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Hospital, Patient, and Clinical Factors Influence 30- and 90-Day Readmission After Primary Total Hip Arthroplasty

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ABSTRACT

Background: The purpose of this study was to analyze the hospital, clinical, and patient factors associated with inpatient readmission after total hip arthroplasty (THA) in the Medicare population and to understand the primary reasons for readmission.

Methods: The Medicare 100% national hospital claims database was used to identify 442,333 older patients (65+) with a primary THA in 3730 hospitals between 2010 and 2013. A multilevel logistic regression analysis with a clustered data structure was used to investigate the risk of all-cause 30- and 90-day readmission, incorporating hospital, clinical, and patient factors.

Results: At 30 days, 5.8% (median) of the patients were readmitted, whereas at 90 days, 10.5% (median) were readmitted. Geographic census region, hospital procedure volume, and nonprofit ownership were the only significant hospital factors among those we studied. Overall, clinical factors explained more of the variation in readmission rates than general hospital factors. Use of a perioperative transfusion was associated with 14% greater risk, patients discharged to home had 28% lower risk, and surgeon volume and length of stay were also significant risk factors. The top 5 most frequently reported primary reasons for 30-day readmission in THA were procedure related: dislocation (5.9%), deep infection (5.1%), wound infection (4.8%), periprosthetic fracture (4.4%), or hematoma (3.4%).

Conclusion: These findings support further optimization of the delivery of care—both intraoperative and postoperative—to reduce the broad variation in hospital readmissions.

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Galvanized by the Affordable Care and Patient Protection Act of 2010, health care reform in the United States is resulting in disruptive changes to the reimbursement of orthopedic surgery [1–3].

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The traditional fee-for-service paradigm is changing into an episode of care model in which affiliated health care providers coordinate services into a single payment bundle, covering up to 90 days after discharge from the hospital [4]. In theory, patient-centered coordination of care is thought to provide incentives for stakeholders to provide the optimal care at a reduced, sustainable cost. In practice, the success of a bundled care model, from both patient and societal perspectives, is predicated on assuring that quality of care is not sacrificed to simply achieve lower costs and maximize profit for provider stakeholder(s) in control of a patient's payment bundle [1–3].

To achieve these quality goals, the Centers for Medicare and Medicaid Services (CMS) has recently introduced a series of hospital quality measures or benchmarks specifically for total joint arthroplasty [5]. One such hospital quality benchmark, known as

Table 1
Centers for Medicare and Medicaid Services Limited Data Set Inpatient Data 2010–2013: Patients Undergoing THA and Rehospitalized (All Cause) in 30 or 90 Days and Demographic Profile and Hospital Characteristics of Primary and Readmitted Patients.

