

Lower Costs and Health Care Resource Utilization of Patients Undergoing Spinal Fusion Treated With Liposomal Bupivacaine in the Inpatient Commercial Setting: a Propensity Score Matched Cohort

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OBJECTIVE

To evaluate the real-world effectiveness of liposomal bupivacaine (LB) versus non-LB analgesia in spinal fusion surgery, focusing on cost and health care resource utilization (HCRU) from the index surgery day through the 30 days after the surgery day

CONCLUSIONS

- The use of LB was associated with significantly lower total costs in the inpatient commercial setting for spinal fusion, largely driven by lower length of hospital stay (LOS)
- Incorporating LB into postoperative pain management for spinal fusion holds promising clinical and economic potential, particularly in the commercial setting
- By demonstrating significantly lower total costs and reduced LOS with LB compared with non-LB analgesia, the findings support the consideration of LB as a cost-effective analgesic strategy in inpatient surgical care

INTRODUCTION

- Spinal fusion is a surgical procedure used to alleviate pain and improve stability in patients with degenerative spine conditions or deformities¹
- Effective postoperative pain management is essential for optimizing recovery and improving clinical outcomes^{2,3}
- Traditional anesthetics (eg, bupivacaine hydrochloride) for spinal fusion offer a limited 4–5-hour window of relief, often leaving patients requiring secondary pain medications; LB bridges this gap by providing sustained analgesia for up to 3–4 days²
- LB is an extended-release formulation of bupivacaine that offers prolonged pain relief compared with conventional anesthetics²

METHODS

STUDY DESIGN

- This retrospective cohort study used deidentified real-world patient data from NorstellaLinQ (a US closed claims database linked to inpatient electronic medical records) from January 2020 until March 2025
- The study population comprised commercially insured beneficiaries undergoing spinal fusion surgery in the inpatient care setting who received LB or standard of care options (non-LB)
- The index date was the day of spinal fusion surgery in the inpatient setting
 - Identified by Current Procedural Terminology and International Classification of Diseases, 10th Revision procedure codes
 - Propensity score matching (1:3 ratio) conducted between the LB and non-LB group was based on age, sex, race, geographic region, spinal fusion area (cervical vs lumbar), number of levels (1 vs ≥2), year of surgery, comorbidities, and medical costs 6 months before the index spinal fusion surgery

STUDY OUTCOMES AND STATISTICAL ANALYSIS

- Mean total costs per patient were assessed inclusive of the index spinal fusion surgery through the 30-day follow-up
- Mean HCRU per patient was assessed from the index spinal fusion surgery through the 30-day follow-up, including emergency department (ED) visits, inpatient admissions, and outpatient visits
- Differences between groups were analyzed using chi-square test for categorical variables and Wilcoxon-Mann-Whitney test for continuous variables (significance level: $P < 0.05$)

RESULTS

- There were 478 patients in the LB cohort and 1434 in the non-LB cohort
- Baseline demographics for the LB and non-LB cohorts were well balanced after propensity score matching (standardized mean difference, < 0.1)
- The mean age of patients was 56 years; most patients were female (55%) and white (>64%), and most received spinal fusion surgery at the lumbar level (84%; Table)

Table. Baseline Demographics of Patients With NorstellaLinQ Data for Spinal Surgery

