Geriatric Orthopaedic Surgery
& Rehabilitation
2015, Vol. 6(3) 123-129

DOI: 10.1177/2151458515570477
gos.sagepub.com
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Admission From Nursing Home Residence Increases Acute Mortality After Hip Fractures

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Abstract

Background: Little is known about the effect of preinjury residence on inpatient mortality following hip fracture. This study addressed whether (1) admission from a nursing home residence and (2) admission from another hospital were associated with higher inpatient mortality after a hip fracture. **Methods:** Using the National Hospital Discharge Survey database, we analyzed an estimated 2 124 388 hip fractures discharges, from 2001 to 2007. Multivariable logistic regression analysis was performed to identify whether admission from a nursing home and admission from another hospital were independent risk factors for inpatient mortality. Our primary null hypothesis is that there is no difference in inpatient mortality rates after hip fracture in patients admitted from a nursing home, compared to other forms of admission. The secondary null hypothesis is that there is no difference in inpatient mortality after hip fracture in patients whose source of admission was another hospital, compared to other sources of admission. **Results:** Almost 4% of the patients were admitted from a nursing home and 6% from another hospital. The mean age was 79 years and 71% were women. The majority of patients were treated with internal fixation. Admission from a nursing home residence (odds ratio [OR] of 2.1, confidence interval [CI] 1.9-2.3) and prior hospital stay (OR 3.4, CI 3.2-3.7) were associated with a higher risk of inpatient mortality after accounting for other comorbidities and type of treatment. **Conclusions:** Patients transferred to an acute care hospital from a long-term care facility or another acute care hospital are at particularly high risk of inpatient death. This subset of patients should be considered separately from patients admitted from other sources. **Level of Evidence:** Prognostic level II.

Keywords

patient language, disability, pain, patient self-efficacy

Introduction

Hip fractures are prevalent in the geriatric population and are associated with increased utilization of health care resources and high rates of mortality and disability.[1-3] Hip fracture risk increases exponentially with age[4] and the number of fractures and their associated expenditure is projected to increase 3- to 8-fold in the next 20 years.[5,6]

Most nursing home residents are older adults with multiple medical conditions that have trouble living independently.[7] Previous research showed that the risk of hip fracture in nursing home residents[3,8-10] is at least 2 to 3 times higher than in community dwellers of the same age and sex.[2] This higher incidence may partly be explained by a higher number of falls in institutionalized elderly patients.[11] An Australian study[12] of 666 patients compared mortality rates in patients with hip fractures who were nursing home residents at the time of the injury to community dwellers and concluded that nursing home residence conferred greater odds of mortality in the postinjury period.[12] On the other hand, a study conducted by Poor and colleagues[13] concluded that residential status prior to sustaining a hip fracture was not a predictor for increased in-hospital mortality. However, this study was conducted in 1989 (study time period 1978-1989) with a cohort of only 131 patients.[13]

This study addressed whether (1) preinjury source of admission from a nursing home residence and (2) admission from another hospital were associated with higher inpatient mortality after a hip fracture.

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Methods

Data for this study were obtained from the National Hospital Discharge Survey (NHDS) database.[14] The NHDS is a national probability survey conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention and collects annually medical and demographic information since 1965.[14] The data are collected from inpatients discharge records from more than 500 general and children's hospitals in the United States, excluding exclusive federal, military, and Veterans Administrations hospitals. All of the hospitals were nonfederal and short stay (less than 30 days on average) or with a general specialty, and the hospitals had 6 or more beds staffed for patient use.

Medical information was based on the *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) of the NHDS database.[15,16] The deidentified NHDS data are free and available online. Therefore, no institutional review board approval was necessary for this study.

We included all adult patients (older than 18 years) with a hip fracture (femoral neck and pertrochanteric) between 2001 and 2007 in the data set (Table 1). The NHDS collected type of admission and source of admission since 2001, which was the reason for selecting this time frame.

