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Original Research

Unplanned Postoperative Phone Calls and Electronic Messages for Patients With and Without Opioid Prescriptions After Carpal Tunnel Release

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Purpose: The purpose of our study was to compare unplanned postoperative patient communication in the form of phone calls and/or electronic patient portal messages (EPPM) after carpal tunnel release (CTR) for patients with and without a postoperative opioid prescription.

Methods: We identified all patients ≥18 years of age who underwent primary CTR between 2017 and 2022 without an opioid ordered within 90 days prior to surgery. The following two groups were created: cases with and without an opioid prescribed on the day of surgery. We recorded baseline demographics for all patients and recorded all unplanned communication (phone calls and EPPM) sent from a patient to the surgeon's office within 14 days after surgery. Unadjusted associations between unplanned communication and case characteristics were evaluated. Multiple logistic regression models were used to assess the relationship between opioid status and unplanned communication.

Results: A total of 5,735 CTRs were included, and 54% of the patients were prescribed an opioid on the day of surgery. Forty-two percent of cases had unplanned postoperative communication, and 48.1% of cases, without an opioid prescription, had unplanned communication compared with 36.8% in the opioid group. Patients who were prescribed opioids were 0.62 times less likely to contact the surgeon's office via phone calls or EPPM (95% confidence interval [CI]: 0.56, 0.70). Increased age was associated with a reduction in the odds of unplanned contact (odds ratios [OR] = 0.95, 95% CI: 0.93, 0.97), whereas higher body mass index was significantly associated with increased communication (OR = 1.05, 95% CI: 1.01, 1.09).

Conclusions: Patients prescribed opioids after CTR are 0.62 times less likely to contact the surgeon's office after surgery. Considering the 11% increase in unplanned postoperative communication after CTR, surgeons should consider alternative methods that have previously been demonstrated to reduce opioid consumption.

Type of study/level of evidence: Prognostic II.

The opioid epidemic has had a devastating impact in the United States and internationally, particularly since the last decade of the 20th century.[1–3] Despite mitigation efforts, opioid misuse and abuse continue to plague multiple aspects of the society, including the health care sector.[4–7] This epidemic has been fueled, in part, by opioid use as a pharmaceutical analgesic where the resultant opioid dependence and addiction drive continued use of these substances.[8] Specific to upper extremity (UE) surgery, approximately 13% of previously opioid-naïve patients continue to utilize opioids months after a UE surgical procedure.[9] Opioids remain overprescribed after hand and UE surgery, specifically elective soft-tissue procedures such as carpal tunnel release (CTR) where these medications often go unused.[6,10] Chapman et al[10] demonstrated that 61% of patients reported having unused opioids after different orthopedic procedures. In this context, eliminating unnecessary postoperative opioid prescriptions may aid in both decreasing the number of patients exposed to these medications and decreasing unused opioids, which have the potential for misuse.

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Within UE surgery, increasing evidence from prospective, randomized clinical studies has demonstrated that routine opioid use is unnecessary after soft-tissue, elective hand surgery procedures like CTR.[11–13] However, a number of factors may contribute to surgeons choosing to utilize these medications after CTR. Despite evidence suggesting that opioid prescriptions are not associated with patient satisfaction, there is a perception that uncontrolled pain may lead to either dissatisfaction or formal complaints.[14–17] This was underscored by the focus on "pain as the fifth vital sign" at the end of the 20th century, which encouraged physicians to aggressively treat pain with the goal of increasing patient satisfaction.[14,17] However, opioid reduction protocols as well as other interventions such as written guidelines for surgeons and distribution of educational handouts for patients have been able to simultaneously decrease opioid utilization while maintaining patient satisfaction after UE procedures.[13,18]

In addition to concerns regarding patient satisfaction, another potential driver of opioid prescriptions after elective, soft-tissue hand surgery may be related to the possibility of increased phone calls, patient messages, and unplanned visits when opioids are not prescribed. This unplanned health care contact can be burdensome for both office staff and surgeons, as the time necessary to read, process, and respond to these messages is not reimbursed within the 90-day global perioperative billing period in the United States. After fixation of distal radius fractures, up to 20% of patients have unplanned health care contact in the form of either clinical encounters or phone calls.[19] These unscheduled contacts can increase both the administrative burden and the unreimbursed workload for surgeons.[19] Considering the staffing shortages throughout healthcare following the Coronavirus Disease 2019 pandemic, the impact of these unplanned encounters may be more impactful.[20–22] In addition, issues related to access and availability are associated with formal patient complaints involving UE surgeons, which can be exacerbated by delays in responding to phone calls and messages.[15] It remains uncertain if postoperative opioid prescriptions following elective, soft-tissue hand surgery procedures function to decrease unplanned health care communication after surgery in the form of phone calls and electronic messages.

