Does in-hospital opioid use have any effect on long term opioid use after lumbar fusion surgery for opioid naïve patients?

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INTRODUCTION: Opioids have been used in the postoperative setting since the turn of the 20th century to help mitigate postoperative pain. However, despite their benefits, opioids carry significant risks, including risks of dependence and tolerance. In 2016, the CDC published new guidelines regarding steps that can be taken to minimize adverse effects related to opioid consumption. In their guidelines, they specified 90 MME as a soft cutoff that providers should try to stay under when prescribing opioids to patients suffering from chronic pain conditions. In 2022, the CDC published updated guidelines that further reduced their daily recommended MME to 50 MME. Ideal MME in the acute postoperative setting has not been explored, though it is generally recommended that providers use the lowest amount of opioids necessary for adequate pain relief. To date, there are no studies that examine whether opioid-naïve patients who consume higher quantities of opioids are at increased risk of long term opioid use. Thus, the purpose of this study is to examine long term opioid use in patients who received > or <50 MME per day while at the hospital.

METHODS: We identified all opioid naïve patients aged 18 years or older who underwent lumbar fusion from 2018-2019. Opioid naïve patients were defined as those who did not consumed opioids in the year prior to surgery, consistent with prior literature. We stratified patients by whether they received > or <50 MME per day per CDC guidelines. All patients were retrospectively reviewed for demographic information (age, sex, race, body mass index (BMI)), Charlson Comorbidity Index (CCI), Elixhauser, surgical levels fused, and length of stay (LOS). Opioid utilization, including total number of prescriptions and morphine milligram equivalents (MME) per day, was tracked for both sets of patients from one year prior to the surgery to two years postoperatively, utilizing data from the Pennsylvania Prescription Drug Monitoring Program. Opioid-related data was further categorized by time intervals (60-30 days and 30-0 days before surgery, 0-30, 30-90, 90-365, and 365-720 days after surgery). We analyzed 90 day hospital readmission rates and recorded all surgeries up to two years postoperatively. Linear and Poisson regressions were conducted using MME per day within the first 90 days and 90-365 days postoperatively as dependent variables.

RESULTS:

143 opioid naïve patients consumed fewer than 50 MME per day, while 180 patients consumed more than 50 MME per day. Patients who consumed more than 50 MME per day were on average younger (58.7 vs 66.4, $p<0.001$) with lower CCI scores (2.82 vs 4.01, $p<0.001$) and a shorter length of stay (3.0 vs 3.81, $p=0.002$). On bivariate analysis, patients who consumed more than 50 MME per day consumed higher MMEs from 0-90 days ($p<0.001$), and 90-365 days ($p=0.037$) postoperatively. No differences existed between groups with regards to MME use from 1-2 years postoperatively. Multivariate regression identified age, CCI and in hospital MME per day as independent predictors of elevated MME consumption within the first 3 months postoperatively. Multivariate regression identified CCI and in hospital MME per day as independent predictors of elevated MME consumption from 90-365 days postoperatively.

DISCUSSION AND CONCLUSION: Our results suggest that elevated in-hospital MME is an independent predictor of long term postoperative opioid use up to one year after surgery for opioid naïve patients. Thus while higher in-hospital opioid use is beneficial with regards to pain management, and may potentially contribute to a reduced length of stay, continuity of such care should be maintained after discharge, as these patients may be at higher risk for increased opioid consumption in the first year after surgery. Importantly, our results show that opioid consumption equalizes beyond one year, which suggests that increased in-hospital MME does not substantially increase a patient's risk of chronic opioid dependence. Additional follow-up studies are warranted to further investigate these relationships.