We divided the patients into 3 groups, based on their source of admission: admission from a nursing home, admission from a hospital, and a rest group including all other sources of admission (physician referral, clinical referral, Health Maintenance Organization referral, emergency department [ED], and court/law enforcement).

All comorbidities, treatments, and adverse events, based on the *ICD-9* codes, were listed (Tables 2-4). The *ICD* codes for wound-related complications as well as for the complications acute renal failure, ventricular arrhythmias and arrest, iatrogenic hypotension, pulmonary embolism, acute myocardial infarct, fat embolism, new mental disorder, pneumonia and pulmonary congestion, deep venous thrombosis, intubation and mechanical ventilation, transfusion, and conversion disorder were used to identify the complications (Table 4).

We reported means and standard deviations of continuous baseline variables. Frequencies and percentages were used for baseline categorical variables and presence of comorbidities or complications in baseline, comorbidities for the entire cohort.

Based on the sample size, we assumed normality of the data. We compared patients admitted from a nursing home with patients admitted from another hospital (comparison 1) and patients admitted from a nursing home with patients admitted from other sources (comparison 2). We used independent samples *t* test for both comparisons for continuous outcomes and chi-square test (or Fisher exact test when applicable) for categorical parameters.

In order to find whether admission from a nursing home was an independent risk factor for death when corrected for confounders, we entered all variables that were significantly ($P < .001$) different in bivariate analysis and were present in at least 2% of the population[17] in a backward likelihood ratio multivariable logistic regression.

Results

The cohort consisted of an estimated number of 2 124 388 patients. Seventy-one percent were female, and the mean age was 79 years (range 18-99). Nearly 4% of the patients were admitted from a nursing home and 6% from a hospital (Table 1).

Patients admitted from a nursing home were older and had fewer days of inpatient care compared to patients admitted from a hospital, but more days of care compared to patients admitted from another source.

The inpatient mortality rate was 3.3% in the total cohort, but the inpatient mortality of patients admitted from a nursing home (3.9%) was significantly greater than for patients transferred from a hospital ($P < .001$) or another source ($P < .001$; Table 1).

Comorbidities were present in 76% of the patients with a hip fracture. Patients admitted from a nursing home had significantly more comorbidities than patients admitted from another hospital ($P < .001$) and from another source ($P < .001$; Table 2).

Patients admitted from another hospital had significantly more additional injuries compared to patients admitted from another hospital or patients admitted from other sources (Table 3).

Most of the patients with a hip fracture were surgically treated with internal fixation (54%) or prosthetic arthroplasty (32%). The remainder 14% had nonoperative treatment of the hip fracture. Patients admitted from a nursing home had more adverse events compared to patients transferred from a hospital or other source of admission. Transfusion and acute postoperative anemia were the most common adverse events in all 3 groups. Patients from a nursing home also had more acute renal failure, pulmonary embolism, and inducedmental disorder, acquired during the admission compared to both the patients admitted from another hospital and the patients with other sources of admission.

Admission from a nursing home ($\beta = 0.74$, $P < .001$, odds ratio [OR] 2.1, confidence interval [CI] 1.9-2.3) or from a hospital resulted in an increased risk of death ($\beta = 1.2$, $P < .001$, OR 3.4, CI 3.2-3.7), when controlling for demographics, comorbidities, treatment, and adverse events (model fit: Omnibus test of model coefficients: chi-square = 511 943, $P < .001$, Nagelkerke $R^2 = 0.86$).

Both internal fixation ($\beta = -1.7$, $P < .001$, OR 0.18, CI 0.18-0.19) and prosthetic arthroplasty ($\beta = -1.5$, $P < .001$, OR 0.23, CI 0.22-0.24) were associated with decreased risk of inpatient mortality in comparison to nonoperative treatment.

