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Original Research

The Effect of an Electronic Prescribing Policy for Opioids on Physician Prescribing Patterns Following Common Upper Extremity Procedures

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A R T I C L E   I N F O

Purpose: We evaluated physician prescribing patterns before and after the implementation of a state-mandated opioid electronic prescribing (ePrescribing) program after 4 common outpatient hand surgeries. Specifically, we aimed to answer the following: (1) is there a change in the number of opioids prescribed after the institution of ePrescribing for carpal tunnel release (CTR), ganglion excision, distal radius fracture (DRF) open reduction internal fixation (ORIF), and carpometacarpal (CMC) arthroplasty and (2) what factors are associated with an increased number of tablets or total morphine milligram equivalents (MMEs) prescribed.
Methods: We retrospectively reviewed patients who underwent CTR, ganglion excision, DRF ORIF, or CMC arthroplasty and analyzed the number of tablets and MMEs prescribed before and after the policy implementation, as well as which factors were associated with an increased total number of opioid tablets and MMEs prescribed.
Results: A total of 428 patients were included. After policy implementation, there was a significant decrease in MMEs prescribed for ganglion excision (68 [SD, 45] vs 50 [SD, 60], $P = .03$) and CMC arthroplasty (283 [SD, 147] vs 217 [SD, 92], $P < .01$). There was also a significant decrease in the total number of tablets prescribed for ganglion excision (11 [SD, 5.7] vs 6.8 [SD, 8.0], $P < .01$), CMC arthroplasty (36 [SD, 13] vs 29 [SD, 12], $P < .01$), and DRF ORIF (31 [SD, 8.6] vs 28 [SD, 8.5], $P = .04$). The number of patients receiving any opioid prescription also significantly decreased following CTR (30% vs 51%, $P = .03$) and ganglion excision (11% vs 53%, $P < .01$).
Conclusions: The initiation of state-mandated ePrescribing was associated with a decreased number of opioids—both MMEs and tablets—prescribed after surgery by hand surgeons for a variety of common procedures. Furthermore, a greater percentage of patients received no opioid prescriptions after ePrescribing. These findings support the value of ePrescribing as a potential tool to further decrease excess opioid prescriptions.
Type of study/level of evidence: Therapeutic III.

The opioid epidemic is a public health emergency with devastating consequences, including opioid overdose accounting for 70% of the 67,367 drug overdose deaths that occurred in the United States in 2018.[1] Combating the opioid overdose epidemic in the United States demands more conscientious opioid prescriptions by physicians, including hand surgeons, who account for 8% of all opioid prescriptions in the United States.[2] On average, surgeons prescribe 2–5 times more opioids than patients consume after upper extremity procedures.[3–5] Although currently there are no formal national clinical practice recommendations to guide

postoperative opioid prescriptions for specific orthopedic procedures, prior studies have demonstrated the efficacy of implementing prescription protocols and prescriber and patient education programs on decreasing excessive opioid presriptions.[6–10] Therefore, changing opioid prescribing habits may reduce the amount of unused narcotic medications in the community, which may decrease opportunities for misuse or overdose.

In 2010, the US Drug Enforcement Administration revised regulations to allow physicians to electronically prescribe controlled substances electronically.[11] The potential benefits of electronically prescribing (ePrescribing) opioids include reduction in prescription fraud and closer monitoring of patient prescriptions, including those who may have multiple active prescriptions from various providers. Our institution is located in Massachusetts, where the state legislature enacted a new law mandating that narcotics be prescribed electronically on or after January 1, 2020 (with a 1-year regulatory grace period effectively requiring all providers to comply by January 1, 2021).[12] Several states have already implemented similar prescribing regulations, and beginning January 1, 2021, Medicare Part D started requiring electronic prescriptions of controlled substances.[13,14] It is thus particularly relevant to determine the impact of this new legislation on physician prescribing patterns. Although 1 study across all of health care broadly did not find a relationship between opioid ePrescribing requirements and a decreased number of prescriptions and morphine milligram equivalents (MMEs), more specific evaluation of such a policy on opioid prescribing patterns within hand surgery is lacking.[15]

This study evaluates opioid prescription patterns by hand surgeons following the advent of an ePrescribing policy. Specifically, we aimed to answer the following question: is there a change in the number of opioids prescribed after the institution of electronic opioid prescriptions in 4 common, yet diverse, outpatient hand surgeries: carpal tunnel release (CTR), ganglion excision, distal radius fracture (DRF) open reduction internal fixation (ORIF), and carpometacarpal (CMC) arthroplasty? Further, we aimed to determine the factors that are associated with an increased number of tablets prescribed or increased MMEs prescribed. We hypothesized that the introduction of an ePrescribing policy would decrease the total number of opioids prescribed.