The purpose of this investigation was to compare unplanned postoperative patient communication (phone calls and electronic messages) after elective CTR for patients with and without a postoperative opioid prescription on the day of surgery. We aimed to test the null hypothesis that the frequency of unplanned postoperative patient communication would not differ whether an opioid was prescribed on the day of surgery.

Materials and Methods

Institutional review board approval was obtained for this retrospective cohort study. Data collection for this investigation was initiated by identifying all primary open CTR (OCTR) and endoscopic CTR (ECTR) performed for patients who were $\geq$18 years old at our institution between September 2017 and September 2022. Our institution is a rural, multi-hospital–integrated health care system in the northeastern United States. It contains a level I, academic trauma center in addition to smaller, nonacademic community hospitals. Current procedural terminology codes ("29848" for ECTR and "64721" for OCTR) were utilized to identify our population of interest. We excluded all patients who had any additional procedures other than a CTR on the date of surgery.

Within our electronic medical record (EMR) system, we then queried medication orders to identify all opioid-naïve patients within this cohort. For the purposes of this investigation, we defined "opioid-naïve" as patients who did not have an active or completed opioid medication order within a 90-day period prior to the date of surgery. Similar to prior investigations assessing opioid use after hand surgery, patients who had an opioid prescription within a 90-day period prior to surgery were excluded.[23,24] From this opioid-naïve cohort, we then identified all patients who had opioid medication prescribed after surgery on the day of their CTR. After identifying included patients and opioid prescriptions, the following two groups were created for comparison: cases with an opioid prescription on the day of surgery (POD 0) and those who did not have an opioid order on the day of surgery.

The primary outcome of interest was any unplanned communication originating from the patient to the surgeon's office. Unplanned communication was defined as phone calls or electronic portal messages (EPPM) sent from a patient to the surgeon's administrative office. Postoperative phone calls and EPPM from patients to our orthopedic surgery department between POD 0 and POD-14 were then recorded for all included cases. Our institution utilizes a web-based electronic text messaging system that allows patients to contact their providers directly with questions. Both phone calls and EPPM are stored as separate encounters within the EMR and are linked to both departments and individual providers, allowing them to be easily searched and identified.

Statistics

Demographic, clinical, and surgical characteristics were collected and evaluated in the present study. The primary outcome of interest was any unplanned communication (phone calls or EPPM) sent from a CTR patient to the surgeon's administrative office, measured binarily ("Yes" or "No").

The difference between the two prescription groups was of particular interest in the present work. Also of interest were the dichotomous (two levels) or binary (yes or no) characteristics of the type of CTR surgery performed (OCTR or ECTR), laterality, associated mental, behavioral or neurodevelopmental diagnosis (ICD-10 F-code), insurance status, current tobacco use, diabetes, sex, race, marital status, age, and body mass index (BMI). In the absence of raw patient data, the binary variables of ICD-10 F-codes and diabetes were simulated using prior sample probabilities. We included multiple patient baseline demographic factors, such as age, sex, BMI, and tobacco use, as these characteristics have been associated with increased or prolonged opioid use after hand procedures.[23,25–27]

All characteristics of interest were summarized using means and standard deviations or frequencies and percentages, where appropriate. The unadjusted association between unplanned communication and all binary or dichotomous characteristics was evaluated using χ^2 tests with one degree of freedom, whereas equal variance two samples *t* tests were used for age and BMI at surgery. Absolute standardized differences presented as percentages (%ASD) were reported as sample size-independent measures of effect between each predictor and the occurrence of unplanned communication.

