

Association of Patient, Surgeon, and Facility Factors with Unplanned Hospital Visits after Outpatient Orthopaedic Surgery

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INTRODUCTION:

Unplanned hospital visits following same-day outpatient surgery are an important measure of quality in health care and are an important marker of postoperative adverse events. The most common reason for postoperative hospital visits following outpatient surgery are pain, urinary retention, or constipation. Unplanned hospital visits are costly, with average charges for these encounters as high as \$1,869 for pain-related visits and \$12,000 for non-pain-related visits⁷. Medicare has recognized rates of unplanned hospital visits following outpatient surgery as an important marker of quality in health care by mandating public reporting of facility-level rates of unplanned hospital visits after outpatient surgery in general in hospital outpatient departments (HOPDs) and after outpatient orthopaedic surgery in ambulatory surgery centers (ASCs). Surgeons and surgical facilities may be unaware of hospital visits as patients may present to emergency departments at other institutions, making it difficult to understand what factors may make patients more or less likely to present to hospitals after surgery.

There is a paucity of data on rates of unplanned hospital visits following outpatient orthopaedic surgery and factors associated with this outcome. Our objective was to evaluate the association of patient, surgeon, and facility factors with unplanned hospital visits within seven, thirty, and ninety days following outpatient orthopaedic surgery. This information would be useful to patients, payers, clinicians, and hospitals as it would help to inform relative risks and benefits of surgery and also help to quantify the demands for postoperative healthcare utilization.

METHODS:

We used the 2018-2019 inpatient, outpatient, ambulatory surgery, and emergency department files from the New York Statewide Planning and Research Cooperative System (SPARCS) database. We included patients undergoing outpatient orthopaedic surgical procedures performed in HOPDs and ASCs. Our primary outcome was unplanned hospital visits (any emergency department visit, observation stay, or unplanned inpatient admission) within 7 days of outpatient orthopaedic surgery. Our secondary outcomes were unplanned hospital visits within 30 and 90 days of outpatient orthopaedic surgery. We used Medicare's algorithm to determine whether admissions were planned vs. unplanned based on diagnoses and procedures performed during postoperative hospital visits. We estimated multivariable logistic regression models to examine the association postoperative unplanned visits with patient, facility, and surgeon characteristics. These models controlled for patient demographics, medical comorbidities, surgical procedure, surgeon volume, and facility characteristics.

RESULTS:

There were 476,654 outpatient surgical encounters included in our study. The mean (standard deviation) age was 59.92 (15.82) years (Table 1), 309,563 (64.9%) were White, 250,400 (52.5%) were female, and 214,438 (45.0%) had private insurance. The majority of surgeries were performed in facilities with bed size <200 (56.4%), and 49.8% were performed in not-for-profit hospitals. There were 7,351 (1.5%), 9,703 (2.0%), and 12,967 (2.7%) encounters that had an unplanned hospital visit with 7, 30, or 90 days of outpatient orthopaedic surgery, respectively.

After controlling for patient, facility, and surgeon-level covariates, and relative to their respective comparators, the odds of unplanned hospital visits within 7, 30, and 90 days were higher for racial and ethnic minority patients (e.g., odds ratio [OR] 1.11, 95% confidence interval [CI] 1.02 to 1.21, P=0.02 for Hispanic race and ethnicity compared to White at 7 days), self-pay status (Table 1) (e.g., OR 1.66, 95% CI 1.48 to 1.86, P<0.001 private insurance at 7 days). Medicaid insurance was associated with higher odds of unplanned hospital visits within 30 or 90 days (e.g., OR 1.12, 95% CI 1.05 to 1.19, P<0.001 compared to private insurance at 30 days). Having surgery with lower volume surgeons was associated with a higher odds of postoperative unplanned hospital visits at all time points (e.g., OR 4.76, 95% CI 4.17 to 5.44, P<0.001 for lowest volume quartile compared to highest volume quartile at 7 days). Having surgery at an ambulatory surgery center (ASC) was associated with a lower odds of postoperative unplanned hospital visits at all time points (e.g., OR 0.22, 95% CI 0.14 to 0.33, P<0.001 having surgery and government-owned facilities at 7 days).

DISCUSSION AND CONCLUSION:

Patient, facility, surgeon, and facility factors were associated with unplanned hospital visits within 7, 30, and 90 days after outpatient orthopaedic surgery. Future work may seek to assess mechanisms that may explain why racial and ethnic minority patients experienced higher rates of postoperative unplanned hospital visits. It is reassuring that lower volume facilities were not associated with higher odds of postoperative unplanned hospital visits. Patients, payers, and facilities may seek out higher volume surgeons to reduce risk for postoperative healthcare utilization. This information may help patients, payers, clinicians, and hospitals better-understand risk for postoperative healthcare utilization after outpatient orthopaedic surgery.

Table 1. Patient, facility, and surgeon characteristics.