Materials and Methods

This study was approved by our institutional review board (2019P001090). In accordance with an internal institutional policy promoting the ePrescribing of controlled substances prior to the state's mandate for ePrescribing, our hand/upper extremity division comprising 3 academic surgeons, 3 advanced practitioners, 3 fellows, and 3 residents began ePrescribing all opioids from November 18, 2019. We retrospectively reviewed charts of patients who underwent CTR, ganglion excision, DRF ORIF, or CMC arthroplasty as outpatients at a single academic institution following the implementation of ePrescribing from November 18, 2019. The patients were identified using billing databases using Current Procedural Terminology codes 64721, 25111, 25112, 24607, 25608, 25609, and 25447. Next, we identified a consecutive cohort of patients using the same Current Procedural Terminology codes who underwent the same procedures within 12 months prior to November 18, 2019. Thus, patients were classified in the prepolicy group if they underwent their respective procedures prior to November 18, 2019, when ePrescribing was instituted, or classified as postpolicy if they underwent their respective procedures after this date. Patients were excluded if multiple procedures were performed during the same encounter (eg, CTR in the setting of a DRF ORIF) or if the patient experienced a polytrauma. Data included patient age (years), sex (female or male), ethnicity (Caucasian,

Hispanic, African American, or other), tobacco use, employment status (employed, unemployed, retired, or disabled), insurance type (private, Medicare, Medicaid, or workers' compensation), hand dominance, contraindication to nonsteroidal anti-inflammatory drug use, preoperative opioid use within 12 months before surgery, chronic pain diagnosis, type of anesthesia (local, regional, monitored anesthesia care, or general), opioid prescribed after surgery, total MME, the total number of tablets prescribed, and the number of refills and MMEs within a 90-day period after surgery. No other department intervention related to opioids (such as an educational event about limiting opioid prescriptions) occurred. There were no formal ePrescribing discussions regarding implementation at the hand division or the orthopedic surgery department levels across all prescribers. The prescriptions were written by any individual active in direct patient care (eg, faculty, hand surgery fellows, residents, or advanced practitioners) both before and after the implementation of ePrescribing. There was no change within our institution regarding the number of opioids that could be prescribed during our study timeframe. The decision to provide refills was multifactorial and was left to the individual providers.

Statistical analysis

The descriptive statistics were calculated. A comparison of patient characteristics, number of tablets prescribed, and total MMEs prescribed before and after ePrescribing policy implementation was performed using chi-square or Fisher exact tests for categorical variables and using Mann-Whitney U test for continuous variables. Mann-Whitney U test was used because the data were not normally distributed. Multivariable linear regression analysis was used to analyze the factors that were associated with the total number of opioid tablets and total MMEs prescribed.

An a priori power analysis was performed using G*Power.[16] To detect a large effect size (Cohen d = 0.5) at an α of 0.05 and 80% power, 53 patients prior to protocol implementation and 53 patients following protocol implementation for each procedure were required. This power analysis was performed under the assumption of a 1-tailed Mann-Whitney U test. A 1-tailed test was used because we assumed we knew the direction of the outcome (eg, the number of tablets and MMEs prescribed would decrease). Further, a paired approach was not used because the same patients were not in the pre- and postimplementation cohorts. For all analyses, $P < .05$ was considered statistically significant.

Results

A total of 428 patients were included in the study, 216 in the prepolicy group and 212 in the postpolicy group (Table 1). For each procedure, there were 54 patients in the prepolicy and 53 patients in the postpolicy groups. When comparing the pre- and post-intervention groups across all procedures, there was no difference in age, sex, contraindication to nonsteroidal anti-inflammatory drugs, chronic pain diagnosis, insurance type, or recent opioid use before surgery (Table 2). Further, when all patients—regardless of the procedure—were considered together, the average total MMEs prescribed per patient per procedure prior to the institution of ePrescribing was significantly greater than the average total MMEs prescribed after the institution of ePrescribing (155 [SD, 134] vs 128 [SD, 108], $P = .01$). Additionally, across all patients, the average total number of tablets prescribed per patient per procedure for the prepolicy group significantly differed from that prescribed for the postpolicy group (21 [SD, 15] vs 17 [SD, 14], $P < .01$).

