



Unplanned 30-day readmissions in orthopaedic trauma



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ABSTRACT

Introduction: 30-day readmission is increasingly used as a hospital quality metric. The objective of this study was to describe the patient factors associated with unplanned 30-day hospital readmission of orthopaedic trauma patients.

Methods: A statewide observational study was undertaken using data from all acute hospitals in California. All hospital inpatients with a primary diagnosis of fracture or dislocation (ICD-9-CM codes 800–829) were included, except for those with isolated injuries to the skull, face, or ribs. The primary outcome measure was unplanned 30-day readmission to any hospital in California.

Results: 416,568 trauma admissions were available for analysis. The overall readmission rate was 6.5%, and 27.3% of readmitted patients presented to a different hospital. Factors significantly associated with readmission were male sex (OR 1.23, 95% CI 1.19–1.27), age 46–65 (2.61 [2.27–2.99]), black race (1.19 [1.11–1.27]), entitlement to publicly funded healthcare (1.38 [1.25–1.52]), Charlson Comorbidity Index ≥ 2 (1.84 [1.79–1.90]), discharge against medical advice (3.13 [2.67–3.68]), and spinal fracture (1.42 [1.34–1.49]). Major reasons for readmission included: cardiopulmonary disease (25.6%), infections (20.1%), musculoskeletal problems (18.1%), and procedural complications (12.0%).

Conclusions: Many orthopaedic trauma readmissions are potentially unrelated to the initial hospitalization. Penalties for unplanned readmissions risk penalizing hospitals that serve disadvantaged communities and treat a high proportion of trauma patients.

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Introduction

Unplanned readmission to hospital is increasingly used as a health outcome measure [1,2]. Up to 20% of Medicare beneficiaries are re-hospitalized within 30 days of discharge from an acute care hospital, at an annual cost of \$17 billion [3,4]. There is evidence that many readmissions are preventable, particularly given considerable variation between healthcare providers and evidence from randomized controlled trials that specific interventions reduce readmission rates [5,6]. Reducing unplanned readmissions presents an opportunity both to improve healthcare quality and reduce cost [2]. For this reason, some healthcare systems use readmission rates as a quality metric for the purposes of calculating healthcare payments [7,8]. In the United States, the

Hospital Readmissions Reduction Program (HRRP) penalizes hospitals up to 3% of total Medicare payments for excess risk-adjusted readmissions across a range of medical conditions, including acute myocardial infarction, congestive cardiac failure, and pneumonia [8].

Although there are plans to extend the HRRP to include specific surgical populations [1], it remains unclear whether readmission rates measure quality or simply reflect socioeconomic factors beyond the influence of individual hospitals. Factors associated with readmission include living alone, limited education, poor family support, and ethnic minority status [9]. Perhaps unsurprisingly, the first wave of HRRP penalties overwhelmingly penalized “safety net” hospitals, i.e. those treating high numbers of disadvantaged and ethnic minority patients [8].

There is increasing interest in using 30-day readmission rates as a quality metric in trauma care. This is important as trauma predominantly affects patients with independent risk factors (such as low socioeconomic status) for unplanned readmission. However, a recent systematic review [10] identified only one single-center

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Table 1
Population characteristics, in-hospital mortality, and unplanned 30-day readmission.

Characteristics		Number	Proportion (%)	Mortality (%)	30-day readmission (%)
All patients		416,568	100.0	1.4	6.5
Age (years)	0–18	20,991	5.0	0.1	1.5
	19–44	70,252	16.9	0.2	3.5
	45–65	88,547	21.3	0.6	5.8
	65–	230,801	1.4	2.2	8.4
Sex	Male	161,775	38.8	1.7	6.9
	Female	237,138	56.9	1.3	6.7
Race	White	270,255	64.9	1.6	7.2
	Black	17,444	4.2	1.0	7.7
	Hispanic	63,735	15.3	1.0	6.4
	Other	26,747	6.4	1.5	6.6
Insurance Type	Public	266,191	63.9	1.9	8.2
	Private	97,672	23.5	0.5	3.7
	Self-pay	18,722	4.5	0.4	3.8
	Other	33,934	8.2	0.3	3.6
Charlson Comorbidity Index	<2	332,883	79.9	0.9	5.3
	≥2	83,685	20.1	3.4	12.0
Injury Severity Score	<15	402,649	96.7	1.3	6.6
	≥15	13,919	3.3	4.8	5.2
Injury Type	Upper limb	80,427	19.3	0.5	4.8
	Spine	52,559	12.6	2.1	8.4
	Pelvis	27,290	6.6	1.8	7.0
	Hip	134,598	32.3	2.3	8.3
	Femur	21,199	5.1	1.9	6.4
	Tibia	30,202	7.3	0.5	5.0
	Foot and ankle	52,723	12.7	0.2	4.5
	Other	6,760	1.6	0.2	4.5
	Dislocation	10,791	2.3	0.4	5.6

study that explored predictors for readmission of orthopaedic trauma patients [11].

Our study used a comprehensive statewide population database to identify risk factors for unplanned 30-day readmission in the orthopaedic trauma setting. This database permitted longitudinal follow-up of patients, including those that were readmitted to a hospital other than the institution at which they were initially treated.

Methods

A statewide administrative database was analyzed to identify risk factors and reasons for unplanned hospital readmission within 30 days of discharge following traumatic injury. The protocol was approved by our hospital institutional review board.

Data source

Data were extracted from the California State Inpatient Database (SID) 2007–2011. This resource is part of the family of databases developed for the Healthcare Cost and Utilization Project (HCUP), which aims to create national resource of patient- and provider-level data for administrative and research purposes. The SID contains 98% of inpatient discharge records from hospitals in California, regardless of payment source [12]. It includes data on over a hundred demographic and clinical variables for over four million inpatient episodes per year. Unique identifiers within the SID allow individuals to be tracked between admissions, even when these are to different hospitals. Outpatient and emergency department visits that do not lead to readmission are not recorded within the SID.

Table 2
Multivariable analyses of factors associated with 30-day readmissions in trauma patients.

Characteristics		Odds ratio (95% CI)
Age (years)	18–45	1.94 (1.69–2.23)
	46–65	2.61 (2.27–2.99)
	66–	2.57 (2.23–2.95)
Sex	Male	1.23 (1.19–1.27)
Race	Black	1.19 (1.11–1.27)
	Hispanic	1.07 (1.03–1.12)
	Other	0.92 (0.87–0.97)
Insurance Type	Public	1.38 (1.25–1.52)
	Private	0.89 (0.81–0.98)
	Other	0.90 (0.81–1.00)
Charlson Comorbidity Index	≥2	1.84 (1.79–1.90)
Injury Severity Score	≥15	1.10 (1.01–1.19)
Discharge destination	Another hospital	0.58 (0.51–0.66)
	SNF or ICF ^a	1.30 (1.24–1.36)
	Home Health Care	1.30 (1.24–1.37)
	Against medical advice	3.13 (2.67–3.68)
Injury Type	Spine	1.42 (1.34–1.49)
	Pelvis	1.06 (1.00–1.14)
	Hip	1.08 (1.03–1.13)
	Femur	1.10 (1.03–1.19)
	Tibia	1.12 (1.05–1.21)
	Foot and ankle	0.96 (0.90–1.02)
	Other	0.75 (0.65–0.87)
Dislocation	1.27 (1.14–1.41)	

Reference ranges not shown: age (0–18), sex (male), race (white), insurance type (self-pay), Charlson Comorbidity Index (<2), Injury Severity Score (<15), discharge destination (home), injury type (upper limb).

^a SNF = skilled nursing facility, ICF = intermediate care facility.

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