Clinical and Health Economic Outcomes With and Without Liposomal Bupivacaine in Medicare-Insured Patients Undergoing Outpatient Shoulder Arthroplasty

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OBJECTIVE

To evaluate the impact of liposomal bupivacaine (LB) on healthcare utilization and opioid use for up to 12 months following total shoulder arthroplasty (TSA)

CONCLUSIONS

- Medicare-insured patients receiving LB for outpatient TSA had lower all-cause total healthcare costs over 1 year of follow-up and experienced lower opioid use 1 week following surgery compared with patients not receiving LB (non-LB), which may have been driven by more effective perioperative pain management
- 2 These findings support reduced cost and improved quality metrics in patients treated with LB versus non-LB analgesia for outpatient shoulder surgery



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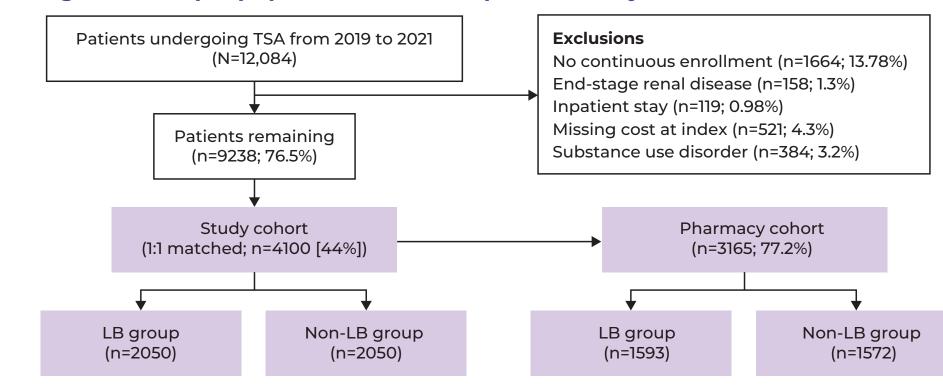
INTRODUCTION

- TSA (anatomic and reverse) procedures have been increasingly performed in the United States in recent years, with >100,000 procedures estimated to be performed in 2025¹
- Performing TSA procedures in outpatient care settings is associated with reduced healthcare costs compared with performing these procedures in inpatient settings²
- Effective perioperative pain management is critical to enable shorter length of stay after TSA and avoid severe pain, which can lead to downstream healthcare resource utilization and costs^{3,4}
- A continuous indwelling catheter is one method for prolonged pain control after outpatient TSA, but it can have a high equipment cost and is associated with complications^{5,6}
- LB is a nonopioid treatment that has been found to be associated with reduced opioid consumption in patients undergoing TSA procedures⁷⁻⁹
- The NOPAIN Act has expanded reimbursement for qualifying nonopioid therapies, such as LB, when used for Medicare-insured patients undergoing outpatient procedures¹⁰
- However, data regarding LB use for outpatient TSA in Medicare-insured patients are limited

RESULTS

• Overall, 4100 patients were included in the analysis (LB, n=2050; non-LB, n=2050) (Figure 1)

Figure 1. Sample population for retrospective analysis.



 $LB, liposomal\ bupiva caine; TSA, total\ shoulder\ arthroplasty.$

- After propensity score matching, patient characteristics were similar between groups (Table 1)
- The median age was ~74 years; most patients were female, White, and had a diagnosis of osteoarthritis
- ~16% of patients had prior opioid exposure; ~25% to 30% of patients had chronic pain or were obese, and ~15% to 17% of patients had anxiety, depression, or had smoked

Table 1. Baseline Demographic and Clinical Characteristics

	PS-matched LB (n=2050) ^a	PS-matched non-LB (n=2050) ^a	PS-matched standardized mean difference, %
Age, mean (SD), y	74.5 (6.1)	74.3 (6.1)	3.5
Sex	(/	(37)	
Female	1152 (56.2)	1118 (54.5)	-3.3
Male	898 (43.8)	932 (45.5)	3.3
Race	, ,	, ,	
White	1892 (92.3)	1917 (93.5)	-4.8
Non-White	158 (7.7)	133 (6.5)	4.8
Charlson Comorbidity Score, mean (SD)	0.6 (1.0)	0.6 (1.1)	1.8
Anxiety	334 (16.3)	343 (16.7)	-1.2
Chronic pain	625 (30.5)	638 (31.1)	-1.4
Depression	321 (15.7)	307 (15.0)	-1.9
Osteoarthritis	1926 (93.9)	1943 (94.8)	-3.6
Smoking	343 (16.7)	327 (15.9)	-2.1
Cancer	316 (15.4)	282 (13.8)	-4.7
Obesity	560 (27.3)	553 (27.0)	-0.8
Prior opioid exposure ^b	348 (17.0)	333 (16.2)	-2.0
Procedure year			
2019	36 (1.8)	32 (1.6)	1.5
2020	44 (2.2)	48 (2.3)	-1.3
2021	1970 (96.1)	1970 (96.1)	0.0
Region			
Northeast	214 (10.4)	228 (11.1)	-3.0
Midwest	530 (25.9)	557 (27.2)	2.2
South	935 (45.6)	777 (37.9)	15.7
West	371 (18.1)	488 (23.8)	-]4.]