Multiple logistic regression models were used to assess the relationship between the opioid prescription status predictor of interest and unplanned communication, adjusting for all other demographic, clinical, and surgical predictors of interest. These models were propensity score inverse-weighted to control for any confounding relationships, assessed using %ASD, between whether the patient was prescribed an opioid on the day of CTR surgery and the type of CTR surgery performed as well as the indication of an ICD-10 F-code. Goodness-of-fit for each of these propensity score inverse-weighted multiple logistic regression models was assessed using the Hosmer–Lemeshow χ^2 statistic. As well, odds ratios (OR), 95% confidence intervals (95% confidence interval [CI]) of the OR, and *P* values corresponding to each predictor effect were reported.

Table 1
Demographic, Clinical, and Surgical Characteristics Across Opioid Prescription Status on the Date of Surgery

Characteristic	Total	Prescribed Opioid on Day of Surgery		*P* Value*
	(*N* = 5,735)	Yes (*n* = 3,079)	No (*n* = 2,656)	
Unplanned communication, *n* (%)	2,411 (42.0)	1,133 (36.8)	1,278 (48.1)	<.05
Phone Call†	1,477 (61.3‡)	723 (63.8‡)	754 (59.0‡)	
Electronic Portal Message§	1,343 (55.7‡)	576 (50.8‡)	767 (60.0‡)	
Type of CTR surgery performed, *n* (%)				
ECTR	1,241 (21.6)	437 (14.2)	804 (30.3)	<.05
OCTR	4,494 (78.4)	2,642 (85.8)	1,852 (69.7)	
Age at surgery (y), mean (SD)	55.5 (15.0)	55.6 (14.8)	55.5 (15.3)	.72‖
BMI at surgery¶ (kg/m^2), mean (SD)	33.3 (7.7)	33.1 (7.6)	33.5 (7.8)	.06‖
Male sex, *n* (%)	2,197 (38.3)	1,184 (38.5)	1,013 (38.1)	.81
Right laterality, *n* (%)	3,333 (58.1)	1,792 (58.2)	1,541 (58.0)	.89
White race, *n* (%)	5,479 (95.5)	2,919 (94.8)	2,560 (96.4)	<.05
Current tobacco user, *n* (%)	1,248 (21.8)	681 (22.1)	567 (21.3)	.48
Married, *n* (%)	3,207 (55.9)	1,721 (55.9)	1,486 (55.9)	.97
Diabetes, *n* (%)	1,657 (28.9)	903 (29.3)	754 (28.4)	.43
Private insurance, *n* (%)	4,667 (81.4)	2,509 (81.5)	2,158 (81.3)	.82
Indication of ICD-10 F-codes, *n* (%)	4,532 (79.0)	2,291 (74.4)	2,241 (84.4)	<.05

BMI, body mass index; CTR, carpal tunnel release; ECTR, endoscopic carpal tunnel release; OCTR, open carpal tunnel release; ICD, International Classification of Diseases.
* *P* value corresponding to χ^2 statistic with one degree of freedom, unless indicated otherwise.
† Number of patients with telephone contact, irrespective of electronic portal messaging.
‡ Percent of appropriate unplanned communication (ie, Total, Yes, or No).
§ Number of patients with electronic portal message contact, irrespective of telephone call.
‖ *P* value corresponding to equal-variances two-sample *t*-test.
¶ 301 missing BMI values for opioid prescription status: 222 (74%) Yes, 79 (26%) No.

Table 2
Patient Demographic and Surgical Characteristics Across Unplanned Communication Outcome, Including Absolute Standardized Differences