When comparing prescription patterns pre- and post-ePrescribing by procedure, there was a significant decrease in

Table 1
. Patient Characteristics (N = 428)

Characteristic	Mean (Standard Deviation) [Range] or n (%)
Age, y	58 (16)
Laterality of surgery	
Right	218 (51%)
Left	208 (49%)
Bilateral	2 (0.5%)
Hand dominance	
Right	394 (92%)
Left	31 (7.2%)
Unknown	3 (0.7%)
Sex	
Female	315 (74%)
Male	113 (26%)
Race	
White	307 (72%)
Black	42 (9.8%)
Asian	16 (3.7%)
Hispanic	33 (7.7%)
Other/not reported	30 (7.0%)
Contraindication to NSAIDs	
No	396 (93%)
Yes	32 (7.5%)
Chronic pain diagnosis	
No	402 (94%)
Yes	26 (6.1%)
Recent opioid use before surgery	
No	362 (85%)
Yes	66 (15%)
Total morphine equivalents prescribed	142 (122) [0–1050]
Tablets prescribed	19 (15) [0–81]
No. of prescription refills	
0	391 (91%)
1	30 (7.0%)
2	5 (1.2%)
3	2 (0.5%)

NSAID, nonsteroidal anti-inflammatory drug.

Table 2
Comparison of Patient Characteristics Pre- and Postopioid ePrescribing Ability

Characteristic	Pre (n = 216)	Post (n = 212)	P Value
	Mean (Standard Deviation) or n (%)	Mean (Standard Deviation) or n (%)	
Age, y	58 (16)	57 (15)	.14
Sex			.52
Female	156 (72%)	159 (75%)	
Male	60 (28%)	53 (25%)	
Race			.02
White	142 (66%)	165 (78%)	
Black	25 (12%)	17 (8.0%)	
Asian	7 (3.2%)	9 (4.2%)	
Hispanic	20 (9.3%)	13 (6.1%)	
Other/not reported	22 (10%)	8 (3.8%)	
Insurance type			.05
Private/commercial	128 (59%)	145 (68%)	
Medicare	72 (33%)	46 (22%)	
Medicaid	11 (5.1%)	13 (6.1%)	
Workers' compensation	2 (0.9%)	6 (2.8%)	
Other	3 (1.4%)	2 (0.9%)	
Contraindication to NSAIDs			.50
No	198 (92%)	198 (93%)	
Yes	18 (8.3%)	14 (6.6%)	
Chronic pain diagnosis			.12
No	199 (92%)	203 (96%)	
Yes	17 (7.9%)	9 (4.2%)	
Recent opioid use before surgery			.32
No	179 (83%)	183 (86%)	
Yes	37 (17%)	29 (14%)	
Total morphine equivalents prescribed	155 (134)	128 (108)	.01
Tablets prescribed	21 (15)	17 (14)	<.01

NSAID, nonsteroidal anti-inflammatory drug.
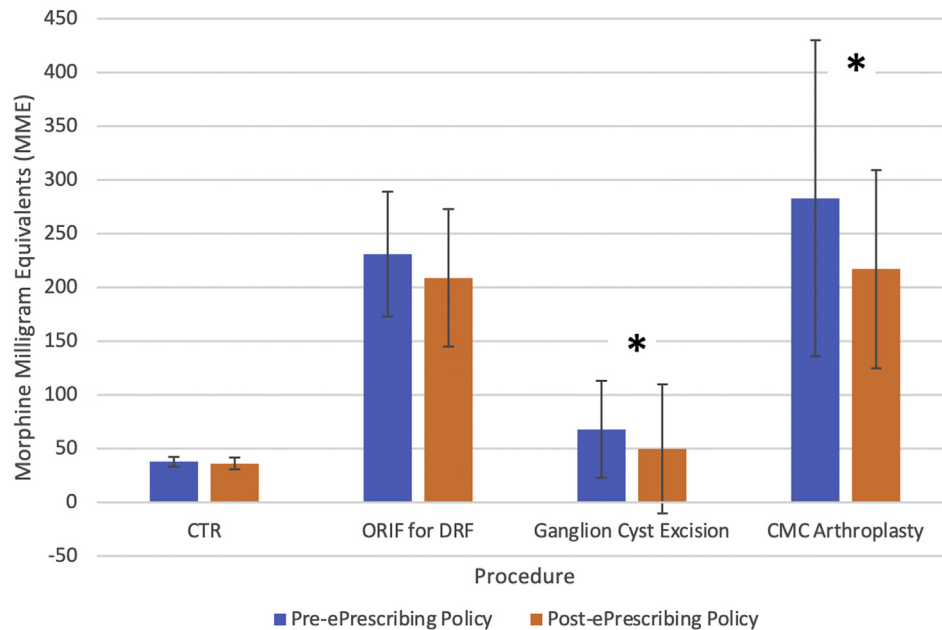
Figure 1. A comparison of average MMEs prescribed per person per procedure for CTR, DRF ORIF, ganglion excision, and CMC arthroplasty pre- and post-ePrescribing policy. There was a significant decrease in the MMEs prescribed on average per patient per procedure for ganglion excision (68 [SD, 45] vs 50 [SD, 60], $P = .03$) and CMC arthroplasty (283 [SD: 147] vs 217 [SD: 92], $P < .01$).