- Although there was no difference in the cost on the day of surgery between the 2 groups, the LB group had lower total medical costs compared with the non-LB group during follow-up after surgery (Figure 2)
- Specifically, total medical costs were significantly lower in the LB group than the non-LB group over 30 days (\$359 reduction; rate ratio [95% confidence interval (CI)], 0.84 [0.73, 0.96]; P=0.011), 90 days (\$500 reduction; rate ratio [95% CI], 0.85 [0.77, 0.94]; P=0.002), and 180 days (\$541 reduction; rate ratio [95% CI], 0.89 [0.81, 0.98]; P=0.015) after surgery, and costs were numerically lower over 365 days after surgery (\$476 reduction; rate ratio [95% CI], 0.94 [0.86, 1.02]; P=0.159)
- Total medical cost savings were generally driven by lower ED and outpatient medical costs in the LB group versus the non-LB group
- Total all-cause ED costs were numerically lower in the LB group than the non-LB group over 30 days after surgery (\$8 reduction; rate ratio [95% CI], 0.95 [0.64, 1.42]; P=0.817) and were significantly lower over 90 days (\$96 reduction; rate ratio [95% CI], 0.73 [0.55, 0.97]; P=0.029), 180 days (\$194 reduction; rate ratio [95% CI], 0.70 [0.37, 0.88]; P=0.002), and 365 days (\$205 reduction; rate ratio [95% CI], 0.80 [0.67, 0.96]; P=0.014) after surgery
- Total all-cause outpatient medical costs were numerically lower in the LB group over 30 days (\$28 reduction),
 90 days (\$128 reduction), and 180 days (\$85 reduction) after surgery than the non-LB group
- Similar trends were observed in the subgroup of opioidnaive patients, with those in the LB group having lower medical costs at 30, 90, 180, and 365 days than the non-LB group due to lower all-cause ED and all-cause outpatient costs at 90, 180, and 365 days (Figure 3)
- The subgroup of opioid-experienced patients in the LB group had lower medical costs at each time point compared with the non-LB group, which was driven mostly by lower all-cause outpatient costs (Figure 4)
- For patients with opioid use after surgery, the LB group consumed significantly fewer opioids than the non-LB group in the first week (average 165 vs 183 MMEs; rate ratio [95% CI], 0.9 [0.8, 1.0]; *P*=0.01); for up to 90 days after surgery, there was numerically lower opioid consumption in the LB group than non-LB group
- Similar observations were observed for opioid-naive patients in the first week and 30 days after surgery
- For opioid-experienced patients, lower, albeit not statistically significant, opioid consumption was observed over 12 months of follow-up in the LB group compared with the non-LB group
- The overall rate of pain-related complications (ICD diagnosis code, M25.51X) over 6 months after surgery was comparable between the LB and non-LB groups; however, the subgroup of patients who were opioid experienced before surgery had 31% lower odds of pain-related complications over a year after surgery (52.3% in the LB group vs 61.3% in the non-LB group; odds ratio [95% CI], 0.69 [0.51-0.94]; *P*=0.0183) with event reduction persisting to 12 months

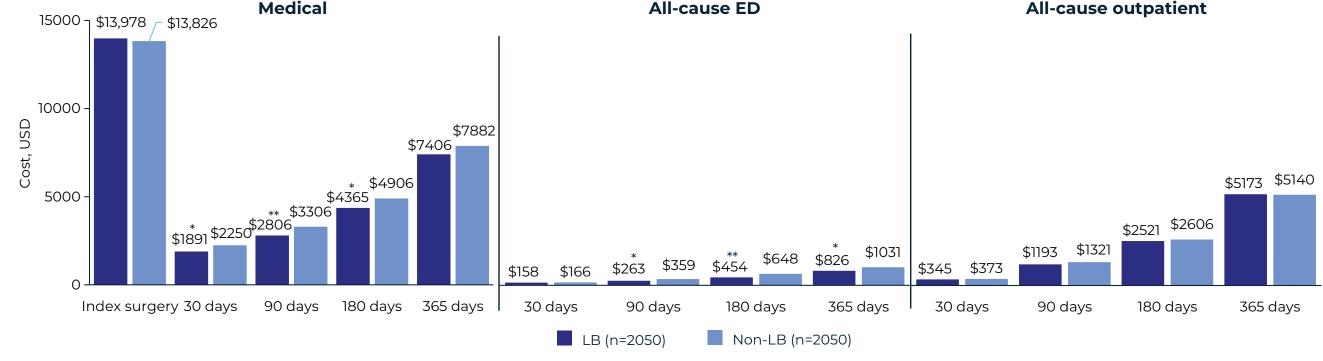
METHODS

- Adults undergoing a TSA procedure between January 2019 and December 2021 in a hospital outpatient department with continuous enrollment at least 6 months before surgery and 12 months after surgery were retrospectively identified from the Centers for Medicare & Medicaid Services (CMS) database
- Data for this study were extracted from the 20% Research Identifiable File Medicare Fee for Service (FFS) claims data (Parts A, B, D) and beneficiary enrollment/summary files under CMS Data Use Agreement (DUA) 70419
- The study cohort (Figure 1) was composed of patients who were divided into 2 groups on the basis of LB use during or after the TSA procedure; groups were generated with 1:1 propensity score matching between the LB and non-LB groups
 Opioid-related outcomes were assessed over 12 months of follow-up after the surgery visit in the pharmacy cohort and included opioid use in oral morphine
- milligram equivalents (MMEs) and prescription status (yes/no)