Characteristic	Unplanned Communication			Standardized Differences	
	Yes (*n* = 2,411)	No (*n* = 3,324)	P Value‡	Comparison	%ASD
Type of CTR surgery performed, *n* (%)					
ECTR	519 (21.5)	722 (21.7)	.86	OCTR vs ECTR	0.5
OCTR	1,892 (78.5)	2,602 (78.3)			
Age at surgery (y), mean (SD)	54.0 (14.9)	56.7 (15.0)	<.01*,§	Five-unit increase	17.8†
BMI at surgery‖ (kg/m^2), mean (SD)	33.8 (8.0)	33.0 (7.5)	<.01*,§	Five-unit increase	11.6†
Male sex, *n* (%)	872 (36.2)	1,325 (39.9)	<.01*	Male vs female	7.6
Right laterality, *n* (%)	1,425 (59.1)	1,908 (57.4)	.20	Right vs other	3.5
White race, *n* (%)	2,301 (95.4)	3,178 (95.6)	.76	White vs other	0.8
Current tobacco user, *n* (%)	545 (22.6)	703 (21.1)	.19	Yes vs No	3.5
Married, *n* (%)	1,302 (54.0)	1,905 (57.3)	.01*	Yes vs No	6.7
Diabetes, *n* (%)	704 (29.2)	953 (28.7)	.66	Yes vs No	1.2
Private insurance, *n* (%)	1,973 (81.8)	2,694 (81.0)	.45	Yes vs No	2.0
Indication of ICD-10 F-code, *n* (%)	1,900 (78.8)	2,632 (79.2)	.73	Yes vs No	0.9
Prescribed opioid on date of surgery, *n* (%)	1,133 (47.0)	1,946 (58.5)	<.01*	Yes vs No	23.3†

ASD, absolute standardized difference(s); BMI, body mass index; CTR, carpal tunnel release; ECTR, endoscopic carpal tunnel release; ICD: International Classification of Diseases; OCTR, open carpal tunnel release.
* Statistically significant at $\alpha = 0.05$.
† Clinically meaningful (ie, sample size-independent) difference between occurrence of unplanned communication and predictor, %ASD>10.
‡ *P* value corresponding to χ^2 test with one degree of freedom, unless otherwise indicated.
§ *P* value corresponding to two-sample *t*-test.
‖ 301 missing BMI values for unplanned communication: 114 (38%) Yes, 187 (62%) No.

Each OR provides the sample size-independent weighted and adjusted measure of effect.

Statistical analyses were performed in SAS Enterprise Guide 8.3 and R version 4.2.1. Differences were statistically significant when the *P* value was less than the type I error rate of 5% (*P* value < .05), whereas ASD greater than 10% indicated clinically relevant sample size-independent differences (unadjusted analyses) or potential confounders (adjusted analyses).

A post hoc power analysis was performed for the primary outcome of interest (percentage of cases with unplanned postoperative communication stratified by postoperative opioid prescription status). Given the large sample size, minute differences in outcomes were detected, suggesting 100% power ($\alpha = 0.05$).

Results

Patient demographic, clinical, and surgical characteristics summarized across opioid prescription status are presented in Table 1. There were a total of 5,735 included CTR cases performed by 81 distinct surgeons, and 3,079 (54%) were prescribed an opioid on their date of surgery. Forty-two percent of cases had an unplanned postoperative phone call or EPPM within the 14-day postoperative period. For the group without an opioid prescription, 48% had an unplanned phone call compared with 37% in the group who prescribed an opioid (*P* < .05).

Table 2 explains the unadjusted association between each predictor and the occurrence of unplanned postoperative

Table 3
Unweighted and Weighted Standard Differences Between Demographic, Clinical, and Surgical Characteristics and Opioid Prescription Status on Date of Surgery

Characteristic	Comparison	$\%ASD_{pre}$ ‡	$\%ASD_{post}$ ‡
Type of CTR surgery performed	OCTR vs ECTR	39.4*,†	0.0
Age at surgery (y)	Five-unit increase	0.9	2.1
BMI at surgery (kg/m^2)	Five-unit increase	5.2	6.0
Sex	Male vs female	0.6	0.0
Laterality	Right vs other	0.4	0.8
Racial affiliation	White vs other	7.7*	6.3
Current tobacco user	Yes vs No	1.9	0.4
Marital status	Married vs other	0.1	2.0
Diabetes	Yes vs No	2.1	3.1
Private insurance	Yes vs No	0.6	0.6
Indication of ICD-10 F-code	Yes vs No	24.8*,†	0.1

ASD, absolute standardized difference(s); BMI, body mass index; CTR, carpal tunnel release; ECTR, endoscopic carpal tunnel release, OCTR; open carpal tunnel release; ICD, International Classification of Diseases.
* Significant difference at $\alpha = 0.05$.
† Characteristic used to generate propensity score, $\%ASD_{pre}>10$.
‡ %ASDpre: %ASD calculated prior to inverse-weighting by propensity score (%ASDpost: after weighting).