Table 1: Demographic Characteristics

	Fewer than 50 MME per Day (N=143)	More than 50 MME per Day (N=180)	P Value
Age	66.4 (10.7)	58.7 (10.6)	**<0.001**
Race			0.273
White	105 (73.4%)	140 (77.8%)	
Black	23 (16.1%)	26 (14.4%)	
Asian	5 (3.50%)	1 (0.56%)	
Other	10 (6.99%)	13 (7.22%)	
Sex			0.426
Male	69 (48.3%)	96 (53.3%)	
Female	74 (51.7%)	84 (46.7%)	
Body Mass Index	30.4 (6.18)	31.1 (6.36)	0.388
CCI	4.01 (1.72)	2.82 (1.57)	**<0.001**
Smoking Status			0.104
Never	86 (60.1%)	98 (54.4%)	
Former	37 (25.9%)	40 (22.2%)	
Current	20 (14.0%)	42 (23.3%)	

Data listed as either: mean (SD) or n (%)

CCI=Charlson Comorbidity Index

Table 2: In-Hospital Characteristics

	Fewer than 50 MME per Day (N=143)	More than 50 MME per Day (N=180)	P Value
Surgery Performed			0.301
PLDF	69 (48.3%)	68 (37.8%)	
TLIF	44 (30.8%)	65 (36.1%)	
A/PLDF	28 (19.6%)	44 (24.4%)	
XLIF	2 (1.40%)	3 (1.67%)	
Levels Fused	1.87 (1.54)	1.76 (1.68)	0.323
Cut to Close Time (Min)	228 (104)	223 (90.4)	0.876
Hospital Length of Stay	3.81 (2.91)	3.00 (1.19)	**0.002**
Total In Hospital MME	125 (96.8)	232 (104)	**<0.001**
In-Hospital MME per Day	33.9 (10.4)	78.9 (21.1)	**<0.001**
Utilized PCA	10 (6.99%)	11 (6.11%)	0.927
In Hospital Opioids Received			
Codeine	1 (0.69%)	0 (0.00%)	0.433
Fentanyl	43 (30.1%)	68 (37.8%)	0.183
Hydrocodone	5 (3.50%)	4 (2.22%)	0.516
Hydromorphone	71 (49.7%)	103 (57.2%)	0.214
Morphine	8 (5.59%)	10 (5.56%)	1.000
Oxycodone	102 (71.3%)	175 (97.2%)	**<0.001**
Tramadol	109 (76.2%)	150 (83.3%)	0.147

Data listed as either: mean (SD) or n (%)

PLDF=Posterior Lumbar Decompression and Fusion; TLIF=Transforaminal Lumbar Interbody Fusion; A/PLDF=Combined Anterior/Posterior Decompression and Fusion; XLIF=Extreme Lateral Interbody Fusion; MME=Morphine Milligram Equivalent; PCA=Patient-Controlled Anesthesia

Table 3: Post-Operative Opioid Consumption

	Fewer than 50 MME per Day (N=143)	More than 50 MME per Day (N=180)	P Value
Number of Patients Using Opioids 0-90 Days Post-Op	129 (90.2%)	174 (96.7%)	**0.031**
Number of Patients Using Opioids Beyond 90 Days	46 (32.2%)	45 (25.0%)	0.194
Total Prescriptions Post-Op	2.47 (3.24)	2.71 (3.97)	0.819
Total MME 0-2 Years Post-Op	114 (176)	150 (313)	**0.001**
MME 0-90 Days Post-Op	73.8 (75.5)	107 (111)	**<0.001**
MME 90-365 Days Post-Op	10.2 (23.0)	23.8 (193)	**0.037**
MME 1-2 Years Post-Op	30.2 (140)	18.7 (72.1)	0.760

Data listed as either: mean (SD) or n (%)

MME=Morphine Milligram Equivalent

This write up is looking at running two linear regressions focusing on MME intake within the first 3 months and then MME intake from 3 months up to a year.

Table one looks at MME per day within the first 3 months postop as the dependent outcome.

Variable	Estimate	P Value	Lower 95	Upper 95
Age	-1.85	0.017	-3.36	-0.34
CCI	13.77	0.008	4.04	23.49
Levels Fused	2.63	0.424	-3.81	9.07
In Hospital MME per Day	0.79	<0.001	0.37	1.20

Table two looks at MME per day from 90 days to 1 Year postop as the dependent outcome.

Variable	Estimate	P Value	Lower 95	Upper 95
Age	-1.67	0.150	-3.93	0.60
CCI	20.87	0.005	6.31	35.44
Levels Fused	0.90	0.856	-8.74	10.53
In Hospital MME per Day	0.83	0.009	0.21	1.46