The strongest risk factor for inpatient mortality was pulmonary insufficiency (OR 20), and osteoporosis was associated with a better outcome (OR 0.22) after internal fixation. Factors associated with increased risk of mortality were older age, hypertension, hospitals up to 200 beds compared to large hospitals (>500 beds), chronic pulmonary disease, chronic renal disease, congestive heart failure, atrial fibrillation, dementia, nutritional deficiency, malignancy, acute renal failure, pneumonia or pulmonary congestion, pulmonary insufficiency, and concomitant fracture of neck or trunk. Factors associated with decreased risk of inpatient mortality were female sex,

Table 1. Baseline Statistics.

Parameter	Total		Nursing Home		Hospital		*P*	Other Admission[a]		*P*[b]
	N	%	n	%	n	%		n	%	
Sex										
Male	610 655	29	24 133	31	37 129	30	<.001	549 393	29	<.001
Female	1 513 733	71	54 245	69	87 667	70		1 371 821	71	
Age, ±SD (range), years	79	±13 (18-99)	82	±12 (21-99)	78	±14 (18-99)	<.001	79	±13 (18-99)	<.001
Age groups, years										
<60	162 302	7.7	3427	4.4	9570	7.7	<.001	149 305	7.8	<.001
60-70	188 728	8.9	3908	5.0	13 574	11		171 246	8.9	
70-80	508 423	24	15 011	19	34 887	28		458 525	24	
>80	1 264 935	60	5 6032	72	66 765	54		1 142 138	59	
Geographic region										
Northeast	404 415	19	17 679	23	18 828	15	<.001	367 908	19	<.001
Midwest	582 904	27	25 482	33	44 958	36		512 464	27	
South	768 461	36	20 217	26	42 307	34		705 937	37	
West	368 608	17	15 000	19	18 703	15		334 905	17	
Hospital size (beds)										
6-99	598 710	28	24 139	31	41 525	33	<.001	533 046	28	<.001
100-199	547 266	26	19 729	25	25 450	20		502 087	26	
200-299	430 463	20	12 202	16	21 143	17		397 118	21	
300-499	378 132	18	15 541	20	23 490	19		339 101	18	
500 and over	169 817	8	6767	9	13 188	11		149 862	8	
Comorbidities										
No	520 293	25	16 805	21	33 488	27	<.001	470 000	25	<.001
Comorbidities present	1 604 095	76	61 573	79	91 308	73		1 451 214	76	
Complications										
No	1 192 132	56	41 087	52	84 488	68	<.001	1 066 557	56	<.001
Complications present	932 256	44	37 291	48	40 308	32		854 657	45	
Days of care, ±SD (range), days	6.75	±5.9 (1-253)	7.2	± 5.2 (1-34)	9.2	± 6.5 (1-60)	<.001	6.6	± 5.9 (1-253)	<.001
Discharge status										
Routine/discharged home	342 684	16	9592	12	38 491	31	<.001	294 601	15	<.001
Left against medical advice	3158	0.1	30	0.0	22	0		3106	0.2	
Discharged/transferred to short-term facility	315 581	15	9208	12	18 333	15		288 040	15	
Discharged/transferred to long-term facility	1 066 085	50	47 428	61	46 113	37		972 544	51	
Alive, disposition not stated	275 730	13	7642	10	16 615	13		251 473	13	
Dead	69 423	3.3	3091	3.9	3520	2.8		62 812	3.3	
Not reported	51 727	2.4	1387	1.8	1702	1		48 638	2.5	
Mortality	69 423	3.3	3091	3.9	3520	2.8	<.001	62 812	3.3	<.001

Abbreviations: HMO, Health Maintenance Organization; SD, standard deviation.
[a]Other sources of admission (physician referral, clinical referral, HMO referral, Emergency room, and court/law enforcement/other).
[b]Difference between nursing home and other admission.

Table 2. Comorbidities.