Table 4
Weighted and Adjusted Effects of Patient and Surgical Characteristics on Unplanned Communication

Characteristic	Comparison	OR (95% CI)	*P* Value
Prescribed opioid on date of surgery	Yes vs No	0.62 (0.56, 0.70)	<.05*
Type of CTR case	OCTR vs ECTR	1.12 (0.98, 1.28)	.09
Age at surgery (y)	Five-unit increase	0.95 (0.93, 0.97)	<.05*
BMI at surgery (kg/m^2)	Five-unit increase	1.05 (1.01, 1.09)	<.05*
Sex	Male vs female	0.92 (0.82, 1.03)	.14
Laterality	Right vs other	1.07 (0.96, 1.20)	.22
Racial affiliation	White vs other	1.02 (0.78, 1.33)	.91
Current tobacco user	Yes vs No	1.00 (0.87, 1.15)	.99
Marital status	Married vs other	0.92 (0.82, 1.02)	.12
Diabetes	Yes vs No	1.03 (0.91, 1.16)	.63
Private insurance	Yes vs No	0.88 (0.75, 1.02)	.09
Indication of ICD-10 F-code	Yes vs No	0.90 (0.78, 1.03)	.12

BMI, body mass index; CTR, carpal tunnel release; ECTR, endoscopic carpal tunnel release; OCTR, open carpal tunnel release; OR (95% CI), odds ratio (95% confidence interval); ICD, International Classification of Diseases.
* Significant difference at $\alpha = 0.05$.

communication with corresponding %ASD. Five-unit increases in age (P value < .05) and BMI (P value < .05) at surgery were each statistically associated with a patient having either an unplanned phone call or EPPM, as were patient sex ($P < .05$), marital status ($P <$ .05), and whether an opioid was prescribed at POD 0 ($P < .05$). Meaningful clinical associations were observed between the unplanned communication outcome and age (%ASD = 17.8) and BMI (%ASD = 11.6) at surgery, as well as opioid prescription at POD 0 (% ASD = 23.2).

Table 3 gives the %ASD between each predictor and whether an opioid prescription was received on the day of surgery, before ($\%ASD_{pre}$) and after ($\%ASD_{post}$) adjusting for confounding. Odds ratios, 95% CI, and P values corresponding to the effect of each predictor on whether unplanned communication occurred are provided in Table 4. Inverse-weighted by propensity score and adjusted for confounding, patients prescribed opioids on the date of surgery were 0.62 times less likely to contact the surgeon's administrative office via an unplanned phone call or EPPM (95% CI: 0.56, 0.70, P value < .01). A five-unit increase in patient age at surgery was significantly associated with a reduction in the odds of unplanned contact (OR = 0.95, 95% CI: 0.93, 0.97, P value < .05), whereas BMI at surgery was associated with increased odds (OR = 1.05, 95% CI: 1.01, 1.09, $P < .05$). However, there was evidence of model lack of fit [H-L $X2(8) = 17.4$, $P < .05$].

We separately assessed the mean number of phone calls and EPPM for patients who underwent an endoscopic vs open CTR. There were no statistically significant differences in the mean number of unplanned communications between endoscopic (0.94 ± 1.79) and open approaches (0.94 ± 1.79, $P = .36$). Similarly, we found no statistically significant difference for the percentage of patients undergoing endoscopic vs open CTR who had any form of unplanned postoperative contact (43% vs 43%, $P = .92$).

Discussion

Although phone calls and EPPMs can offer a convenient means of communication between patients and surgeons, these unplanned postoperative communications can result in increased administrative burdens for surgeons and clinic staff.[28,29] In a series of >5,000 CTRs, we found that 42% of patients had an unplanned postoperative phone call or EPPM within the 14-day postoperative period. Patients prescribed opioids on the date of surgery were 0.62 times less likely to contact the surgeon's administrative office via unplanned phone calls or EPPM. In their retrospective investigation of 488 patients, Reid et al[30] demonstrated that 28% and 16% of patients made a telephone call regarding postoperative pain control and medication questions within the first 14 days after undergoing spine surgery, respectively. Additionally, Hadeed et al[28] found that 29% of patients undergoing orthopedic trauma surgery contacted the physician's office during the 2 weeks following their procedure with the main reason for these calls being pain control. In the context of these prior investigations, the results of this present study indicate that unplanned, patient-initiated postoperative communications occur frequently and may be related to pain control. Understanding the factors associated with unplanned postoperative communication may aid in discussions related to clinical resource allocation and can allow surgeons to optimize preoperative patient education. Patients should not be dissuaded

