.1	9.9	12.4	12.5	0.09
Patient characteristics							
% Male	36.1	40.1	36.6	39.7	35.9	38.7	0.66
% Aged ≥85 years	70.4	69.2	64.9	74.6	72.8	73.9	0.26
% RAC[B]	29.1	26.8	30.4	34.9	25.8	28.6	0.46
Quan score ≥3[C]	13.7	12.2	12.6	9.9	16.8	15.4	0.20
Hospital services provided							
Surgery (%)	83.6	83.3	88.7	92.1	84.4	82.9	0.24
Intensive care (%)	5.5	6.1	14.4	0.0	9.3	1.0	<0.001
Rehabilitation (%)	47.7	40.9	41.8	31.7	50.4	44.0	0.003
Total LOS (days)	30.6	35.0	24.7	25.7	31.5	31.6	<0.001
Total cost (A$)	32 880	31 838	24 052	28 747	29 625	36 247	<0.001
Cost per bed-day (A$)	1075	910	974	1119	941	1147	<0.001
Post-hospital services							
Community nursing[D] (%)	29.0	29.6	33.5	26.8	22.8	21.1	0.001
Veterans' home care[D] (%)	29.2	25.5	41.9	26.8	29.8	23.4	0.001
RAC days[E]	21.3	22.1	17.5	18.8	23.5	18.5	<0.001

[A]Incidence per 1000 of the Department of Veterans' Affairs treatment population.
[B]Patients admitted from RAC.
[C]Comorbidity scores for community patients only.
[D]Percentage of hospital survivors receiving service within 12 months of fracture.
[E]Days in RAC as percentage of total survival days within 12 months of fracture.