Effect	Level	THA	Readmit 30 Days	Readmit 90 Days	THA (%)	Readmit 30 Days (%)	Readmit 90 Days (%)
Age	Total	442,333	26,076	45,242	100.0	100.0	100.0
	65–69	123,690	5195	9046	28.0	19.9	20.0
	70–74	116,075	5797	9978	26.2	22.2	22.1
	75–79	96,250	5908	10,243	21.8	22.7	22.6
	80–84	68,244	5272	9122	15.4	20.2	20.2
CCI	85+	38,074	3904	6853	8.6	15.0	15.1
	00	243,948	10,752	18,093	55.2	41.2	40.0
	1–2	156,320	10,500	18,310	35.3	40.3	40.5
	3–4	32,600	3341	6050	7.4	12.8	13.4
	5+	9465	1483	2789	2.1	5.7	6.2
Discharge type	Home	77,158	2842	4716	17.4	10.9	10.4
	Home with HHS	146,499	5671	9692	33.1	21.7	21.4
	Other facility	5452	1384	1687	1.2	5.3	3.7
	Rehab facility	51,212	4251	7688	11.6	16.3	17.0
	SNF	162,012	11,928	21,459	36.6	45.7	47.4
Hospital annual TJA volume	001–149	87,287	6102	10,330	19.7	23.4	22.8
	150–299	125,084	7546	13,122	28.3	28.9	29.0
	300–449	83,086	4651	8125	18.8	17.8	18.0
	450–599	53,996	2967	5251	12.2	11.4	11.6
	600+	92,880	4810	8414	21.0	18.4	18.6
Hospital beds	001–149	94,096	5570	9261	21.3	21.4	20.5
	150–299	123,386	7288	12,695	27.9	27.9	28.1
	300–499	114,551	6774	11,882	25.9	26.0	26.3
	500+	110,300	6444	11,404	24.9	24.7	25.2
	Nonprofit	68,775	4382	7444	15.5	16.8	16.5
Hospital ownership	Private	327,524	19,013	33,138	74.0	72.9	73.2
	Public	46,033	2680	4659	10.4	10.3	10.3
	Unknown	1	1	1	0.0	0.0	0.0
Hospital setting	Rural	53,996	3369	5789	12.2	12.9	12.8
	Urban	388,337	22,707	39,453	87.8	87.1	87.2
Hospital stay	1–2	87,078	3303	5344	19.7	12.7	11.8
	3–4	299,757	16,008	28,029	67.8	61.4	62.0
	5+	55,498	6765	11,869	12.5	25.9	26.2
Hospital teaching	No	302,226	17,792	30,803	68.3	68.2	68.1
	Yes	140,107	8284	14,439	31.7	31.8	31.9
Race	Black	19,890	1311	2282	4.5	5.0	5.0
	Other/unknown	8807	494	858	2.0	1.9	1.9
	White	413,636	24,271	42,102	93.5	93.1	93.1
Resident region	Midwest	119,193	7094	12,196	26.9	27.2	27.0
	Northeast	82,893	5078	8645	18.7	19.5	19.1
	South	156,097	9802	17,209	35.3	37.6	38.0
	West	84,150	4102	7192	19.0	15.7	15.9
	Female	276,478	15,893	28,170	62.5	60.9	62.3
Gender	Male	165,855	10,183	17,072	37.5	39.1	37.7

THA, total hip arthroplasty; TJA, total joint arthroplasty; CCI, Charlson Comorbidity Index; HHS, home health service; SNF, skilled nursing facility.

30-day, all-cause risk-standardized readmission, is compiled for each hospital relative to a national average and reported publicly on the Internet (<https://www.medicare.gov/hospitalcompare/search.html>). Thus, prospective patients can consider this information when deciding where to have their surgery performed. Furthermore, hospitals that are found by CMS to have “excess” 30-day readmission rates can be financially penalized by retrospectively having up to 3% of their payments withheld or “clawed back” [6]. Although 30-day readmission rates are considered to be a hospital quality measure, 90-day readmissions are equally relevant as the maximum window for an episode of care, during which the stakeholders in the payment bundle are liable for all of the costs associated with patient treatment, regardless of whether or not the reason for readmission is related to the index orthopedic surgery [1–3]. Thus, both hospital and bundled care providers currently have both concerns and explicit incentives to minimize 30- and 90-day readmissions risks.

In light of these developments, recent research has been focused on the factors associated with hospital readmissions after THA [6–12]. Previous studies have examined patient factors and clinical factors associated with readmission in a single institution [6–12].

Comparatively few studies have examined THA readmission across multiple institutions [10,11,13,14], and little is known about the role of hospital factors and how they influence the overall risk of readmission after primary THA.

To add to the knowledge base on 30- and 90-day readmissions after THA, we studied the hospital as the unit of analysis and asked the following research questions for the Medicare population of primary THA patients: (1) Which hospital factors influence 30- and 90-day readmissions after primary THA? (2) Which clinical factors influence 30- and 90-day readmissions? (3) What are the principal reasons for 30- and 90-day hospital readmissions and are they procedure related?

Materials and Methods

This study is based on analysis of the 100% Medicare inpatient limited data set (LDS), from which we identified 442,333 patients (65+ years old) who received a primary THA between 2010 and 2013 (Table 1). The LDS files contain conventional fee-for-service claims submitted to CMS for payment, and in recent years, 12–13 million claims for hospital services are processed annually by CMS.

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