

Smoking History and General Anesthesia Are Associated with Increased 90-Day Readmission Following Total Knee Arthroplasty: A Retrospective Cohort Study

Alexander Burbelo¹, Jovon Cobbs¹, A. Blake Huffman¹, Adel Kanaan¹, Malik Khan¹, Liam Cleary¹, Amit Singla¹, Matthew Bullock¹
¹Marshall University Joan C. Edwards School of Medicine, Huntington, WV
 burbelo@marshall.edu

Disclosures: A. Burbelo (N) J. Cobbs (N), A. B. Huffman (N), A. Kanaan (N), M. Khan (N), L. Cleary (N), A. Singla (N), M. Bullock (3B, Smith & Nephew)

Introduction: Total knee arthroplasty (TKA) ranks among the most frequently performed surgeries in the United States, with procedure volume projected to grow by approximately 85%, reaching an estimated 1.26 million annual cases by 2030 [1]. Although TKA is typically performed safely as a same-day or short-stay outpatient surgery, its most frequent complications- periprosthetic joint infection and venous thromboembolism-continue to drive early postoperative morbidity and readmissions [2-4]. Since unplanned readmission poses significant clinical risk, it is necessary to identify modifiable perioperative factors that contribute to readmissions. Cigarette smoking remains a well-established predictor of poor arthroplasty outcomes among patient-related risk factors, with cohort and meta-analytic studies associating postoperative smoking with higher rates of lower respiratory infections, greater analgesic requirements and increased 30-day readmission rates [5,6]. Despite this, the combined impact of smoking history and anesthesia type on readmission risk remains largely unexplored in TKA populations.

Methods: We retrospectively reviewed 742 adults (296 male) who underwent primary TKA performed by four fellowship-trained arthroplasty surgeons at a single academic institution between September 2020 and April 2025 (IRB-approved). Patients were stratified by smoking status (nonsmoker vs. smoker [former or current]) and anesthesia type (regional vs. general) into four groups: nonsmoker + regional (NR), smoker + regional (SR), nonsmoker + general (NG), and smoker + general (SG). Demographic data (age, sex, BMI, ASA score), perioperative variables including intraoperative mean arterial pressure (MAP), and postoperative outcomes were obtained from the electronic medical record. The primary outcome was 90-day all-cause readmission; the secondary outcome was 90-day periprosthetic joint infection (PJI) confirmed by ICD-10 codes and adjudicated using the 2018 Musculoskeletal Infection Society (MSIS) criteria. Group comparisons were performed using ANOVA for continuous variables and Fisher’s exact test for categorical variables. Multivariable logistic regression was used to identify independent predictors of 90-day readmission and PJI, adjusting for age, sex, BMI, and ASA score. All analyses were conducted using R version 4.4.3, with significance set at $p < 0.05$.

Results: All four groups experienced a decrease in intraoperative MAP from baseline. The nonsmoker + regional (NR) group (n = 461) had the largest average drop (37.2 ± 14.0 mmHg) and served as the reference. Mean MAP drops were lower in the smoker + regional (SR) group (n = 212) (33.9 ± 13.1 mmHg, $p < 0.05$), nonsmoker + general (NG) group (n = 43) (28.3 ± 12.3 mmHg, $p < 0.001$), and smoker + general (SG) group (n = 26) (28.2 ± 15.5 mmHg, $p < 0.05$). Ninety-day all-cause readmission rates differed significantly between groups (unadjusted $p = 0.0011$). The SG group had the highest readmission rate (11.5%), followed by SR (4.2%), NG (2.3%), and NR (0.9%). Adjusted pairwise comparisons showed significantly higher readmission rates in SR (Holm-adjusted $p = 0.027$) and SG ($p = 0.025$) compared with NR, with no other significant differences. PJI incidence did not significantly differ between groups ($p = 0.090$).

Conclusion: Smoking history—regardless of anesthesia type—was associated with significantly higher odds of 90-day readmission following primary TKA, and patients in the smoker + general (SG) group had the highest risk. Both smoker + regional (SR) and smoker + general (SG) groups demonstrated higher readmission rates compared with nonsmoker + regional (NR), suggesting that smoking remains a dominant modifiable patient-level risk factor, and the use of general anesthesia may heighten this risk.

Significance/Clinical Relevance: These findings support avoiding the use of general anesthesia in TKA patients with a current or former smoking history, and taking steps to optimize their health preoperatively to avoid unplanned early postoperative readmissions.

Reference: [1] Sloan et al. *J Bone Joint Surg Am.* 2018 [2] Scully et al. *J Am Acad Orthop Surg.* 2020 [3] Cutter et al. *World J Orthop.* 2023 [4] Vasso et al. *Orthop Rev (Pavia).* 2022 [5] Yue et al. *Front Surg.* 2022 [6] Matharu et al. *Acta Orthop.* 2019

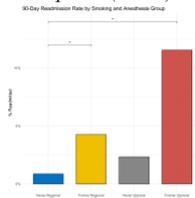


Figure 1. 90-day all-cause readmission rate by smoking and anesthesia group.

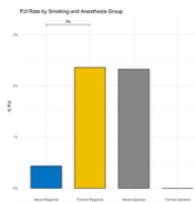


Figure 2. Readmission rate for periprosthetic joint infection (PJI) within 90-

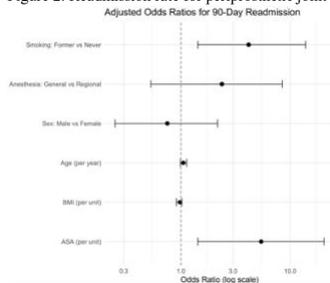


Figure 3. Multivariable Logistic Regression Predicting 90-Day Readmission.