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Original research

Legislation Limiting Postoperative Opioid Prescribing Does Not Impact Patients' Perception of Pain Management After Total Joint Arthroplasty

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ABSTRACT

Background: In an effort to combat the opioid epidemic, state legislation was passed to limit postoperative narcotic prescribing. The purpose of this study was to assess if the legislation had an impact on patients' perception of pain management after total hip arthroplasty (THA) and total knee arthroplasty (TKA). We hypothesized that patients would not perceive their pain management experience to be impacted.

Methods: A prospective survey study was performed on all consenting patients undergoing primary THA or TKA at a large academic center from July 2019 to February 2020. Patients taking opioids preoperatively were excluded. Surveys given preoperatively and at 2 weeks postoperatively assessed patients' concerns surrounding postoperative pain control and their perception of the impact of a newly implemented legislation. Descriptive analysis and Spearman's rho correlation coefficients were performed.

Results: Ninety-three patients met inclusion criteria and consented. Seventy-nine (29 THA and 50 TKA) completed both surveys. Preoperatively, 9.2% of patients were concerned that the legislation would impact their pain management, despite 43.0% having pain concerns. Postoperatively, 87.0% of patients felt that the legislation had no or mild effect on pain control. Although 36.7% of patients reported moderate to severe postoperative pain, 15.2% of patients reported being dissatisfied with pain control. There was no statistical correlation between preoperative pain concern and feelings that the legislation impacted pain.

Conclusions: After primary THA and TKA, our data suggest that patients' perception of their pain management was not impacted by the legislation. Prescribers should be reassured that the decreased allowable opioids does not hinder the patients' perception of their pain management experience.

Introduction

The opioid epidemic escalated, and deaths due to opioid-related overdose has drastically increased in recent years. Unintentional opioid-related deaths have increased roughly twelve-fold from 1999 until 2016, and opioid-related emergency department visits have increased from 3015 in 2011 up to 4163 in 2016 in our state [1]. Of these deaths, the majority are from the use of common physician-prescribed opioids such as oxycodone and hydrocodone [1,2]. This is alarming as opioids are often prescribed as a means of managing postoperative pain [3]. While opioids can be extremely effective at treating postoperative pain in patients after major surgeries, they also introduce a risk of opioid dependence. It has been demonstrated that prescription opioids introduce a higher risk of long-term dependence than alternative pain management medications [4] and, according to the Centers for Disease Control, account for the most rapidly growing drug problem in the United States [5]. A contributor to this unfortunate fact is some patients have a false sense of security with prescription opioids. As they

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were provided by a physician, often patients are under the impression that these drugs are safe to use unrestricted, despite proper opioid counseling. Despite this, opioids remain the mainstay of postoperative pain relief [6,7].

State legislation was passed in January 2018 and aimed to limit the amount of opioids prescribed by physicians. One of the stipulations of the legislation was with regard to the postoperative period, allowing physicians to prescribe only a 7-day supply of narcotics postoperatively. This holds true across all surgeries in all specialties, meaning there is no stratification based on the type of surgery and the anticipated postoperative pain [8]. It is common practice to prescribe opioids for pain control after total joint arthroplasty (TJA), making TJA and orthopedic surgery, as a whole, subjected to substantial change by the legislation. It has been demonstrated that a portion of opioid-naive patients will become chronic opioid users after TJA and that there is no clear link between persistent opioid use and persistent pain [9]. The incidence of TJA is rapidly increasing in the United States and projected to continue to rise at an accelerating rate [10,11]. The aim of the legislation was to reduce the rate of physician-prescribed opioid dependence as the incidence of TJA and other surgeries remains.

It has been demonstrated that the state legislation has decreased the rate of opioid prescribing among orthopedic surgeons [12], but it remained unknown how this change in postoperative pain management was perceived from the perspective of the patient. The purpose of this study was to assess patients' opinions of whether their postoperative pain management experience was impacted by the state legislation. We hypothesized that patients would not feel that their pain management was negatively impacted as a result of the legislation.

Material and methods

Approval was obtained from our institutional review board. Patients undergoing primary total knee arthroplasty (TKA) or primary total hip arthroplasty (THA) by a single adult reconstruction surgeon at our academic center from July 15, 2019, to February 12, 2020, prospectively consented. Inclusion criteria were all patients undergoing primary elective TKA. Exclusion criteria included those patients undergoing revision procedures as well as those that were actively taking narcotics before surgery. Patients participating in the study completed a survey at their regularly scheduled preoperative clinic visit and a second survey at their regularly scheduled 2-week follow-up clinic visit.