from contacting their surgeon with postoperative concerns; however, effective preoperative communication may aid in reducing calls and messages related to expected postoperative discomfort after CTR.

Although statistically significant, these modest increases in the frequency of unplanned communication do not justify routine opioid prescriptions after CTR, especially when considering the known adverse sequala for these medications. Although we did not define the reason for each unplanned communication event, issues related to pain control represent the most common reason for unscheduled visits and health care contact after distal radius fracture surgery.[19] Prior authors have suggested that pre- and postoperative counseling may aid in setting appropriate expectations related to pain and analgesia after UE procedures. A previous report by Dwyer et al[18] demonstrated that written handouts and education guidelines were effective in reducing opioid consumption by 55% in CTR patients without compromising patient satisfaction. Another investigation that focused on prescriber education reported a 52% decrease in average opioid prescription after ambulatory hand surgery.[31] Recent evidence from a multicenter investigation has also shown that larger opioid doses and durations predispose patients to prolonged opioid consumption after hand and UE surgery.[32] Moreover, considering the evidence supporting over-the-counter analgesia after CTR, surgeons and prescribers should exercise caution relative to opioid use and enhance efforts to counsel patients on pain expectations after hand surgery.[10–12,18] Considering the serious side effects of opioid medications, the observed increase in unplanned postoperative communication after CTR should not be a deterrent for nonopioid analgesic options.

In addition to opioid prescription status, additional patient factors were also associated with increased odds of unplanned postpreparative communication after CTR. Younger patients and those with higher BMIs were more likely to have an unplanned phone call or EPPM after surgery. Our health care system emphasizes the use of EPPMs as a secure and efficient method for establishing patient–provider communication; however, this specific communication practice may be challenging to navigate, particularly for older patients in our rural health care system.[33] Similar to our findings, Reid et al[30] demonstrated an association between higher BMI and a greater number of phone calls within 2 weeks after spine surgery. The reasons for this association are unclear but may be related to additional comorbid illnesses that can be seen with elevated BMI. Sumner et al[19] previously demonstrated that 20% of patients have unscheduled health care contact within 30 days after receiving treatment for distal radius fractures. They also found that younger patients were more likely to have unscheduled health care contact.[19]

This study has limitations that should be considered. There are inherent limitations to retrospective investigations, which rely on the accuracy of the EMR. Because of the volume of phone calls and EPPMs, we were unable to quantify the nature/reason for each call. As with many retrospective studies, it is possible that some patient or surgeon demographic factors that were not studied may contribute to the observed results. This investigation was conducted within a large, rural health care system with a homogeneous patient population, which may limit the generalizability of our results. There was no standardization with respect to the decision to use opioids after surgery, and there was substantial variation in prescription practices between surgeons. We did not quantify unplanned in-person visits, as the routine postoperative follow-up periods and protocols were not standardized among a large number of surgeons. There was a lack of standardization with respect to postoperative instructions, which may have influenced the frequency of patient calls. We chose 90 days as a definition for opioid-naïve, but it is uncertain if using a longer time period would have altered our results.

After primary, elective CTR, 42% of patients will have unplanned postoperative communication in the form of phone calls or EPPM. Carpal tunnel release cases who are prescribed opioids on the date of surgery are 0.62 times less likely to contact the surgeon's administrative office within 2 weeks of their procedure. Considering the 11% increase in the rate of unplanned postoperative communication for patients not receiving an opioid after CTR, surgeons should consider strategies that have been effective in reducing opioid consumption, such as presurgical patient education focusing on expectations and analgesia, as a potential means of preempting some unplanned postoperative phone calls and messages for expected postoperative discomfort.

Conflicts of Interest

No benefits in any form have been received or will be received related directly to this article.

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