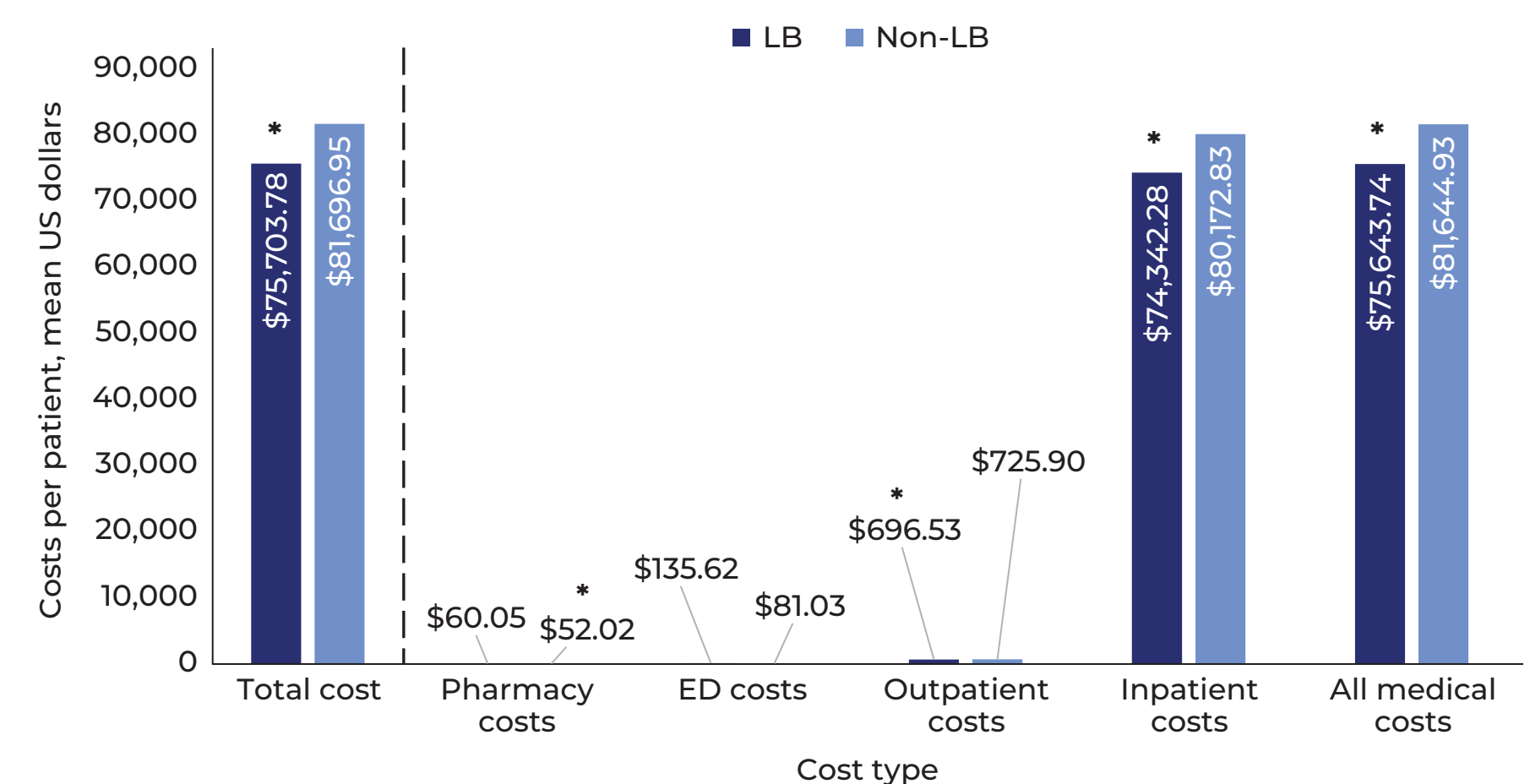
	LB (n=478)	Non-LB (n=1434)
Age, mean (SD), y	56 (10.5)	56 (11.5)
Female sex, %	56.1	55.2
Race/Ethnicity, n (%)^a		
Asian	8 (1.7)	20 (1.4)
Black/African American	31 (6.4)	78 (5.4)
White	308 (64.4)	970 (67.6)
Hispanic	53 (11.1)	172 (12.0)
Unknown	78 (16.3)	193 (13.4)
Key comorbidities, n (%)^b		
COPD	67 (14.0)	222 (15.5)
Diabetes	133 (27.8)	411 (28.7)
Obesity	167 (34.9)	434 (30.3)
Tobacco use	88 (18.4)	213 (14.8)
Opioid-related disorders	18 (3.8)	50 (3.5)
Spinal fusion level, n (%)		
Cervical	44 (9.21)	132 (9.21)
Lumbar	402 (84.1)	1206 (84.1)
Index year of surgery, n (%)		
2020	68 (14.2)	204 (14.2)
2021	97 (20.3)	291 (20.3)
2022	121 (25.3)	363 (25.3)
2023	130 (27.2)	390 (27.2)
2024	62 (13.0)	186 (13.0)

^a1 patient in the non-LB cohort identified as Native Hawaiian or other Pacific Islander.

^bComorbidities occurring in >10% of patients or related to pain modification. COPD, chronic obstructive pulmonary disease; LB, liposomal bupivacaine.

- The healthcare costs at the index spinal fusion surgery for the LB and non-LB groups were \$8072 and \$7487, respectively
- Mean total costs per patient from index spinal surgery to 30 days after surgery were significantly lower in the LB versus non-LB group ($-\$5993.17$ [\$75,703.78 vs \$81,696.95]; $P=0.0138$) (Figure 1)
 - These significant decreases in mean total costs for LB-treated patients were primarily driven by lower total medical costs ($-\$6001.19$; $P=0.0142$), attributable to lower inpatient costs ($-\$5830.55$; $P=0.0188$), followed by lower outpatient costs ($-\$29.37$; $P=0.0008$)
 - The somewhat higher pharmacy costs (\$8.03; $P < 0.0001$) and ED costs (\$54.59; $P > 0.05$) in the LB relative to the non-LB group were offset by the savings from medical costs