Survey design

The aim of the first survey at the preoperative visit was to gain knowledge about the patient's baseline level of concern surrounding pain control and opioid dependence as a result of their upcoming surgery, as well as to assess the patient's knowledge of the legislation. After answering questions about their concerns about pain control and medication dependence, they were asked if they were familiar with the legislation and then given a brief information page to read about the legislation, taken from our state's medical board website [13]. After reading about the legislation, patients were asked if they were worried that it would directly impact their pain management experience after their surgery. All survey questions in the preoperative survey used a four-point Likert scale and, for statistical purposes, were then aggregated into two groups, those answering with a one or two in the first group and those answering with a three or four in the second group (Table 1).

The aim of the second survey at the 2-week postoperative visit was to assess the patients' satisfaction with pain control as well as their feelings of dependence toward pain medications. We then sought to assess if the patient felt that the legislation had a direct effect on their pain control as well as inquiring about the patients' opinion of the legislation's impact on feelings of dependence. All questions in the postoperative survey used a four-point Likert scale and were also aggregated into two groups, those answering with a one or two in the first group and those answering with a three or four in the second group (Table 2).

Pain control regimen

All patients received intraoperative and postoperative pain control as per the protocol at our institution. All patients undergoing TJA at our institution have a preoperative education led by a

Table 1
Preoperative survey questions and responses.

Survey question	Total	Total	TKA	TKA	THA	THA
	1-2 *Yes, when noted	3-4 *No, when noted	1-2 *Yes, when noted	3-4 *No, when noted	1-2 *Yes, when noted	3-4 *No, when noted
What is your pain level in the joint in which you are having surgery?	21 (26.6%)	58 (73.4%)	16 (32.0%)	34 (68.0%)	5 (17.2%)	24 (82.8%)
Are you worried about pain control after surgery?	45 (57.0%)	34 (43.0%)	30 (60.0%)	20 (40.0%)	15 (51.7%)	14 (48.3%)
Are you worried about becoming dependent on pain medications after surgery?	67 (84.8%)	12 (15.2%)	43 (86.0%)	7 (14.0%)	24 (82.8%)	5 (17.2%)
Are you aware of the legislation and its impact on post-surgical pain prescriptions? (yes/no)	24 yes (31.2%) n = 77	53 no (68.8%) n = 77	16 yes (33.3%) n = 48	32 no (66.7%) n = 48	8 yes (25.6%) n = 29	21 no (74.4%) n = 29
Are you worried about your pain following surgery after reading about the legisltation?	50 (64.9%) n = 77	27 (35.1%) n = 77	34 (69.4%) n = 49	15 (30.6%) n = 49	16 (57.1%) n = 28	12 (42.9%) n = 28
Are you worried that the legislation will directly impact your experience with your surgery?	7 (9.2%) n = 76	69 (90.8%) n = 76	3 (6.3%) n = 48	45 (93.7%) n = 48	4 (14.3%) n = 28	24 (85.7%) n = 28

Response of "none" and "mild" were grouped together and "moderate" and "extreme" were grouped together. Total n = 79, TKA = 50, THA = 29 unless otherwise specified. This was done on a Likert scale with 1-2 representing none/mild and 3-4 representing moderate/extreme.
Asterisk (*) identifies statistical significance.

Table 2
Postoperative survey questions and responses.

Survey question	Total 1-2	Total 3-4	TKA 1-2	TKA 3-4	THA 1-2	THA 3-4
What is your pain level in the joint in which you are having surgery?	50 (63.3%)	29 (36.7%)	23 (46%)	27 (54%)	27 (93.1%)	2 (6.9%)
Are you satisfied with your pain control after surgery?	13 (16.5%)	66 (83.5%)	12 (24%)	38 (76%)	1 (3.4%)	28 (96.6%)
Do you feel dependent on pain medications following your surgery?	12 (15.2%)	67 (84.8%)	11 (22%)	39 (78%)	1 (3.4%)	28 (96.6%)
Do you think the legislation interfered with controlling pain control after surgery?	10 (13.0%), n = 77	67 (87%), n = 77	9 (18.8%), n = 48	39 (81.2%), n = 48	1 (3.4%)	28 (96.6%)
Do you think you were less likely to become dependent on pain medications because of the legislation?	5 (6.8%), n = 73	68 (93.2%), n = 73	2 (4.5%), n = 44	42 (95.5%), n = 44	3 (10.3%)	26 (89.7%)

Response of "none" and "mild" were grouped together and "moderate" and "extreme" were grouped together. Total n = 79, TKA = 50, THA = 29 unless otherwise specified. This was done on a Likert scale with 1-2 representing none/mild and 3-4 representing moderate/extreme.