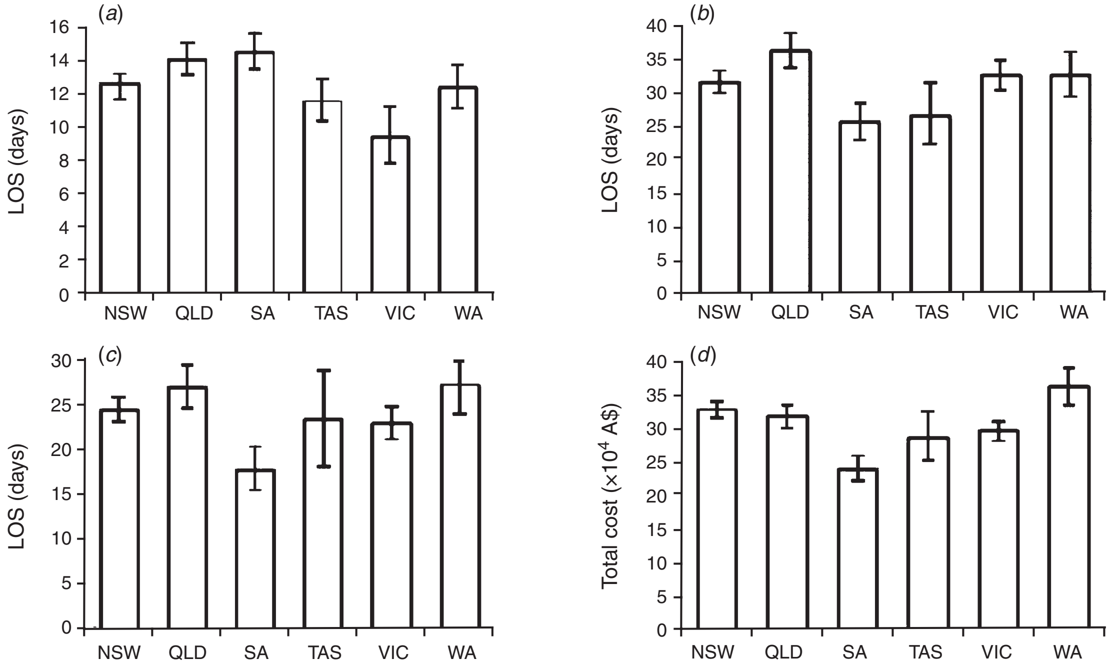

Fig. 1. Hospital utilisation by state: 2530 patients aged ≥65 years, 2008–09. (*a*) Adjusted acute phase length of stay (LOS; Australian mean 13.4 days), (*b*) adjusted total hospital LOS (Australian mean 30.8 days), (*c*) adjusted rehabilitation LOS (Australian mean 24.7 days) and (*d*) adjusted total hospital cost (Australian mean A$31 208). Values are adjusted for age, sex, comorbidity weight and prefracture residential status. Data show mean values with 95% confidence intervals. NSW, New South Wales; QLD, Queensland; SA, South Australia; TAS, Tasmania; VIC, Victoria; WA, Western Australia.

Table 2. Length of stay, bed-day costs and total episode costs by state and hospital type, Australian veterans and war widows 2008–09

NSW, New South Wales; Qld, Queensland; SA, South Australia; Tas., Tasmania; Vic., Victoria; WA, Western Australia; RAC, residential aged care; LOS, length of stay

	Private hospitals				Public hospitals			
	No. patients	LOS for episode (days)	Cost per occupied bed-day (A$ per day)	Cost of hospital episode (A$)	No. patients	LOS for episode (days)	Cost per occupied bed-day (A$ per day)	Cost of hospital episode (A$)
Episodes including surgery: 2303 episodes for 2194 patients								
NSW	146	13.6	1563	21 313	676	11.8	1934	22 731
Vic.	268	14.3	1477	21 118	317	11.2	1599	17 888
Qld	346	13.8	1343	18 591	128	14.5	1537	22 237
SA	129	11.4	1478	16 878	56	14.3	1437	20 526
Tas.	14	8.9	1733	15 351	45	9.6	1976	18 877
WA	51	20.3	1136	23 059	127	9.1	2657	24 097
Australia	954	13.9	1417	19 677	1349	11.7	1840	21 455
Episodes including rehabilitation: 1272 episodes for 1159 patients								
NSW	269	25.9	578	14 971	200	20.8	690	14 378
Vic.	134	17.5	584	10 207	214	25.0	663	16 599
Qld	195	23.0	584	13 444	48	22.3	649	14 436
SA	59	15.7	555	8773	28	19.4	546	10 589
Tas.	16	18.6	661	12 319	6	26.2	482	12 612
WA	33	26.9	608	16 358	70	20.7	706	14 597
Australia	706	22.5	582	13 128	566	22.5	668	15 044

Significant and substantial differences for total hospital costs persisted after data for each state were standardised for public–private distribution and for bed-day costs with regard to surgery and rehabilitation.

Post-hospital services

Of 1214 community patients discharged to independent living, nursing services were provided to 613 people and VHC services were provided to 666 people at some time within the year after