		Total		Nursing Home		Hospital			Other Admission[a]		
Parameter		n	%	n	%	n	%	*P*	n	%	*P*[b]
Hypertensive disease	Present	88 7205	42	27 031	35	53 908	43	<.001	806 266	42	<.001
Diabetes mellitus	Present	299 786	14	10 490	13	19 767	16	<.001	269 529	14	<.001
Obesity	Present	14 150	0.7	654	0.8	705	0.6	<.001	12 791	0.7	<.001
Chronic pulmonary disease	Present	378 807	18	15 861	20	23 215	19	<.001	339 731	18	<.001
Chronic renal disease	Present	55 096	2.6	2231	2.8	2058	1.6	.001	50 807	2.6	.001
Chronic liver disease	Present	12 061	0.6	540	0.7	1067	0.9	<.001	10 454	0.5	<.001
Congestive heart failure	Present	339 855	16	14 124	18	18 956	15	<.001	306 775	16	<.001
Atrial fibrillation	Present	308 568	15	10 833	14	13 888	11	<.001	283 847	15	<.001
Chronic alcoholism	Present	16 395	0.8	745	1.0	630	0.5	<.001	15 020	0.8	<.001
Dementia	Present	71 018	3.3	4918	6.3	3515	2.8	<.001	62 585	3.3	<.001
Osteoporosis	Present	218 674	10	4976	6.3	14 295	12	<.001	199 403	10	<.001
Nutritional deficiency	Present	56 625	2.7	3419	4.4	3881	3.1	<.001	49 325	2.6	<.001
Malignancy	Present	81 156	3.8	2438	3.1	7149	5.7	<.001	71 569	3.7	<.001

Abbreviation: HMO, Health Maintenance Organization.
[a]Other sources of admission (physician referral, clinical referral, HMO referral, emergency department, and court/law enforcement/other).
[b]Difference between nursing home and other admission.

Table 3. Additional Injuries.

		Total		Nursing Home		Hospital			Other Admission[a]		
Parameter		n	%	n	%	n	%	*P*	n	%	*P*[b]
Skull fracture	Present	8748	0	23	0.0	144	0.1	<.001	8581	0.4	<.001
Neck or trunk fracture	Present	44 679	2.1	1690	2.2	3175	2.5	<.001	39 814	2.1	.11
Clavicle fracture	Present	6151	0.3	685	0.9	663	0.5	<.001	4803	0.2	<.001
Scapula fracture	Present	1273	0.1	0	0.0	267	0.2	<.001	1006	0.1	<.001
Humerus fracture	Present	33 816	1.6	2398	3.1	2632	2.1	<.001	28 786	1.5	<.001
Radius/ulna fracture	Present	53 090	2.5	1106	1.4	3425	2.7	<.001	48 559	2.5	<.001
Femur fracture	Present	10 768	0.5	164	0.2	645	0.5	<.001	9959	0.5	<.001
Tibia/fibula fracture	Present	6550	0.3	489	0.6	193	0.2	<.001	5868	0.3	<.001
Ankle fracture	Present	4145	0.2	416	0.5	0	0.0	<.001	3729	0.2	<.001
Tarsal/metatarsal fracture	Present	4394	0.2	480	0.6	101	0.1	<.001	3813	0.2	<.001
Multiple fractures	Present	14 8543	7.0	5944	7.6	9709	7.8	.11	132 890	6.9	<.001
Pelvic fracture	Present	25 895	1.2	676	0.9	1834	1.5	<.001	23 385	1.2	<.001
Proximal humerus fracture	Present	29 394	1.4	2311	2.9	1648	1.3	<.001	25 435	1.3	<.001
Head trauma	Present	13 763	0.6	249	0.3	782	0.6	<.001	12 732	0.7	<.001
Chest and abdominal trauma	Present	12 597	0.6	426	0.5	1918	1.5	<.001	10 253	0.5	.71

Abbreviation: HMO, Health Maintenance Organization.
[a]Other sources of admission (physician referral, clinical referral, HMO referral, emergency department, and court/law enforcement/other).
[b]Difference between nursing home and other admission.

geographic region (northeast or midwest compared to west), 200 to 300 bed hospitals compared to large hospitals (>500 beds), diabetes, osteoporosis, new mental disorder, concomitant fracture of radius, and ulna and transfusion (Table 5).