MMEs prescribed on average per patient per procedure for ganglion excision (68 [SD, 45] vs 50 [SD, 60], $P = .03$) and CMC arthroplasty (283 ([SD, 147] vs 217 [SD, 92], $P < .01$) (Fig. 1). There was also a significant decrease in the total number of tablets prescribed on average per patient per procedure for ganglion excision (11 [SD, 5.7] vs 6.8 [SD, 8.0], $P < .01$), CMC arthroplasty (36 [SD, 13] vs 29 [SD, 12], $P < .01$), and DRF ORIF (31 [SD, 8.6] vs 28 [SD, 8.5], $P = .04$) (Fig. 2). There was no significant difference in the total number of opioid tablets (5.9 [SD, 4.6] vs 4.8 [SD, 5.4], $P = .27$) or the average total MMEs (38 [SD, 4.5] vs 36 [SD, 5.6], $P = .44$) prescribed per patient per procedure before and after the policy implementation for patients who underwent CTR (Table 3). Across our entire patient sample, 79 of 428 (18.5%) patients (CTR, n = 43; DRF ORIF, n = 0; ganglion excision, n = 34; CMC arthroplasty, n = 2) did not receive a single opioid prescription, and there was a significant increase in the number of patients not receiving opioid prescriptions after surgery following the implementation of the ePrescribing policy (before policy implementation: 10% [22/216] vs after policy implementation: 27% [57/212], $P < .01$). When analyzing the number of patients receiving no opioid prescriptions after surgery by procedures before and after the implementation of ePrescribing policy, there was a significant increase in the number of patients not receiving opioid prescriptions following CTR (30% [16/54] vs 51% [27/53], $P = .03$) and ganglion excision (11% [6/54] vs 53% [28/53], $P < .01$). Across our entire patient sample (ie, patients presenting for care both pre- and post-ePrescribing policy), 91% (391/428) patients did not request or require an opioid refill. This did not change after the implementation of the policy (before policy implementation: 90% [194/216] vs after policy implementation: 93% [197/212], $P = .25$).

Multivariable linear regression analysis demonstrated that age was associated with a decrease in the postoperative MMEs prescribed (regression coefficient, -0.71 [95% confidence interval {CI}, -1.25 to -0.17], $P = .01$) (Table 4). Importantly, the implementation of the ePrescribing policy was also associated with a decrease in postoperative MMEs prescribed (regression

coefficient, -28.60 [95% CI, -43.48 to -13.72], $P < .01$). Both age (regression coefficient, -0.10 [95% CI, -0.16 to -0.04], $P < .01$] and implementation of the ePrescribing policy (regression coefficient, -4.21 [95% CI, -5.89 to -2.53], $P < .01$) were associated with a decrease in the number of tablets prescribed after surgery (Table 5). The presence of a chronic pain diagnosis (regression coefficient, 5.99 [95% CI, 2.01 to 9.97], $P < .01$) was the only patient factor associated with an increased number of opioid tablets prescribed after surgery.