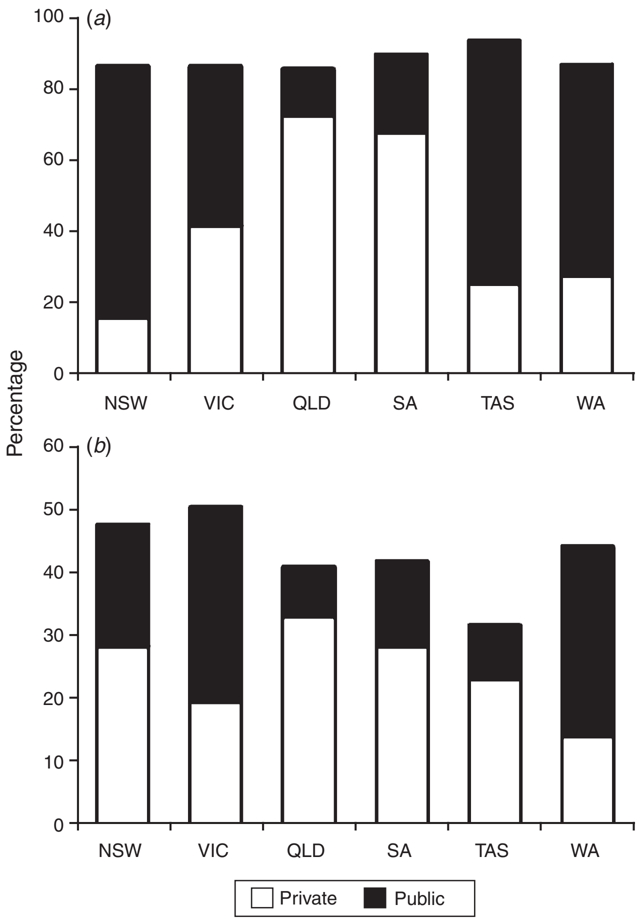

Fig. 2. Differences in public–private distribution of (*a*) surgical and (*b*) rehabilitation services among states. NSW, New South Wales; QLD, Queensland; SA, South Australia; TAS, Tasmania; VIC, Victoria; WA, Western Australia.

fracture, and 360 people (30%) received both services at some time. There were significant differences between the states in unadjusted rates of service provision (Table 1). By 1 year after fracture, 444 of 1076 (41.3%) potentially independent people were currently receiving one or both services, but the adjusted state distribution was no longer disproportionate ($P = 0.20$). The 1-year combined cost of these services was A$3.7 million or A$1631 per hospital survivor (data not shown).

Hospital re-admission within 1 year occurred for 57% of hospital survivors. This rate varied between 48% (Tasmania) and 63% (South Australia), but the results for the other states clustered tightly about the mean and the overall distribution did not show significant difference ($P = 0.14$).

Outcomes at 1 year

In contrast with the diversities in patterns of service delivery, there were no significant differences in unadjusted or adjusted data describing mortality rates and occupation of aged care facilities at 1 year after fracture (Table 3). At 1 year, the spread of unadjusted mortality rates was 31%–41%, but all confidence intervals were overlapping ($P = 0.73$) and the multivariate regression model showed a similar lack of significant difference ($P = 0.71$). The pattern was repeated for RAC occupancy among 1-year survivors and for the composite outcomes of ‘potential independence’ with and without additional supportive services. One year after the index admission date, 632 community patients (35%) were living in non-RAC accommodation without support of nursing or VHC services. In the adjusted model there were again no significant differences in the proportion of these ‘good outcomes’ among the states ($P = 0.20$). Crude and adjusted values for all outcome measures suggested that the state with the lowest costs (South Australia) achieved equivalent or superior outcomes compared with other states (Table 3, Fig. 1*b*, *c*).

Discussion

There were substantial and significant differences in hospital utilisation profiles among the six states with regard to acute LOS (9–15 days), total LOS (24–35 days), rates of referral to rehabilitation (32%–51%) and the aggregate time in rehabilitation (18–27 days). An extensive list of factors associated with acute and total LOS has been published previously.[23] These differences contributed to the wide range of hospital costs among states. Differential rates of private hospital admissions for surgery and rehabilitation episodes and cost differences between public and private providers (Fig. 2*b*) may also have been a factor.

Costs, especially in the private sector, may have reflected differing contract arrangements between the DVA and provider organisations, but details were not available. Significant and substantial differences for total hospital costs persisted after data for each state were standardised for public–private distribution and for bed-day costs with regard to episodes involving surgery and rehabilitation (Table 2; Fig. 2).

Equally wide utilisation differences have been reported in other contemporary studies, in which total hospital stay ranged from 17 to 48 days,[1,24] rates of referral to rehabilitation ranged from 21% to 67%[8,11] and mean duration of hospital-based rehabilitation was between 1 and 6 weeks.[24,25]

A recent Australian study found significant differences between four states in terms of LOS for rehabilitation of specific classes of lower limb amputees.[26]

The outcome parameters accessible to the present study were mortality, RAC residency and the absence of both, taken as a surrogate for independent living. These elements are widely acknowledged as key indicators of ‘poor’ or ‘good’ longer-term outcomes in the elderly.[27] An additional level of better functionality was possibly indicated by the absence of community nursing or VHC services, especially in the longer term, as identified in Table 3.

