HOSPITAL FOR SPECIAL SURGERY

Thirty-Day Acute Healthcare Resource Utilization Following Outpatient Anterior Cruciate Ligament Surgery

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INTRODUCTION

The need for hospital-based acute care following outpatient surgical procedures is expensive and measured as marker for quality. However, little information is available about events leading to emergency department (ED) visit or inpatient (IP) admission after ambulatory anterior cruciate ligament (ACL) surgery.

METHODS

We studied adult patients who underwent outpatient ACL surgery in New York State between 2009 and 2013 using the Healthcare Cost and Utilization Project (HCUP) database. ED visits and IP admissions within 30 days of surgery were identified by cross-matching two additional independent HCUP databases.

Table 1. Demographic Information of All Patients Who Received ACL Surgery

		All Patients		Control Patients		Acute Care Patients		
		N/Average	%/Stdev	N/Average	%/Stdev	N/Average	%/Stdev	P-value
Subjects		26,873		25,837		1,036		
Age		33.3	11.3	33.3	11.4	33.8	10.7	<0.001
Sex	Male	17049	63.5	16410	63.5	639	61.7	0.221
	Female	9811	36.5	9414	36.5	397	38.3	
Race								
	White	16573	61.7	15946	61.7	627	60.5	<0.001
	Black	2205	8.2	2074	8.0	131	12.6	
	Hispanic	2369	8.8	2261	8.8	108	10.4	
	Other	5726	21.3	5556	21.5	170	16.4	
Expected Insurance Payer								
	Medicare	317	1.2	284	1.1	33	3.2	<0.001
	Medicaid	2338	8.7	2147	8.3	191	18.5	
	Private	19893	74.2	19307	74.8	586	56.8	
	Self-pay	829	3.1	802	3.1	27	2.6	
	No charge	15	0.1	12	0.0	3	0.3	
	Other	3435	12.8	3243	12.6	192	18.6	
Deyo Comorbidity Index								
	0	25234	93.9	24292	94.0	942	90.9	<0.001
	1	1577	5.9	1488	5.8	89	8.6	
	2	55	0.2	50	0.2	5	0.5	
	3	7	0.0	7	0.0	0	0.0	

RESULTS

The final cohort included 26,873 subjects. We identified 1208 (3.90%, 95% CI: 3.6%-4.1%) secondary healthcare encounters of interest. The majority of these encounters were ED visits (951). The most common reasons were musculoskeletal pain, any infection, drug abuse, wound infection, deep venous thrombosis, and psychotic events. Patients operated in high volume surgical centers were less likely to require subsequent acute care (OR 0.47, p<0.001, 95% CI: 0.34 ~ 0.63), while Medicare/Medicaid patients carried higher odds (OR 2.52, 99% CI, 2.07-3.07).

Table 2. Summary Categories of Hospital Based Acute Care

				SEDD			SID		
	Total	% Events	Rank	Event in 1000 patients	N#	% Events	Rank	N#	% Events	Rank
All events	1208				951	78.7%		257	21.3%	
Musculoskeletal pain	349	28.9%	1	13.0	330	34.7%	1	19	7.4%	5
Infection	122	10.1%	2	4.5	42	4.4%	3	80	31.1%	1
Drug abuse	98	8.1%	3	3.6	66	6.9%	2	32	12.5%	4
Wound infection	87	7.2%	4	3.2	22	2.3%		65	25.3%	2
DVT	77	6.4%	5	2.9	34	3.6%		43	16.7%	3
Psychotic events	54	4.5%	6	2.0	40	4.2%	5	14	5.4%	
Nausea and/or vomiting	46	3.8%	7	1.7	41	4.3%	4	5	1.9%	
Pneumonia	17	1.4%		0.6	8	0.8%		9	3.5%	
Opioid related complications	7	0.6%		0.3	5	0.5%		2	0.8%	
Poisoning	6	0.5%		0.2	6			0		
Pulmonary complication	5	0.4%		0.2	0			5	1.9%	
Alcohol	4	0.3%		0.1	2	0.2%		2	0.8%	
Blood transfusion	4	0.3%		0.1	0			4	1.6%	
GI	3	0.2%		0.1	2	0.2%		1	0.4%	
Myocardial infarction	3	0.2%		0.1	0			3	1.2%	
Cardiovascular and chest pain	2	0.2%		0.1	0			2	0.8%	
Medication	2	0.2%		0.1	2	0.2%		0		
Acute renal failure	1	0.1%		0.0	0			1	0.4%	
CNS	1	0.1%		0.0	0			1	0.4%	
PE	0				0			0		

Table 3. Multivariable Regression Analysis of Risk Factors for Hospital Based Acute Care Within 30 Days of Surgery

	Multi-variable regression analysis					Firth logistic regression analysis				
Risk Factors	Odds Ratio	P-value	95% Confidence Interval			Odds Ratio	P-value	95% Confidence Interval		
General anesthesia	1									
Regional anesthesia	1.09	0.494	0.85	~	1.40					
First quintile (<100 surgeries)	1					1				
Second quintile (100-500 surgeries)	0.77	0.059	0.59	~	1.01	0.78	0.008	0.65	~	0.93
Third quintile (>500 surgeries)	0.47	<0.001	0.34	~	0.63	0.54	<0.001	0.42	~	0.69
Private insurance	1									
Medicare/Medicaid	2.52	<0.001	2.07	~	3.07	2.68	<0.001	2.28		3.16
COPD	1.58	0.002	1.17	~	2.11	1.62	0.000	1.25	~	2.09
Diabetes	2.07	0.019	1.12	~	3.80	2.24	0.002	1.34	~	3.77
Coagulopathy	4.63	0.020	1.27	~	16.86	4.99	0.009	1.49	~	16.66
OR>2hr	0.87	0.130	0.73		1.04					

COPD: Chronic obstructive pulmonary disease; OR>2hr: Operating room time longer than 2 hours.

CONCLUSIONS

The rate of hospital-based acute care following outpatient ACL surgery was 3.90%. Many of the events were expected complications related to surgery, such as infection and deep venous thrombosis. However, musculoskeletal pain, drug abuse, and psychotic events featured more prominently than expected. Our findings may direct efforts to address the reasons for seeking acute care after ACL surgery, reduce cost and improve quality of care.

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