Patient Characteristics		Facility Characteristics	
Age Mean (SD)	51.92 (13.82)	Bed Size N (%)	268,952 (56.4%)
Race and Ethnicity N (%)		<200 beds	71,677 (15.3%)
Non-Hispanic White	306,565 (64.9%)	200-400 beds	128,444 (27.7%)
Non-Hispanic Black	49,547 (10.4%)	>400 beds	3,331 (0.7%)
Hispanic	45,726 (9.6%)	Teaching Hospital N (%)	379,566 (79.9%)
Asian	8,557 (1.8%)	Non-Teaching Hospital	95,386 (20.9%)
Other	63,441 (13.3%)	Teaching Hospital	95,386 (20.9%)
Gender N (%)		Missing	5,381 (1.1%)
Male	226,224 (47.3%)	Hospital Ownership N (%)	
Female	236,402 (50.2%)	Government	29,239 (6.3%)
Insurance N (%)		Non-for-profit	273,774 (58.8%)
Private	214,438 (45.0%)	ABC	206,769 (45.4%)
Medicare	101,838 (21.6%)	Missing	3,931 (0.8%)
Medicaid	66,289 (13.9%)	Facility Volume Quartile N (%)	
Workers' Compensation	42,246 (8.9%)	First (Highest)	118,379 (24.9%)
Sold Pay	5,999 (1.3%)	Second	119,872 (25.7%)
Other	48,844 (9.9%)	Third	119,842 (25.7%)
Patient Residential Location N (%)		Fourth (Lowest)	120,519 (25.9%)
Urban	424,742 (89.1%)	Rural	51,872 (10.9%)
Rural	51,872 (10.9%)	Surgery and Surgeon Characteristics	
Eligible Comorbidities N (%)		Surgical Procedure N (%)	
Compensated Heart Failure	2,934 (0.6%)	Prosthetic joint replacement	56,133 (11.8%)
Cardiac Arrhythmias	8,657 (1.8%)	Peripartum nerve decompression	22,391 (4.7%)
Valvular Disease	3,980 (0.8%)	Laminectomy	17,831 (3.7%)
Pulmonary Circulation Disorders	426 (0.1%)	Partial excision bone	30,536 (6.4%)
Peripheral Vascular Disorders	2,969 (0.6%)	Repair of low deformities	16,545 (3.5%)
Hypertension, uncomplicated	89,774 (18.8%)	Treatment, upper extremity trauma	19,931 (4.2%)
Dyslipidemia	241 (0.1%)	Treatment, lower extremity trauma	21,605 (4.5%)
Other Neurological Disorders	4,046 (0.8%)	Other fractures and dislocations	54,805 (11.5%)
Chronic Pulmonary Disease	37,188 (7.8%)	Excision of knee meniscus cartilage	7,142 (1.5%)
Diabetes, Uncomplicated	29,485 (6.2%)	Hip or knee arthroplasty	6,819 (1.4%)
Diabetes, Complicated	7,839 (1.6%)	Other arthroplasty	2,822 (0.6%)
Hypothyroidism	20,551 (4.3%)	Amputation of lower extremity	5,777 (1.2%)
Liver Disease	1,657 (0.3%)	Spinal fusion	112,000 (23.7%)
Peptic Ulcer Disease Excluding Bleeding	328 (0.1%)	Other muscle and tendon procedures	17,513 (3.7%)
Lymphoma	331 (0.1%)	Other bone procedures	82,783 (17.4%)
Metastatic Cancer	272 (0.1%)	Other joint procedures	2,383 (0.5%)
Solid Tumor Without Metastasis	1,469 (0.3%)	Surgeon Volume Quartile N (%)	
Rheumatoid Arthritis	5,169 (1.1%)	First (Highest)	118,722 (24.9%)
Vascular Disease		Second	118,754 (24.9%)
Coagulopathy	1,362 (0.3%)	Third	119,918 (25.2%)
Obesity	36,178 (7.6%)	Fourth (Lowest)	119,257 (25.0%)
Weight Loss	31 (0.0%)	First (Highest)	118,722 (24.9%)
Fat and Electrolyte Disorders	438 (0.1%)	Second	118,754 (24.9%)
Blood Loss Anemia	64 (0.0%)	Third	119,918 (25.2%)
Deficiency Anemia	1,005 (0.2%)	Fourth (Lowest)	119,257 (25.0%)
Alcohol Abuse	2,185 (0.5%)	First (Highest)	118,722 (24.9%)
Drug Abuse	3,380 (0.7%)	Second	118,754 (24.9%)
Psychoses	517 (0.1%)	Third	119,918 (25.2%)
Depression	15,313 (3.2%)	Fourth (Lowest)	119,257 (25.0%)
Hypertension, Complicated	3,828 (0.8%)	First (Highest)	118,722 (24.9%)
Second	118,754 (24.9%)	Second	118,754 (24.9%)
Third	119,918 (25.2%)	Third	119,918 (25.2%)
Fourth (Lowest)	119,257 (25.0%)	Fourth (Lowest)	119,257 (25.0%)

Abbreviations: SD, Standard deviation; N, Number; %, Percentage; ABC, Ambulatory Surgery Center; ED, Emergency Department.