Examples of the disconnect between resource deployment and patient outcomes following hip fracture are evident at national, regional and individual hospital level. A review of Medicare data in the US for the period 2000–08 showed a downward trend for acute phase LOS and a small downward trend for mortality.[6]

In the 2008 report of the Scottish Hip Fracture Audit,[11] which compared data from 22 hospitals, the four hospitals with the shortest aggregate hospital stay (mean 31.5 days) and the four with the longest stay (42.4 days) had 120-day mortality rates of 19.5% and 18.9%, respectively ($P = 0.74$). The proportion of patients from these groups of hospitals in care home

Table 3. Outcomes of mortality, RAC and independent living status at 1 year by state

Models were adjusted for sex, age group, comorbidity score, prefracture residence in a residential aged care (RAC) facility, rehabilitation, intensive care, community nursing and veterans' home care services. OR, odds ratio; CI, confidence interval; NSW, New South Wales; ACT, Australian Capital Territory; Qld, Queensland; SA, South Australia; NT, Northern Territory; Tas., Tasmania; Vic., Victoria; WA, Western Australia; RAC, residential aged care

Mortality		Unadjusted ($P=0.73$)		Adjusted ($P=0.71$)
	No. patients	No. deaths	% Deaths (95% CI)	OR (95% CI)
NSW	904	305	33.7 (30.6–36.8)	Reference
Qld	526	176	33.5 (29.5–37.5)	0.99 (0.76–1.29)
SA	194	61	31.4 (24.9–37.9)	0.79 (0.53–1.18)
Tas.	63	26	41.3 (29.1–53.5)	1.25 (0.68–2.29)
Vic.	643	222	34.5 (30.8–38.2)	1.02 (0.80–1.31)
WA	200	73	36.5 (29.8–43.2)	1.17 (0.81–1.69)
Australia	2530	863	34.1 (32.3–35.9)	–
RAC residents (from patients alive at 1 year)[A]			Unadjusted ($P=0.90$)	Adjusted ($P=0.56$)
	No. patients	No. RAC residents	% RAC residents (95% CI)	OR (95% CI)
NSW	599	210	35.1 (31.3–38.9)	Reference
Qld	350	123	35.1 (30.1–40.2)	1.13 (0.86–1.48)
SA	133	42	31.6 (24.3–39.2)	1.12 (0.75–1.68)
Tas.	37	14	37.8 (22.2–53.4)	1.02 (0.53–1.96)
Vic.	421	156	37.1 (32.5–41.7)	1.11 (0.86–1.43)
WA	127	43	33.9 (25.7–42.1)	0.77 (0.51–1.18)
Australia	1667	588	35.3 (33.0–37.6)	–
Not in RAC and without community support service at 1 year (from community residents at time of hip fracture)[B]			Unadjusted ($P=0.59$)	Adjusted ($P=0.20$)
	No. patients	No. not in RAC, with no community services	% Not in RAC, with no community services (95% CI)	OR (95% CI)
NSW	641	212	33.1 (29.5–36.7)	Reference
Qld	385	141	36.6 (31.8–41.4)	1.18 (0.83–1.66)
SA	135	46	34.1 (26.1–42.1)	0.79 (0.49–1.26)
Tas.	41	16	39.0 (24.1–53.9)	2.40 (0.85–7.64)
Vic.	477	160	33.5 (29.3–37.7)	1.22 (0.88–1.68)
WA	143	57	39.9 (31.9–47.9)	1.39 (0.84–2.29)
Australia	1822	632	34.7 (32.5–36.9)	–

[A]No. patients alive at 1 year.
[B]No. patients who were not in RAC at time of hip fracture.

accommodation at 120 days was similarly equivalent (17.8% vs 17.2%; $P=0.71$). In the National Hip Fracture Database of 2012,[5] total hospital stay for seven hospitals (with $\geq$100 separations) with the lowest rates of 'private home to private home' outcome at 30 days and for nine facilities with the highest such rates was 20.0 and 19.1 days, respectively [5-derived data]. In the last 3 years of the National Hip Fracture Database report, the national mean LOS has reduced, whereas hospital mortality has remained steady.[5]