 Total medical cost of care was assessed in the study cohort on the basis of costs from outpatient, inpatient, emergency department (ED), and skilled nursing
- facility (SNF) visits

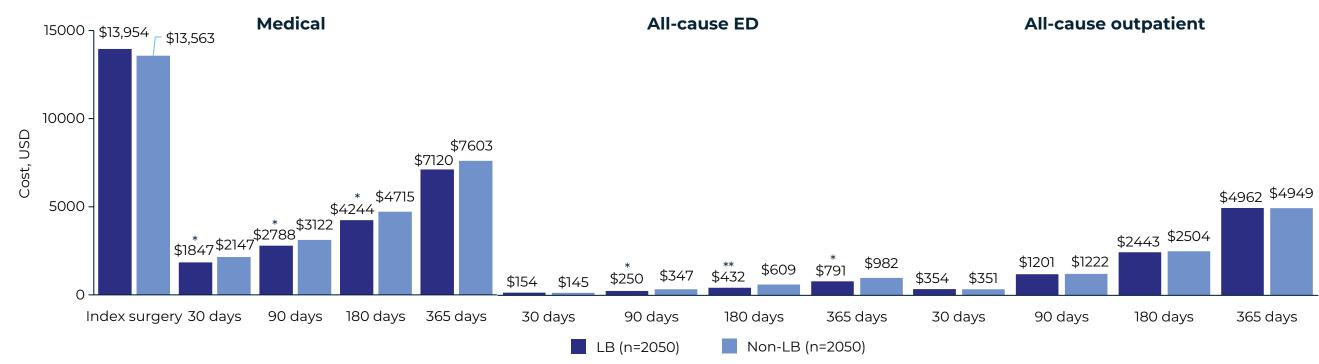
 Generalized linear regression modeling was performed with appropriate distributions including gamma distribution for healthcare costs. Tweedie distribution
- Generalized linear regression modeling was performed with appropriate distributions, including gamma distribution for healthcare costs, Tweedie distribution for opioid intake (MMEs), and binomial distribution for opioid filled status
- Subgroup analysis of outcomes was performed according to opioid exposure at baseline

Figure 2. Medical, all-cause ED, and all-cause outpatient cost comparisons between the LB and non-LB groups.



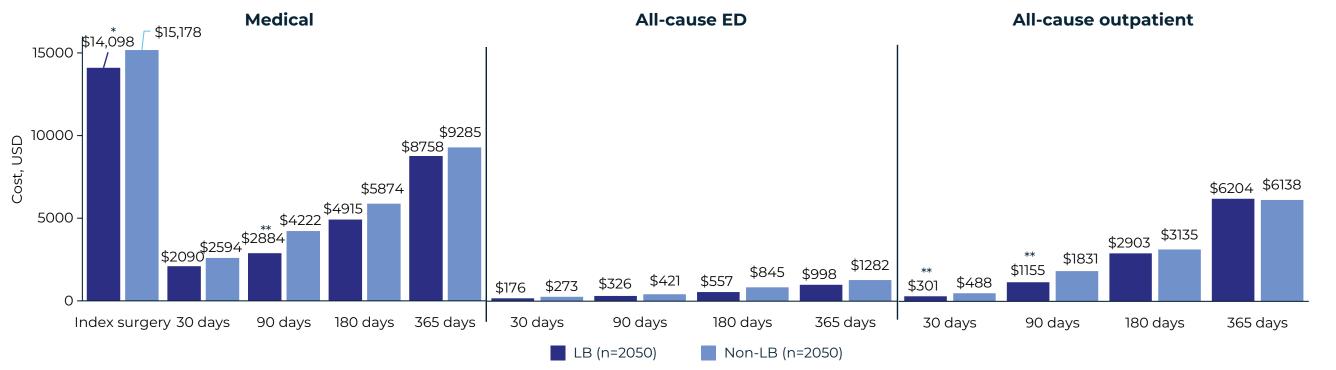
ED, emergency department; LB, liposomal bupivacaine. *P<0.05. **P<0.01.

Figure 3. Medical, all-cause ED, and all-cause outpatient cost comparisons between the LB and non-LB groups for opioid-naive patients.



ED, emergency department; LB, liposomal bupivacaine. *P<0.05. **P<0.01.

Figure 4. Medical, all-cause ED, and all-cause outpatient cost comparisons between the LB and non-LB groups for opioid-experienced patients.



ED, emergency department; LB, liposomal bupivacaine. *P<0.05. **P<0.01.