Anterior Cervical Discectomy and Fusion Reduces Postoperative Opioid Use in the Veteran Population

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INTRODUCTION: The US veteran population represents a large group with a higher burden of mental health comorbidities and substance use problems compared to the general population. The purpose of this study if to examine 1) if having anterior cervical discectomy and fusion (ACDF) would help this vulnerable population decrease their pain medication requirements postoperatively, 2) examine the trends in preoperative opioid prescribing in this population, and 3) evaluate the percentage of opioid naïve patients who remained on opioids after their ACDF.

METHODS: A retrospective study was conducted using the Veterans Affairs Informatics and Computing Infrastructure (VINCI) database. Patients who underwent ACDF were identified and stratified into three groups based on their preoperative opioid usage within the 365 days prior to the procedure. Cumulative pre- and postoperative opioid usage for each patient was calculated in Morphine Milligram Equivalents (MME) and the paired Wilcoxon signed rank test was used to compare cumulative preoperative MME to cumulative postoperative MME.

RESULTS: Of the 7,892 patients identified, 3,927 (49.7%) were opioid naïve prior to surgery, 1,813 (23.0%) had low preoperative opioid claims (1-3 claims), and 2,152 (27.3%) had high preoperative opioids claims (>3 claims). The proportion of patients in the high preoperative opioid claims group with at least one opioid claim dropped from 91.9% at postoperative day 30 to 77.8% by postoperative day 365. In the opioid naïve group, 13.1% of patients remained on opioids at day 365. Among all patients, median postoperative opioid MME was significantly lower than median preoperative opioid usage (0 vs. 7.5, p < 0.001). Patients who were at higher risk for continued opioid use were older, of Hispanic ethnicity, and had higher rates of depression, substance use disorder, tobacco use, wound infections, and any postoperative complication.

DISCUSSION AND CONCLUSION: Following ACDF surgery there was a significant reduction in median postoperative MME in both the low and high preoperative opioid cohorts. In those naïve to opioids prior to surgery, 13.1% remained on opioids at day 365. Notably, those with more than 3 preoperative opioid claims were at significantly higher risk of continued postoperative use, however, the usage did decrease in the year following surgery.

Figure 1. Line diagram demonstrating postoperative claim rates after ACDF surgery by degree of opioid claims made preoperatively. The proportion of patients who filed at least one opioid claim at postoperative days 30, 90, 180, and 365 is shown.

Table 1. Baseline cohort demographics
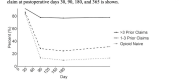
Characteristics	Opioid Naïve (n = 3927)	1-3 Prior Claims (n = 1813)	>3 Prior Claims (n = 2152)
Age (Years), Mean ± SD	64.5 ± 10.8	64.1 ± 11.0	64.8 ± 9.4
Male Sex, n (%)	3652 (93.0)	1666 (91.9)	1974 (91.7)
Race, n (%)			
White	2903 (73.9)	1333 (73.5)	1642 (76.3)
Black	734 (18.7)	369 (20.4)	376 (17.5)
Asian	13 (0.3)	8 (0.4)	6 (0.3)
Native	38 (1.0)	10 (0.6)	8 (0.4)
Other	34 (0.9)	12 (0.7)	17 (0.8)
Comorbidities, n (%)			
Tobacco	557 (14.2)	275 (15.2)	394 (18.3)
Obesity	249 (6.3)	102 (5.6)	172 (8.0)
HTN	1580 (40.2)	744 (41.0)	936 (43.5)
Diabetes Mellitus	595 (15.2)	288 (15.9)	317 (14.7)
Depression	407 (10.4)	206 (11.4)	263 (12.2)
Length of Stay (Days), Median (IQR)	6.2 days ± 26.1	5.9 days ± 38.2	5.9 days ± 69.4

Table 2. Preoperative versus postoperative MME

Groups	Preoperative Median MME (median, IQR)	Postoperative Median MME (median, IQR)	p-value
All	7.5 (0-1,800)	0.0-1,623)	0.006
Opioid Naïve	0 (0-0)	0 (0-0)	<0.001
1-3 Prior Claims	450 (189-900)	0.0-630)	<0.001
>3 Prior Claims	6300 (2846-13160)	5,062 (900-13,357)	<0.001