Discussion

A considerable number of patients sustaining a hip fracture are admitted from either a nursing home or another acute care hospital, but the influence of preinjury residency on in-hospital outcomes is incompletely understood. Given the growing geriatric population and corresponding rise in the independent nursing home market,[18] there is interest in addressing the impact of preoperative residential status on inpatient mortality following hip fractures.[19-22] This study addressed whether (1) admission from a nursing home residence and (2) admission from another hospital were associated with higher mortality after a hip fracture.

The present study has several limitations associated with the utilization of administrative databases.[23] First, *ICD-9* codes were used to retrieve hip fracture discharges, as well as the correspondent treatment and subsequent adverse events. Because of the extensive sample size of our study, we cannot exclude the possibility of misclassification of the codes—as provided

Table 4. Treatment and Complications.

Parameter		Total		Nursing Home		Hospital			Other Admission[a]		
		n	%	n	%	n	%	*P*	n	%	*P*[b]
Treatment											
Internal fixation		1 146 608	54	36 435	47	44 563	36	<.001	1 065 610	56	<.001
Replacement		670 076	32	22 769	29	24 246	19	<.001	623 061	32	<.001
Surgery-related complications											
Wound complications	Present	31 132	1.5	934	1.2	1283	1.0	.001	28 915	1.5	<.001
Hematoma	Present	24 366	1.1	934	1.2	482	0.4	<.001	22 950	1.2	.94
Disruption wound	Present	1387	0.1	0	0.0	145	0.1	<.001	1242	0.1	<.001
Postoperative infection	Present	5785	0.3	0	0.0	699	0.6	<.001	5086	0.3	<.001
Acute postoperative anemia	Present	374 501	18	13 676	17	17 060	14	<.001	343 765	18	.001
General complications											
Complications not elsewhere classified	Present	93 563	4.4	2566	3.3	4399	3.5	.002	86 598	4.5	<.001
Acute renal failure	Present	58 699	2.8	3373	4.3	2507	2.0	<.001	52 819	2.7	<.001
Ventricular arrhythmias and arrest	Present	5911	0.3	87	0.1	391	0.3	<.001	5433	0.3	<.001
Iatrogenic hypotension	Present	5751	0.3	0	0.0	989	0.8	<.001	4762	0.2	<.001
Pulmonary embolism	Present	14 968	0.7	1489	1.9	471	0.4	<.001	13 008	0.7	<.001
Acute myocardial infarction	Present	37 841	1.8	1635	2.1	2498	2.0	.19	33 708	1.8	<.001
Fat embolism	Present	1871	0.1	0	0.0	0	0.0	X	1871	0.1	<.001
Induced mental disorder	Present	50 009	2.4	3934	5.0	2409	1.9	<.001	43 666	2.3	<.001
Pneumonia and pulmonary congestion	Present	89 358	4.2	3378	4.3	2825	2.3	<.001	83 155	4.3	.804
Pulmonary insufficiency	Present	48 615	2.3	1527	1.9	1069	0.9	<.001	46 019	2.4	<.001
Deep venous thrombosis	Present	18 822	0.9	1062	1.4	2771	2.2	<.001	14 989	0.8	<.001
Intubation and mechanical ventilation	Present	35 952	1.7	892	1.1	1651	1.3	<.001	33 409	1.7	<.001
Transfusion	Present	476 815	22	17 117	22	14 309	12	<.001	445 389	23	<.001
Conversion	Present	5971	0.3	0	0.0	161	0.1	<.001	5810	0.3	<.001