All three of these large nationally based reports suggest that reduction in hospital is not accompanied by deterioration in immediate or medium-term outcomes. Conversely, two smaller studies in the United States described lower in-hospital or 6-month mortality rates for patients of high-cost teaching hospitals but associated with very high-cost increments relative to modest mortality gains.[28,29]

At a regional level, an approximate eightfold difference in rates of hospital-based rehabilitation across the 11 health districts in Tuscany has been reported with commensurate cost differentials due to different referral rates and proportions of episodes delivered as admitted care.[4] Six-month mortality rates were not significantly different. For two hospital districts in Finland, with 527 and 731 hip fractures, one group with a significantly shorter total hospital stay reported significantly more patients returned to their homes at 120 days and lower mortality at 1 year.[30]

At the hospital level, an orthogeriatric service in New Zealand reduced hospital stay and increased the rate and promptness of transfers to rehabilitation, without altering 6-month mortality.[17] The 12-month mortality for community-dwelling patients was not associated with length of hospital stay in an orthogeriatric unit in Oslo.[31] An Australian study over a 10-year period showed reductions in 30-day mortality from 12.1% to 8.2%, whereas LOS increased marginally.[32] In the latter two studies, an apparent association between longer stay and improved survival for the whole study population was attributed to the early discharge of frail patients. None of these hospital-based studies identified costs.

Strengths and weaknesses of the present study

The strengths and weaknesses of the present study are essentially the inherent issues associated with the use of administrative datasets. Large populations and an extensive range of data items are available. The sample reported in herein represented approximately one-seventh of the Australian caseload for hip fracture in 2008–09.[19] The level of coding accuracy in Australian hospital data has been assessed as adequate for population-based studies of clinical subjects,[33] and accuracy is further enhanced by data linkage.[34] The database linkage capacity permitted a comprehensive description of hospital resources and of post-hospital events in specific groups of patients, with an extensive list of variables for multivariate analyses.

Database analyses such as these do not provide details of clinical or administrative processes sufficient to compare different models of care. Although patient-related variables that contribute to differences in LOS, cost and/or outcomes are detectable,[23] the clinical elements, such as mobilisation processes or intensity of allied health interventions, are not identified. Studies that access clinical records for substantial patient samples are required to make these comparisons. Hopefully the findings of this paper will help promote such investigations.

Data on transition care (TC) or other forms of post-acute care, although potentially relevant to many patients in the present study by providing short-term support to elderly patients discharging from hospitals, was not available. This service, jointly provided through the Commonwealth and state health agencies in Australia, is not funded nor recorded by the DVA. Nor are DVA clients identified in national reports of TC utilisation published by the Australian Institute of Health and Welfare for 2008–09.[35]

The demographics of the DVA population, being older and with more males than the usual Australian hip fracture population, are noted. The relevance of this for the present study is that there were no demographic differences between the state-specific samples. Patient age and sex were not significant determinants of cost in the present study, but were, as always, major determinants of outcomes. As reported previously,[21] hospital stays for acute phase or rehabilitation episodes show little difference between DVA and non-DVA populations in comparable data. Appropriate adjustments for demographic differences have been made when comparing these data with outcomes of other Australian and international studies.[23]

Conclusions

In the hospital management of hip fracture, there are significant and substantial differences among the Australian states with regard to acute and total LOS, rates of rehabilitation referral, public–private service distribution and costs. In adjusted models for total hospital stay and cost, the highest values exceed the lowest values by more than 40%. With one exception, patient outcomes, as assessed by rates for mortality, RAC placement and use of community support services at 12 months after fracture, were not associated with hospital LOS or costs for primary fracture management at a jurisdictional level.

These findings indicate a potential for substantial cost efficiencies in hospital management of hip fracture without compromise to patient outcomes. These findings have potential significance for the ongoing sustainability of high-quality hospital services. Studies that access clinical records to identify the most cost-effective models of care for hip fracture are indicated.

Conflicts of interest

AWI is a contracted adviser to the Department of Veterans' Affairs, but received no funding for this study. The authors received no other funding and declare no other competing interests.

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