Table 3. Comorbidities associated with continued postoperative opioid use

	Discontinued (n = 6625)	Continued (n = 1267)	OR (95% CI)	p-value
Age, mean (SD)	64.2 ± 11.0	65.0 ± 9.7		<0.001
LOS, mean (SD)	6.1 days (11.0)	5.1 ± 8.7 days		0.072
Gender	6251 (92.6)	1019 (91.9)	1.08 (0.89-1.35)	1
Hispanic Ethnicity	227 (4.9)	109 (6.1)	1.26 (1.03-1.54)	0.023
Not Hispanic Ethnicity	4257 (92.8)	1965 (90.8)	0.85 (0.72-1.60)	0.045
Comorbidities, n (%)				
Tobacco Use	645 (13.8)	581 (17.3)	1.33 (1.10-1.53)	<0.001
CHF	81 (1.8)	65 (1.9)	1.18 (0.78-1.96)	0.609
HTN	1826 (39.7)	1624 (45.6)	1.17 (1.07-1.29)	<0.001
Diabetes Mellitus	688 (14.9)	922 (18.7)	1.06 (0.96-1.21)	0.545
Liver Disease	114 (2.5)	135 (2.6)	1.48 (1.15-1.94)	0.004
Obesity	295 (6.3)	250 (7.0)	1.12 (0.95-1.34)	0.211
Anemia	59 (1.1)	67 (2.1)	1.92 (1.34-2.83)	<0.001
Alcohol use	171 (3.7)	115 (3.5)	0.95 (0.75-1.20)	0.624
Drug Abuse	182 (2.2)	84 (2.6)	1.17 (0.86-1.58)	0.295
Psychoses	93 (2.1)	122 (3.7)	1.80 (1.40-2.45)	<0.001
Depression	474 (10.2)	402 (13.3)	1.23 (1.06-1.42)	0.005
Opioid Naïve	3215 (69.5)	712 (21.0)	0.12 (0.11-0.14)	<0.001
Low preoperative opioid use	1098 (23.6)	715 (22.1)	0.92 (0.83-1.03)	0.150
High preoperative opioid use	528 (6.9)	1832 (56.1)	17.17 (15.45-19.67)	<0.001
Surgical Complications, n (%)				
Wound Infection	21 (0.5)	26 (0.9)	1.90 (1.04-3.52)	0.039
Wound Dehiscence	9 (0.2)	15 (0.5)	2.37 (0.97-6.14)	0.059
Any Orthopaedic Complication	39 (0.9)	36 (1.2)	1.06 (1.11-3.16)	0.012
Any Surgical Complication	555 (12.4)	442 (13.5)	1.15 (1.06-1.25)	0.006
Instrumentation 2-3 Levels	2820 (61.5)	1438 (44.0)	1.01 (0.93-1.11)	0.795
Instrumentation 4-7 Levels	385 (6.6)	286 (7.2)	1.11 (0.95-1.33)	0.207
Instrumentation >8 Levels	8 (0.1)	4 (0.1)	0.94 (0.24-3.56)	1

Table 4. Postoperative 30-day complications stratified by preoperative usage

Complications, n (%)	Opioid Naïve (n = 3,927)	1-3 Prior Claims (n = 1813)	>3 Prior Claims (n = 2152)	p-value
Any Complication	490 (12.5)	111.6)	13 (0.5)	1
Wound Infection	22 (0.6)	5 (0.3)	22 (1.0)	0.140
Wound Dehiscence	7 (0.2)	5 (0.3)	12 (0.6)	0.501
Dural Tear	58 (1.0)	29 (1.6)	28 (1.3)	1
Pulmonary Complication	233 (5.9)	93 (5.1)	109 (4.6)	1
Cardiovascular Complication	39 (1.0)	17 (0.9)	11 (0.5)	1
Urinary Tract Infection	74 (1.9)	34 (1.9)	29 (1.3)	1
Sepsis	26 (0.5)	15 (0.8)	16 (0.7)	1
Pneumonia	42 (1.1)	20 (1.1)	19 (0.9)	1

Table 5. Preoperative MME between 2010-2015 and 2016-2020

Groups	2010-2015 (Median, IQR)	2016-2020 (Median, IQR)	p-value
All	150 (0-2755)	0 (0-900)	<0.001
Opioid Naïve	0 (0-0)	0 (0-0)	N/A
1-3 Prior Claims	527 (240-1000)	300 (150-630)	<0.001
>3 Prior Claims	6,600 (3,000-13,740)	5,700 (2,480-11,295)	<0.001