nurse, in which one of the included topics is pain management. Intraoperatively, all patients underwent spinal anesthesia, with TKAs also receiving a periarticular injection with liposomal bupivacaine/bupivacaine cocktail. All patients received a similar multimodal pain control program in the postoperative period. Patients were encouraged to use nonopioid adjunct medications before taking oxycodone, which was prescribed in 5-mg tablets every 4 hours as needed for pain requiring additional analgesia than provided by nonopioid medication. Nonopioid adjunct medications that were prescribed in addition to oxycodone included acetaminophen 1000 mg every 8 hours, meloxicam 7.5 mg taken once daily, and the use of cryotherapy. Intravenous hydromorphone was also available for pain uncontrolled by oral medications while the patient remained in the hospital. Patients were discharged with a total of 20 tablets of oxycodone 5 mg for THA and 40 tablets of oxycodone 5 mg for TKA and were similarly instructed to use nonopioid adjunct medications. Patients are strongly encouraged to wean as quickly as possible. However, if their pain is still uncontrolled, the clinic will electronically refill during normal clinic hours a partial prescription, as state legislation allows in the postoperative period.

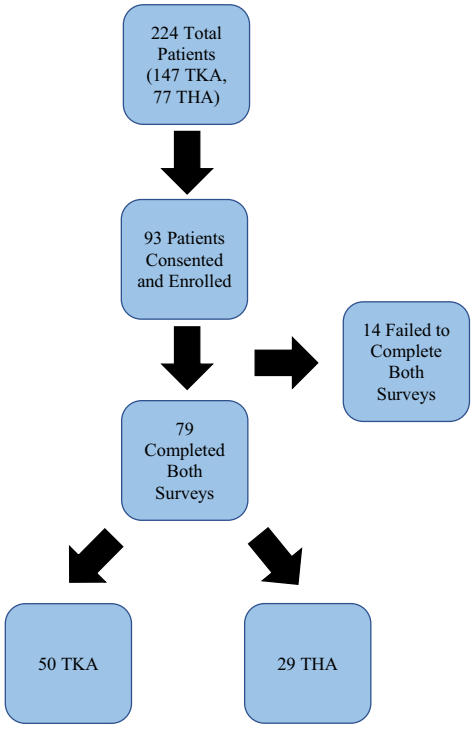

Figure 1. Flowchart showing enrollment of patients.

Statistical analysis

Spearman's rho was used to assess the association between survey questions. The correlation coefficient with a P value < .05 was deemed statistically significant. Descriptive statistics were used to describe the distribution of the variables. Particular attention was paid to demographics, preoperative pain concerns, and postoperative pain satisfaction and how these correlated with feelings that the legislation directly impacted pain control. Attention was also paid to preoperative dependence concerns and postoperative feelings toward dependence and how these correlate with feelings that the legislation directly impacted dependence.

Results

During the enrollment period from July 15, 2019, to February 12, 2020, 93 patients met inclusion criteria and consented to participate in the study. Of those 93 consenting patients, 79 (50 TKA and 29 THA) completed both the preoperative and postoperative surveys (Fig. 1). Table 3 provides demographic and surgical data for our study population and reveals a predominance of females (59.5%) with most patients having undergone a prior surgery in their lifetime (84.8%) but a minority having undergone a prior TJA in their lifetime (25.3%). These trends held true when analyzing both TKAs only and THAs alone.

Preoperatively, only 9.2% of patients were concerned that the legislation would directly impact their postoperative pain management, despite 43.0% being worried about postoperative pain overall (Table 1). While 36.7% of patients reported moderate to severe postoperative pain, only 16.5% of patients reported being dissatisfied with pain control, which were correlated (P < .001). Postoperatively, 87.0% of patients, 81.2% of TKA and 96.6% of THA, felt that the legislation had no or mild effect on pain control (Table 2). For patients with no prior knowledge of the legislation, there was a significant correlation between concern about the legislation and concern about postoperative pain (Spearman's

Table 3
Demographics and breakdown of surgical factors.

Demographic	Total n = 79	TKA n = 50	THA n = 29
Age	64.8 (SD = 9.3)	66.3 (SD = 9.3)	62.3 (SD = 8.9)
Sex			
Male	32 (40.5%)	17 (34.0%)	15 (51.7%)
Female	47 (59.5%)	33 (66.0%)	14 (48.3%)
BMI	32.5 (SD = 6.3)	33.4 (SD = 6.2)	31.0 (SD = 6.3)
Diabetes	14 (17.7%)	10 (20.0%)	4 (13.8%)
Prior surgery	67 (84.8%)	45 (90%)	22 (75.9%)
Prior TJA	20 (25.3%)	16 (32.0%)	4 (13.8%)
Laterality			
Left	44 (55.7%)	28 (56.0%)	16 (55.2%)
Right	35 (44.3%)	22 (44.0%)	13 (44.8%)

Table 4
Spearman's rho correlations of survey questions.