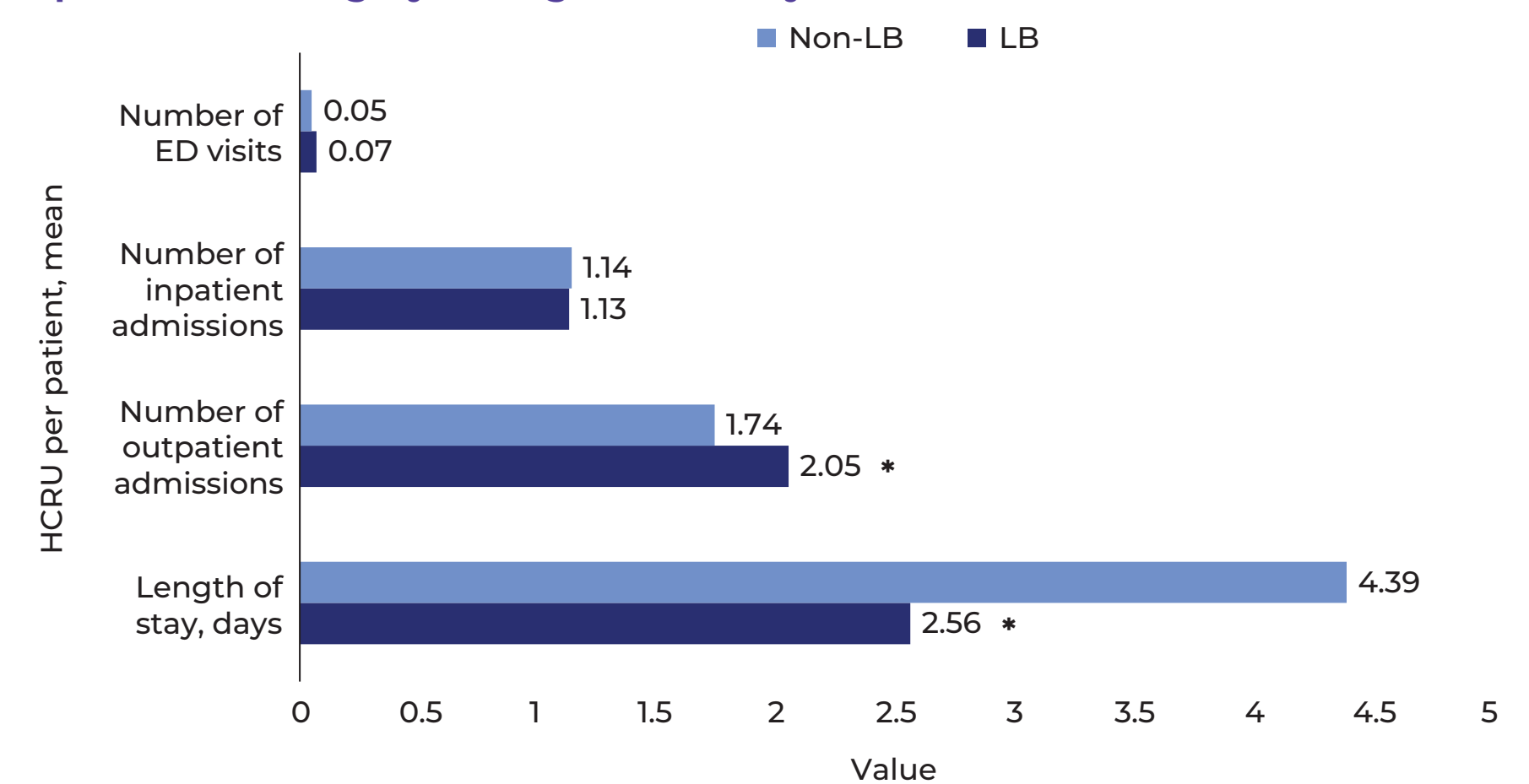
Figure 1. Mean costs per patient in the LB and non-LB groups from the index spinal fusion surgery through the 30-day FU in the inpatient care centers.



ED, emergency department; FU, follow-up; LB, liposomal bupivacaine. * $P < 0.05$.

- In the LB group, lower LOS over a 30-day period was observed in the LB group versus the non-LB group (-1.83 [2.56 vs 4.39] days; $P < 0.0001$) (Figure 2)
 - There were no differences in the number of ED or inpatient admissions between the 2 groups
 - The LB group had a slight increase in the number of outpatient admissions versus the non-LB group (0.31; $P < 0.001$)

Figure 2. Mean HCRU per patient in the LB and non-LB groups from the index spinal fusion surgery through the 30-day FU.



ED, emergency department; FU, follow-up; HCRU, healthcare resource utilization; LB, liposomal bupivacaine. * $P < 0.01$.