Abbreviation: HMO, Health Maintenance Organization.
[a]Other sources of admission (physician referral, clinical referral, HMO referral, emergency department, and court/law enforcement/other)
[b]Difference between nursing home and other admission

by the NHDS—examined in this study. Miscoding could potentially lead to an under- or overestimation of the importance of risk factors.[15] Nonetheless, misclassification errors take place in similar frequency in all comparison groups in large-scale studies.[24] There is an assumption that the database codes "transfer from nursing home" will be applied whether or not the patient goes through the ED. Second, this study was limited to inpatient outcomes after hip fracture; therefore, information regarding complications and mortality rates following hospital discharge, as well as readmission rates due to an adverse event, remains undetected. In addition, the NHDS does not measure functional status, which is another limitation.

The influence of hospital size to mortality stays unclear, hospitals up to 200 beds compared with >500 increase the risk of mortality, while hospitals with 200 to 300 beds compared with >500 beds decrease the risk of inpatient mortality.

The percentage of patients with dementia (3.3%) in the group of patients admitted from a nursing home seems relatively low, this could be underreported. Therefore, the only conclusions that can be drawn from this study are those concerning inpatient mortality.

Our finding that hip replacement or internal fixation is associated with a lower risk of mortality compared to nonoperative treatment is likely due to the fact that nonoperative treatment corresponded with end-of-life care, but it was not possible to determine this from the database. The present study indicates that hip fracture-related mortality rates were significantly higher among patients admitted to US hospitals from nursing homes compared to a non-nursing home preinjury residential status. The overall mortality rate was 3.3% for the entire study cohort, which is consistent with the findings of Bhattacharyya et al,[15] who noted a 3.1% inpatient mortality rate for patients treated for a hip fracture between 1995 and 1997. Particularly, the baseline mortality rate for patients admitted from a nursing home was 3.9%, compared to 3.3% and 2.8% mortality rates for patients admitted from other sources (ie, from home) or from a hospital, respectively.

In a study conducted by Roche et al,[25] 13% of all patients admitted to hospital with a hip fracture between 1999 and 2003 were nursing home residents. A recent study from Neuman et al[26] found an 8.3% of patients admitted from a long-term nursing home among patients with a hip fracture. The overall percentage of hospitalized patients admitted from a nursing home in our study was nearly 4%. This difference in the percentage of nursing home residents admitted to hospital might be explained because the aforementioned authors excluded patients aged less than 60 years old, while we did not (which formed 7.6% of our cohort). Admission from a nursing home was deemed an independent risk factor for in-hospital death in our 7-year cohort. A prior hospital stay in another facility immediately before hospital admission for the hip fracture was also associated with an increased risk of inpatient

Table 5. Logistic Regression for Predictors of Mortality After Hip Fractures.[a]