Table 2. Odds ratios and 95% confidence intervals for the association of patient and facility characteristics with the risk of unplanned hospital readmission for 30 days of outpatient orthopedic surgery.

Patient Characteristics	Unplanned Hospital Readmission for 30 Days		Unplanned Hospital Readmission for 90 Days	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Age	1.00	(1.00 to 1.00)	1.00	(1.00 to 1.00)
Race and Ethnicity	Reference	Reference	Reference	Reference
Non-Hispanic White	Reference	Reference	Reference	Reference
Non-Hispanic Black	1.03	(0.89 to 1.19)	1.00	(0.86 to 1.15)
Hispanic	1.17*	(1.02 to 1.34)	1.09*	(0.93 to 1.27)
Asian	1.04***	(0.78 to 1.39)	1.04***	(0.77 to 1.42)
Other	1.04***	(0.87 to 1.23)	1.09*	(0.93 to 1.28)
Gender	Reference	Reference	Reference	Reference
Male	Reference	Reference	Reference	Reference
Female	0.91***	(0.80 to 0.96)	0.90***	(0.80 to 0.92)
Insurance	Reference	Reference	Reference	Reference
Private	Reference	Reference	Reference	Reference
Medicare	0.97*	(0.89 to 1.05)	1.06	(0.97 to 1.15)
Medicaid	1.03	(0.90 to 1.18)	1.20***	(1.07 to 1.35)
Workers' Compensation	1.27**	(1.08 to 1.51)	1.08	(0.93 to 1.26)
Sold Pay	1.00**	(0.85 to 1.16)	1.27***	(1.03 to 1.58)
Other	1.27***	(1.11 to 1.55)	1.26***	(1.07 to 1.47)
Patient Residential Location	Reference	Reference	Reference	Reference
Urban	Reference	Reference	Reference	Reference
Rural	0.93	(0.78 to 1.07)	0.91	(0.77 to 1.07)
Facility Characteristics	Reference	Reference	Reference	Reference
Bed Size	Reference	Reference	Reference	Reference
<200 beds	Reference	Reference	Reference	Reference
200-400 beds	0.93	(0.80 to 1.17)	0.93	(0.79 to 1.12)
>400 beds	1.11	(0.98 to 1.26)	1.09*	(0.97 to 1.23)
Teaching Hospital	Reference	Reference	Reference	Reference
Non-Teaching Hospital	Reference	Reference	Reference	Reference
Teaching Hospital	0.91	(0.87 to 1.23)	0.93	(0.79 to 1.10)
Non-Teaching Hospital	Reference	Reference	Reference	Reference
Ownership	Reference	Reference	Reference	Reference
Government	Reference	Reference	Reference	Reference
Non-for-profit	0.74*	(0.52 to 0.97)	0.79*	(0.58 to 0.98)
ABC	0.79**	(0.58 to 0.79)	0.79**	(0.57 to 0.81)
Missing	Reference	Reference	Reference	Reference
Facility Volume Quartile	Reference	Reference	Reference	Reference
First (Highest)	Reference	Reference	Reference	Reference
Second	1.06	(0.72 to 1.60)	1.08	(0.71 to 1.63)
Third	1.1	(0.76 to 1.60)	1.18	(0.78 to 1.80)
Fourth (Lowest)	1.02	(0.68 to 1.53)	1.07	(0.71 to 1.61)
Surgeon and Surgeon Characteristics	Reference	Reference	Reference	Reference
Surgeon Volume	Reference	Reference	Reference	Reference
First (Highest)	Reference	Reference	Reference	Reference
Second	1.20***	(1.08 to 1.34)	1.20***	(1.08 to 1.33)
Third	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Fourth (Lowest)	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Prosthetic joint replacement	Reference	Reference	Reference	Reference
Laminectomy	1.20***	(1.08 to 1.34)	1.20***	(1.08 to 1.34)
Partial excision bone	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Repair of low deformities	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Treatment, upper extremity trauma	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Treatment, lower extremity trauma	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other fractures and dislocations	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Excision of knee meniscus cartilage	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Hip or knee arthroplasty	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other arthroplasty	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Amputation of lower extremity	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Spinal fusion	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other muscle and tendon procedures	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other bone procedures	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other joint procedures	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Other musculoskeletal system procedures	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Surgeon Volume Quartile	Reference	Reference	Reference	Reference
First (Highest)	Reference	Reference	Reference	Reference
Second	1.20***	(1.08 to 1.34)	1.20***	(1.08 to 1.34)
Third	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)
Fourth (Lowest)	1.07	(0.97 to 1.18)	1.07	(0.97 to 1.18)

Abbreviations: N, Number; OR, Odds Ratio; CI, Confidence Interval; %, Percentage; ABC, Ambulatory Surgery Center; ED, Emergency Department; P, P-value. Note: Odds ratios and 95% confidence intervals from multivariable logistic regression models controlling for patient and facility characteristics and facility volume effects. Models also controlled for 30 Postoperative Medical Comorbidities (see Table 1). * indicates P < 0.05, ** indicates P < 0.01, *** indicates P < 0.001.