Costs and Health Care Resource Utilization of Liposomal Bupivacaine and Ropivacaine in Total Knee Arthroplasty in the Hospital Outpatient Department: a Propensity Score Matched Cohort

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Disclosures: Gabriel Wong and Jennifer Lin are employees of Pacira BioSciences, Inc. Daniel Goltz has served on a speakers bureau or received an honorarium from Enovis and is a paid employee of the Academic Orthopaedic Consortium.

INTRODUCTION: Total knee arthroplasty (TKA) is a common surgical procedure aimed at alleviating pain and restoring function in patients with severe arthritis of the knee. Postoperative pain management is crucial for patient recovery and overall outcomes. Liposomal bupivacaine (LB) is an analgesic option that offers prolonged pain relief compared with traditional methods. This study evaluates the real-world effectiveness of LB versus ropivacaine in TKA from a cost and health care resource utilization (HCRU) perspective.

METHODS: This retrospective cohort study used deidentified patient data from NorstellaLinQ, a nationwide US closed claims database. The study period was from January 2020 until March 2025. The index date was the day of TKA surgery in the hospital outpatient department, identified by Current Procedural Terminology and International Classification of Diseases, 10th Revision procedure codes. Propensity score matching (1:1 ratio) was conducted between the LB and the ropivacaine cohort based on age, sex, race, region, year of surgery, comorbidities, and medical costs 6 months before surgery. Mean HCRU per patient was assessed over 30 days after surgery, including emergency department (ED), inpatient, and outpatient visits. Inpatient, ED, long-term care (LTC), and home health utilization were similarly assessed. Mean total costs per patient were assessed inclusive of the day of surgery to represent the total episode of care. Differences between groups were analyzed using chi-square test for categorical and Wilcoxon rank-sum test for continuous variables with a significance level of $P<0.05$. All analyses were performed separately by payor type (commercial vs Medicare Advantage [MA]).

RESULTS: The LB and ropivacaine patients were well balanced after 1:1 propensity score matching within each payor cohort (standardized mean difference <0.1). The sample size was 9463 each for the LB and ropivacaine groups in TKA commercial and 2924 each in TKA MA. The mean age was 61 and 71 years, with 57% and 63% being female in the TKA commercial and MA cohorts, respectively.

LB had significantly lower inpatient visits (0.20 vs 0.21) and home health utilization (36.2% vs 41.68%) versus ropivacaine in the commercial population ($P<0.05$) but had 0.6 more outpatient visits per patient ($P<0.01$) 30 days after surgery. In the TKA MA cohort, LTC utilization was higher in the LB versus ropivacaine group (66% vs 60%; $P<0.01$), while home health utilization was lower (39% vs 47%). LB had significantly lower outpatient, pharmacy, and home health costs in the commercial setting compared with ropivacaine ($P<0.01$). In the MA setting, LB had significantly lower outpatient and home health costs than ropivacaine, but higher LTC costs ($P<0.01$). Day-of-surgery costs for LB versus ropivacaine were $33,539 versus $33,867 in the commercial population and $16,693 versus $17,474 in MA ($P<0.01$ for all). Mean total costs per patient for the 30-day episode of care were significantly lower in the LB versus ropivacaine groups for commercial TKA ($37,466 vs $37,875; Figure 1) and MA TKA ($19,814 vs $21,173; $P<0.01$ for all; Figure 2).

DISCUSSION: Limitations of this study include incomplete coding, which can obscure true clinical outcomes or patient histories. Propensity score methods can account for only observable confounders and cannot control unobservable confounders.

SIGNIFICANCE/CLINICAL RELEVANCE: The use of LB is associated with significantly lower total costs in the hospital outpatient department commercial (-$409) and MA (-$1359) setting for TKA compared with ropivacaine over a 30-day surgical episode of care, with the cost savings attributable to reduced outpatient surgery costs and postdischarge home health utilization. These findings support use of LB as a cost-effective strategy in outpatient surgical care.

IMAGES AND TABLES:

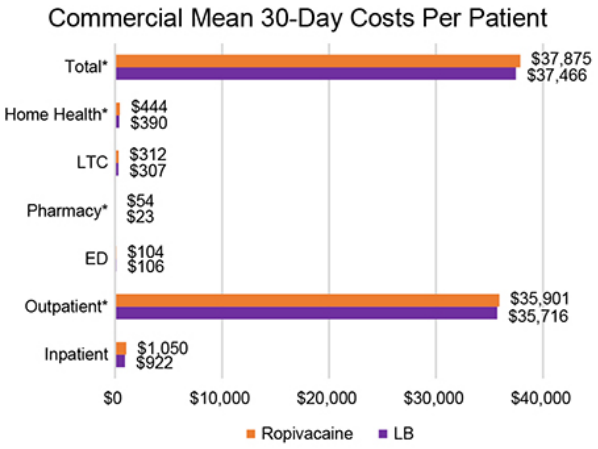

Figure 1. Commercial mean 30-day costs per patient. *$P<0.01$ between the LB and ropivacaine groups.

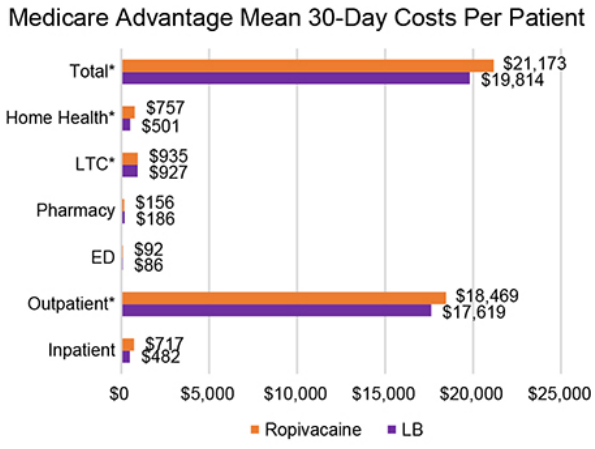

Figure 2. Medicare Advantage mean 30-day costs per patient. *$P<0.01$ between the LB and ropivacaine groups.