Predictors of mortality after hip fractures, N = 2 14 388						
					95% CI for Odds Ratio	
	β	Wald	*P*	Odds Ratio	Lower	Upper
Pulmonary insufficiency	3.0	5039	<.001	20	19	22
Nutritional deficiency	2.3	3536	<.001	10	9.4	11
Pneumonia or pulmonary congestion	1.8	2991	<.001	6.1	5.7	6.5
Admission from hospital compared to other admission	**1.2**	**853**	**<.001**	**3.4**	**3.2**	**3.7**
Fracture of neck and trunk	1.1	410	<.001	3.0	2.7	3.3
Acute renal failure	0.89	737	<.001	2.4	2.3	2.6
Malignancy	0.88	573	<.001	2.4	2.2	2.6
Atrial fibrillation	0.86	1853	<.001	2.4	2.3	2.5
Admission from nursing home compared to other admission	**0.74**	**266**	**<.001**	**2.1**	**1.9**	**2.3**
Number of beds 6-99 compared to >500	0.63	740	<.001	1.9	1.8	2.0
Chronic pulmonary disease	0.60	870	<.001	1.8	1.8	1.9
Chronic renal disease	0.52	175	<.001	1.7	1.6	1.8
Congestive heart failure	0.51	619	<.001	1.7	1.6	1.7
Dementia	0.34	55	<.001	1.4	1.3	1.5
Number of beds 100-199 compared to >500	0.25	117	<.001	1.3	1.2	1.3
Hypertension	0.12	44	<.001	1.1	1.1	1.2
Age	0.053	3430	<.001	1.1	1.05	1.06
Days of care	−0.0030	5.6	.02	1.00	0.99	1.00
Geographic south compared to west	−0.05	2.9	.09	0.95	0.90	1.01
Transfusion	−0.22	126	<.001	0.80	0.77	0.83
Female sex	−0.38	467	<.001	0.68	0.66	0.70
Induced mental disorder	−0.40	24	<.001	0.67	0.57	0.78
Diabetes mellitus	−0.63	424	<.001	0.53	0.50	0.56
Fracture of radius and ulna	−0.73	176	<.001	0.48	0.43	0.54
Number of beds 200-299 compared to >500	−0.83	1267	<.001	0.44	0.42	0.46
Geographic northeast compared to west	−1.1	1947	<.001	0.32	0.30	0.33
Geographic midwest compared to west	−1.3	2496	<.001	0.26	0.25	0.28
Hip replacement	−1.5	3937	<.001	0.23	0.22	0.24
Osteoporosis	−1.5	1611	<.001	0.22	0.20	0.24
Hip internal fixation	−1.7	5714	<.001	0.18	0.18	0.19
Constant	−2.7	1177	<.001			

Abbreviations: CI, confidence interval; N, number of patients in the cohort.
[a]Variables included in the regression: admission from nursing home, admission hospital, age, sex, geographic region, hospital size, discharge status, hypertension, diabetes, fracture of radius ulna, chronic pulmonary disease, chronic renal disease, congestive heart failure, atrial fibrillation, dementia, osteoporosis, nutritional deficiency, malignancy, acute posthemolytic anemia, acute renal failure, induced mental disorder, pneumonia or pulmonary congestion, pulmonary insufficiency, transfusion, hip replacement, hip internal fixation, and fracture of neck and trunk.

death, and this risk was higher than that of patients admitted from nursing homes.

In conclusion, a source of hospital admission other than home prior to sustaining a hip fracture was found to be a reliable predictor for increased inpatient mortality while controlling for other factors, such as comorbidities, sex, and age. Therefore, preinjury residential status, including not only admissions from a nursing home but also from other hospitals, should be taken into account when assessing outcomes following hip fractures. Patients transferred to an acute care hospital from a long-term care facility or another acute care hospital are at higher risk of inpatient death. This subset of patients should be considered separately from patients admitted from other sources.

Authors' Note

This study was approved by the institutional review board of the Massachusetts General Hospital. The IRB reviewed our protocol and decided that this study was exempt from IRB approval because we worked with deidentified data. The study was performed at the Orthopaedic Hand and Upper Extremity Service, Massachusetts General Hospital, Boston, USA.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Arjan G.J. Bot: "AnnaFonds Travel grant" (Dutch Orthopaedic travel grant); "VSB-fonds" a nonmedical study grant; "Prins Bernhard Cultuurfonds, Banning-de Jong fonds" a nonmedical study grant for excellent Dutch students. Valentin Neuhaus: Gottfried und Julia Bangerter-Rhyner-Stiftung, Switzerland. David Ring: Consultant, Wright Medical, Skeletal Dynamics, and Biomet. Mark E. Vrahas: Expert testimony: Law firms, no current, Stock options: Dividends; Travel/accommodations/meeting expenses unrelated to activities listed: CME teaching. David Ring: Study Specific Grants; Skeletal Dynamics (pending); Honoraria: AO North America, AO

International; Royalties Received: Wright Medical; Royalties Contracted; Biomet: Skeletal Dynamics; Stock Options: Illuminos. Mark E. Vrahas: Grants: Aona: OREF: NIH; Funding for Hand Surgery Fellowship: AO North America.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

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