Discussion

Health care provider prescription of narcotics has been shown to significantly contribute to the opioid overdose epidemic.[1,17,18] Although some prior studies have demonstrated the efficacy of implementing prescription protocols as well as prescriber and/or patient education programs on decreasing excessive opioid prescriptions, formal recommendations do not exist for postoperative pain treatment after upper extremity surgery.[6–10,19–21] Although the advent of ePrescribing of controlled substances is thought to potentially increase patient safety by eliminating opioid diversion, curbing prescription fraud, and decreasing overprescribing, the effect of ePrescribing regulations on physicians' patterns of opioid prescribing has not yet been reported in our literature.[15]

This study demonstrates that the initiation of ePrescribing of narcotics significantly changed hand/upper extremity physicians' opioid prescribing patterns at our institution. For CMC arthroplasty, ganglion excision, and DRF ORIF, the implementation of an ePrescribing protocol led to a decrease in the total number of opioid tablets prescribed and a decrease in the total MMEs prescribed for ganglion excision and CMC arthroplasty. Notably, there was no difference in the number of tablets prescribed or MMEs for CTR. This may be partly due to fewer tablets prescribed overall after a CTR. Prior studies have shown that the mean number of pills consumed after a CTR is 4.[3,5] More importantly, we report a much larger number of patients (30% vs 51% for CTR and 11 vs 53% for
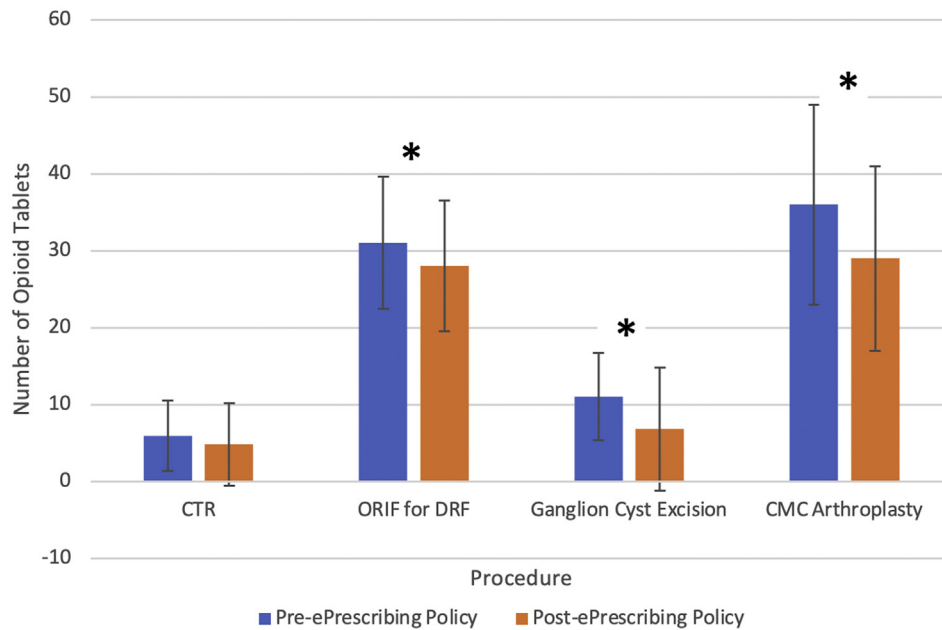
Figure 2. A comparison of the average total number of opioid tablets prescribed per person per procedure for CTR, DRF ORIF, ganglion excision, and CMC arthroplasty pre- and post-ePrescribing policy. There was also a significant decrease in the total number of tablets prescribed on average per patient per procedure for ganglion excision (11 [SD, 5.7] vs 6.8 [SD, 8.0], $P < .01$), CMC arthroplasty (36 [SD, 13] vs 29 [SD, 12], $P < .01$), and DRF ORIF (31 [SD, 8.6] vs 28 [SD, 8.5], $P = .04$).

Table 3
Comparison of Total Morphine Equivalents and Tablets Prescribed Pre- and Post-opioid ePrescribing Ability Overall and By Procedure

Procedure	Pre Mean (Standard Deviation)	Post Mean (Standard Deviation)	P Value
Total morphine equivalents			
CTR	38 (4.5)	36 (5.6)	.44
ORIF for DRF	231 (58)	209 (64)	.06
Ganglion excision*	68 (45)	50 (60)	.03
CMC arthroplasty*	283 (147)	217 (92)	<.01
Total no. of tablets			
CTR	5.9 (4.6)	4.8 (5.4)	.27
ORIF for DRF*	31 (8.6)	28 (8.5)	.04
Ganglion excision*	11 (5.7)	6.8 (8.0)	<.01
CMC arthroplasty*	36 (13)	29 (12)	<.01

* Significant at $P < .05$.