Correlate 1	Correlate 2	Total	TKA	THA	95% CI	*P* value
Preop pain level	Preop pain concern	0.080	0.067	0.167	−0.345, 0.542	.664
Preop pain level	Preop dependence concern	0.155	0.145	0.170	−0.41, 0.45	.928
Preop pain level	Postop pain control satisfaction	−0.034	−0.114	−0.279	−0.569, 0.228	.401
Preop concern about legislation	Preop concern about pain	0.501	-	-	-	<.001*
Preop pain concern (after legislation education)	Postop pain level	0.020	0.158	−0.106	−0.732, 0.199	.261
Preop pain level	Postop pain control satisfaction	0.08	−0.018	0.270	−0.148, 0.7	.201
Preop dependence concern	Postop feelings of dependence	0.036	0.005	0.219	−0.335, 0.743	.458
Amount of narcotics used	Postop feelings of dependence	0.385	0.435	0.236	−0.542, 0.14	.248
Preop pain level	Postop feelings if legislation impacted pain control	0.065	0.077	0.366	−0.037, 0.609	.082
Preop pain concern	Postop feelings if legislation impacted pain control	0.171	0.213	0.142	−0.625, 0.44	.734
Postop pain level	Postop pain satisfaction	−0.492	-	-	-	<.001*
Postop pain control satisfaction	Postop feelings if legislation impacted pain control	−0.432	−0.442	−0.309	−0.421, 0.659	.666
Postop feelings of dependence	Postop feelings if legislation impacted dependence	−0.039	0.015	−0.234	−0.675, 0.21	.303
Prior knowledge of legislation	Postop pain control satisfaction	0.038	−0.038	0.281	−0.029, 0.651	.073
Prior knowledge of legislation	Postop feelings if legislation impacted pain control	0.129	0.257	−0.246	−0.832, −0.175	.003*

* Identifies statistical significance.

rho = 0.501, *P* value < .001). There was a significant correlation of having prior knowledge of the legislation before surgery with feeling as if it had an impact on postoperative pain control (Spearman's rho 0.129, *P* = .003) (Table 4).

Discussion

With the acceleration of the opioid epidemic in the United States, many states have passed legislation limiting opioid prescribing as discussed in this study. This is especially relevant to orthopedic surgery as opioids are commonly prescribed to treat postoperative pain. This study aimed to assess the effects of state legislation as seen from the patient's perspective. With the passing of legislation such as this, it is reasonable for physicians to be concerned that their patients will not receive adequate analgesia in the postoperative period. Our data support the hypothesis that patients would not feel that their postoperative pain control after TJA was impacted by the legislation.

Preoperatively, 43.0% of patients were concerned about their pain management in the postoperative period. Despite this, after being educated on the legislation, only 9.2% felt that the legislation was likely to have an impact on their pain. Furthermore, there were nearly three patients reporting moderate or extreme levels of postoperative pain for every one patient that felt as though the legislation had an impact on their pain control. These data suggest that while patients are still concerned about pain in the preoperative period and reporting high amounts of pain in the postoperative period, they did not feel that the newly implemented legislation was a contributor.

As TJAs commonly use narcotics to treat postoperative pain, we feel this is an important cohort of patients to investigate this need. The passing of state legislation limiting opioid prescribing is a long overdue intervention to help combat the opioid epidemic in the United States. With this intervention comes drawbacks, one of which being the concern for inadequate postoperative analgesia. We feel that this study served as a first step to address this concern and that the significance of our research question, the patient-centered unbiased design of the surveys, and assessing patient opinions in both the preoperative and postoperative periods were the strengths of our study.

There were also several limitations to our study. The first being the patient population limited to TJAs. While these are among the surgeries requiring the most narcotics, our study may not be generalizable across orthopedic surgery or across other surgical fields. Subsequent, larger studies are required to assess the patients' perspective on this type of legislation across a wider array of surgeries. As with many survey-based studies, there was a high number of patients who refused to participate, which could introduce selection bias. In addition, as this was a state legislation, we were only able to assess the perspectives of those in our state. Other states have different levels of restrictions, if any, as well as high variability in the patient populations across states. This study serves as a first step in understanding the patient perspectives about the limited prescribing but is not meant to be complete nor comprehensive.

Conclusions

We conclude that after the passing of new state legislation limiting the prescribing of postoperative opioids, many patients do not feel that their postoperative pain management experience was affected by the legislation. This is despite the fact that patients were concerned about pain preoperatively and also reported high levels of pain postoperatively. We feel our study provides some mitigation of concerns of inadequate postoperative analgesia and reassurance that patients do not feel disdain by the passing of such legislation.

Conflicts of interest

D.J.D.G. is a paid consultant for DePuy, Orthalign, Pacira Pharmaceuticals, and SPR therapeutics; is in the speakers' bureau or gave paid presentations for Pacira Pharmaceuticals; receives research support as a principal investigator from Biomup, Conformis, DePuy, Pacira, Reflection health, Stryker, and Zimmer; and is in the editorial or governing board of *Journal of Arthroplasty*.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.artd.2021.10.017.

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