

## Postoperative Opioid Use in Traumatic vs. Elective Cervical Spine Fusion Patients

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### INTRODUCTION

Opioid use following orthopaedic surgery is a very common postoperative pain management option and is especially common in spine surgery. Prior research regarding the use opioids in spine surgery has focused on predicting preoperative characteristics of patients for prolonged postoperative use of opioids. Additionally, researchers determined 5.5% in patients who underwent elective cervical spine surgery experienced opioid use persistence after 180 days postoperatively. Rates of opioid persistence for opioid-naïve patients vs prior opioid use patients in those who underwent cervical or lumbar surgery were 17.5% and 82.4%, respectively. However, there is no current literature describing opioid use patterns in patients undergoing surgery for traumatic cervical spine injuries. The purpose of this study is to evaluate the postoperative opioid prescription and consumption patterns in the traumatic and elective cervical spine injury patients undergoing cervical fusion surgery.

### METHODS

After Institutional Review Board approval, we reviewed our institutional spine surgery consult service database to identify patients with traumatic cervical injuries who underwent cervical fusion during their initial hospital admission. An additional structured query language (SQL) search was performed to identify patients who underwent elective cervical fusion surgery. After patients were identified, demographical information regarding, age, sex, body mass index (BMI), race, distressed community index (DCI), procedure type, and levels fused was collected by retrospective chart review. The Prescription Drug Monitoring Program (PDMP) was reviewed for each patient regarding the number of opioid prescriptions filled, preoperative opioid use, postoperative opioid use, and use of perioperative benzodiazepines, muscle relaxants, or gabapentin. Statistical analysis was performed to compare traumatic injury patients who underwent cervical fusion to elective cervical fusion patients. A 1:1 propensity match of the cohorts was performed utilizing age, sex, BMI, procedure type and levels fused.

### RESULTS

291 total cervical fusion patients from 2017-2021 were identified with complete PDMP data, including 48 patients who underwent fusion surgery for a traumatic cervical spine injury. Elective patients were found to fill more prescriptions (3.19 vs. 0.65 p=0.023) and take more morphine milligram equivalents (MME) per day (0.60 vs. 0.04 p=0.014) within one year prior to surgery in comparison to traumatic patients. Within 30 days postoperatively, elective patients used opioids more frequently (89.6% vs. 52.1% p<0.001) and took more MMEs per day (3.73 vs. 1.71 p<0.001) than traumatic patients. Multivariate stepwise regression demonstrated preoperative opioid use (Estimate: 1.87 p=0.013) to be correlated with higher postoperative MME/day within 30 days of surgery and surgery after traumatic injury was not correlated with higher postoperative MME use per day within 30 days of surgery (Estimate:-1.63 p=0.022).

### DISCUSSION

Opioid use is a continued postoperative concern in orthopaedic spine surgery. Our results demonstrate that patients who undergo cervical fusion for traumatic cervical spine injuries consume fewer opioids within 30 days after surgery in comparison to elective cervical fusion patients however both cohorts consumed a similar amount after the initial 30-day postoperative period. Additionally, our results show that regardless of the preoperative nature of cervical spine injury, preoperative opioid use was correlated with higher MME consumption per day within 30 days postoperatively.

Our results further support the previously established finding that preoperative opioid use is a risk factor for higher consumption of postoperative opioids, however, prior studies have not described postoperative use in traumatic cervical spine injuries who undergo cervical fusion. We hypothesize our findings could be due to the characteristics of traumatic injury patients as often these patients do not have a history of spine pathology and therefore their follow-up care may not be as well organized preoperatively or as readily accessible. This concern may lead to inadequate pain control in the acute postoperative time frame and the opioid consumption patterns demonstrated in this study.

The limitations of study include first the retrospective design which may inherently allow for selection bias. Second, the inclusion of traumatic and elective patients was influenced by the availability of PDMP data for each patient, which allowed for an additional opportunity for selection bias in this study. Overall, this study is the first attempt to describe the opioid prescription and consumption patterns of traumatic cervical fusion patients and to perform a comparison with elective fusion patients. This study may aid physicians in further understanding postoperative care needs for patients based on presenting injury characteristics and highlights the need for enhanced follow-up care for traumatic cervical spine injury patients after fusion surgery.

### SIGNIFICANCE/CLINICAL RELEVANCE

Opioid use following spine surgery is common in postoperative pain management however there is no current literature regarding opioid use patterns in patients undergoing cervical fusion for traumatic cervical spine injuries. We observed patients who underwent cervical fusion for traumatic injuries consume fewer opioids in the acute postoperative time frame in comparison to elective cervical fusion patients.

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**TABLES:** Perioperative Opioid and Benzodiazepine Use

	Total	Elective	Trauma	P Value
Preop Opioid Use				0.051
Yes	32 (33.3%)	21 (43.8%)	11 (22.9%)	
Used Opioids 0 – 30 Days Postop				<0.001
Yes	68 (70.8%)	43 (89.6%)	25 (52.1%)	
MME/day 0 – 30 Days Postop	2.72 (3.55)	3.73 (3.84)	1.71 (2.95)	<0.001
Used Benzodiazepines 0 – 30 Days Postop:				0.008
Yes	22 (22.9%)	17 (35.4%)	5 (10.4%)	
MME/day 30 – 90 Days Postop	0.90 (2.66)	0.80 (2.02)	0.99 (3.20)	0.402
MME/day 90 – 365 Days Postop	0.43 (1.40)	0.44 (1.23)	0.43 (1.56)	0.634