Table 4
Factors Associated With Prescribed Postoperative Morphine Equivalents*

Characteristic	Regression Coefficient (95% CI)	P Value
Age†	−0.71 (−1.25 to −0.17)	.01
Male sex	−5.20 (−22.21 to 11.81)	.55
Race		
White	Reference	
Black	−12.90 (−38.84 to 13.04)	.33
Asian	−12.17 (−51.47 to 27.12)	.54
Hispanic	−17.14 (−45.57 to 11.29)	.24
Other/not reported	1.58 (−27.84 to 31.01)	.92
Recent preoperative opioid use	−9.99 (−33.55 to 13.57)	.41
Chronic pain diagnosis	34.68 (−0.60 to 69.97)	.05
Contraindication to NSAIDs	0.85 (−28.28 to 29.98)	.95
Procedure		
CTR	Reference	
ORIF for DRF†	178.70 (157.07 to 200.34)	<.01
Ganglion excision	12.76 (−10.07 to 35.59)	.27
CMC arthroplasty†	213.84 (192.59 to 235.09)	<.01
ePrescribing policy†	−28.60 (−43.48 to −13.72)	<.01

NSAID, nonsteroidal anti-inflammatory drug.
* Adjusted R-squared = 0.61.
† Significant at $P < .05$.

ganglion excision) who were discharged without any narcotic prescription after smaller procedures following ePrescribing. We believe that this is a notable change in physician behavior that should be highlighted. This parallels recent findings in Massachusetts in head and neck surgery, where fewer narcotics were prescribed and more patients were discharged without narcotic prescriptions following the implementation of ePrescribing.[22]

Our results suggest that the ability to electronically prescribe changed physicians' prescribing behavior at our institution. We evaluated the number of tablets prescribed and MMEs to allow the practical application of our data, as tablets are often the more common unit of measurement used by physicians to prescribe narcotics. Prior studies have shown that upper extremity surgeons may inadvertently overprescribe opioids to patients after surgery, and the common reasons listed by hand surgeons regarding their rationale for their prescribing patterns included concerns about undermanaging postoperative pain, minimizing patient calls, and limiting hospital readmissions and emergency department visits.[3,19] These concerns may lead to the overprescription of pain medications after surgery, with 1 previous study demonstrating

that patients only consumed an average of 27% of pills prescribed following hand or wrist procedures.[3] Additionally, Rodgers et al[19] demonstrated an average excess of 19 opioid pills per patient after elective outpatient upper extremity surgery. Therefore, further decreases in opioid prescriptions while optimizing pain alleviation remain critical to diminish the opioid overdose epidemic and maximize patient safety.

Both increased age and implementation of the ePrescribing policy were associated with a decrease in the number of tablets prescribed after surgery. The presence of a chronic pain diagnosis was the only patient factor associated with an increased number of opioid tablets prescribed after surgery. This is consistent with prior studies, which have previously demonstrated an inverse relationship between age and increased opioid consumption after upper extremity surgery.[3] There are possible reasons underlying the

Table 5
Factors Associated With Prescribed Postoperative Number of Opioid Tablets*

Characteristic	Regression Coefficient (95% CI)	P Value
Age†	−0.10 (−0.16 to −0.04)	<.01
Male sex	−0.66 (−2.58 to 1.26)	.50
Race		
White	Reference	
Black	−1.61 (−4.54 to 1.32)	.28
Asian	−1.35 (−5.78 to 3.09)	.55
Hispanic	−2.32 (−5.53 to 0.89)	.16
Other/not reported	0.27 (−3.05 to 3.59)	.87
Recent preoperative opioid use	−1.47 (−4.13 to 1.19)	.28
Chronic pain diagnosis†	5.99 (2.01 to 9.97)	<.01
Contraindication to NSAIDs	0.14 (−3.15 to 3.42)	.94
Procedure		
CTR	Reference	
ORIF for DRF†	23.63 (21.19 to 26.07)	<.01
Ganglion excision	1.98 (−0.59 to 4.56)	.13
CMC arthroplasty†	27.12 (24.72 to 29.51)	<.01
ePrescribing policy†	−4.21 (−5.89 to −2.53)	<.01

NSAID, nonsteroidal anti-inflammatory drug.
* Adjusted R-squared = 0.67.
† Significant at $P < .05$.

