Associations Between Opioid Use and 90-Day Costs After Carpal Tunnel Surgery: A Claims-Based Analysis

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INTRODUCTION:

Carpal tunnel release (CTR) is one of the most frequently performed hand surgeries in the U.S., generally involving low postoperative morbidity and limited need for opioid analgesia. Nonetheless, opioid prescriptions remain common, raising concerns about clinical necessity and potential downstream costs. While prior studies have examined prescribing rates and patient consumption, few have assessed whether higher opioid use after CTR is associated with increased short-term healthcare spending. This study examines that relationship using national insurance claims data.

METHODS: We performed a retrospective CPT-level analysis of U.S. commercial claims data using a 5% national sample from January 2019 to January 2020. The dataset included 42 aggregated rows representing patients who underwent CTR (CPT 64721), with data on patient counts, opioid fill categories, and 10th/50th/90th percentiles of 90-day post-discharge costs. Opioid exposure was categorized as: (1) “0–1 fills” (28 rows; 3,552 patients) vs. “2+ fills” (14 rows; 733 patients), and (2) “0 fills” (13 rows; 1,581 patients), “1 fill” (15 rows; 1,971 patients), and “2+ fills” (14 rows; 733 patients). We calculated descriptive statistics for each group and estimated bootstrap-derived 95% confidence intervals. Cost comparisons were performed using Wilcoxon rank-sum and Kruskal–Wallis tests. Secondary analyses included weighted least squares (WLS) regression and Spearman correlation. Violin plots were used to visualize distributional overlap.

RESULTS:

The overall mean 90-day post-discharge cost was $20,843 (SD $20,233; median $10,613). In the binary comparison, patients with “2+ fills” had higher mean costs ($29,085) than those with “0–1 fills” ($16,723). The Wilcoxon test did not reach statistical significance ($p = 0.126$), nor did the Kruskal–Wallis test ($\chi^2 = 2.395$, $p = 0.122$). However, WLS regression found a statistically significant association ($\beta = +\$6,442$ per patient; $p = 0.043$), suggesting a potential link between greater opioid use and increased costs. Bootstrap confidence intervals overlapped between groups. In the three-level comparison, mean costs increased stepwise with fill count ($15,373 → $17,893 → $29,085), but neither the Kruskal–Wallis test ($p = 0.205$) nor WLS regression ($\beta = \$2,777$ per fill-category increase; $p = 0.114$) reached significance. Spearman correlation showed a non-significant positive trend ($\rho = 0.278$, $p = 0.074$). Violin plots confirmed substantial cost overlap across groups.

DISCUSSION AND CONCLUSION:

Patients receiving two or more opioid prescriptions after CTR may incur higher short-term healthcare costs. While distribution-based tests were not statistically significant, the regression model suggests a possible association. Overlapping cost distributions and wide variability highlight the influence of unmeasured factors such as comorbidities or care variability.

In this national claims analysis, greater postoperative opioid use after CTR was associated with higher 90-day healthcare costs in regression analysis, though this trend was not supported by non-parametric tests. These findings support ongoing efforts to reduce unnecessary opioid prescribing and underscore the need for patient-level research to clarify causality.