changes in prescribing patterns demonstrated in our study. The electronic nature of opioid prescriptions may allow for better documentation and monitoring of medications prescribed, which may lead to increased transparency regarding both physician and patient accountability. Physician and patient accountability are essential components in combating opioid overuse, as prior studies have shown that educational interventions focused on raising awareness of opioid overprescribing in both physicians and patients can lead to a significant decrease in postoperative opioid prescriptions and consumption.[6–9,23–25] Notably, the implementation of ePrescribing was an isolated change—prescribers prior to the implementation were required to perform background checks through a state prescription drug monitoring program and this database cross-reference continued. The advent of ePrescribing also did not have associated confounders—such as new limits in the number of opioids prescribed or mandatory training. In addition, ePrescribing may facilitate efficiency and ease of providing patients with refills for their pain medications as needed, thus limiting excess pills initially prescribed in anticipation of persistent postoperative pain. This is especially supported by our findings that a greater percentage of patients received no narcotic prescription after policy implementation compared with before policy implementation. Therefore, the ability to electronically prescribe may have a multifactorial effect in curbing overprescribing and resulting in safer prescribing habits by physicians to optimize perioperative patient care.

There are several limitations to our study. First, we did not evaluate patient consumption of the prescribed opioids but instead focused on physician prescribing patterns. We believe that stratifying the number of opioids necessary to control pain after surgery adequately is a complex, multifaceted issue requiring a better understanding of both physician and patient behaviors. By focusing on the effect of ePrescribing on physician behavior, our study offers novel data on the impact of this new tool on physician prescribing patterns. Additionally, the subjective nature of patient recall bias can lead to inaccurate estimation of pills consumed. Second, a combination of attendings, fellows, residents, and advanced practitioners were involved in the prescription of opioids before and after policy implementation. Nevertheless, this was consistent both pre- and post-ePrescribing. Nonetheless, it likely explains the wide range in relation to our datapoints. Additionally, the literature is conflicting regarding whether surgical trainees prescribe more or

less opioids compared with attendings.[26,27] Thus, this was unlikely to contribute to the change in prescribing patterns. Third, we were unable to assess the narcotic prescription refills at outside hospitals. Although providers were able to access the Massachusetts' prescription monitoring program prior to prescribing or refilling narcotic prescriptions, we are unable to use this database for research purposes. Therefore, the reported provider prescription patterns may not reflect the true number of opioid prescriptions. Although it is possible that patients obtained opioids at outside institutions, we believe that this would be unusual in the early postoperative period without any mention in the medical record. Fourth, there are biases inherent in retrospective studies, with additional bias inherent in data collected from a single institution. These data may not reflect the prescribing pattern of hand surgeons in other locations or settings. Similarly, one cannot generalize our findings to the prescribing patterns of physicians in private practice settings or in other surgical specialties. Although further studies are needed to establish the impact of ePrescribing in various states and practice settings, we believe that the present study provides a crucial framework on which future studies can build. Fifth, although this study suggests that the advent of ePrescribing reduced postoperative opioid prescriptions, other factors may also contribute to the changes in physician prescribing patterns that were not captured in this study, including generalized awareness of the opioid epidemic and societal pressure to reduce opioid prescriptions. We attempted to minimize this by only including patients who underwent surgery during a relatively short period (12 months before and 12 months after the intervention). Additionally, no other confounding department interventions occurred at this time (such as a department educational event on limiting opioid prescriptions or a new department initiative). Thus, we believe that the institution of a state-mandated ePrescribing protocol was the main factor responsible for any measured changes in physician prescribing behavior. Lastly, although our data demonstrate a significant decrease in the total number of opioid pills prescribed and MMEs following our ePrescribing policy implementation, the clinical implications, including the impact of this decline on the risk of opioid addiction or long-term use following hand surgery, remain unknown and are an area for further investigation. Despite these limitations, we believe that our findings provide important insight into the effect of electronic prescriptions on how physicians prescribe postoperative opioids.

Future studies are needed to establish the impact of ePrescribing in various states and practice settings to assess the impact of cultural differences across regions of the United States, which would be of value to ensure interventions are appropriately targeted. Overall, such data would establish a foundation to support the utility of ePrescribing for states that are yet to adopt it and facilitate the establishment of standardized postoperative protocols for opioid prescriptions after common upper extremity procedures. Indeed, our findings will provide a foundation for opioid prescription protocols at our institution for common hand surgery procedures.

Acknowledgments

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