

Opioid Prescribing Patterns in the ED and at Discharge: A Community Hospital Experience

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Abstract

Background

Despite increased awareness and advocacy regarding the opioid epidemic, data from Health Quality Ontario (HQO) shows steady prescribing of opioids with concerning trends toward prescribing more potent opioids. The creation of a quality standard for Opioid Prescribing in Acute Pain provides opportunity for organizations to assess whether they are meeting best practice recommendations.

Objective

To examine opioid prescribing patterns for patients presenting to the emergency department (ED) and to assess opioid prescribing at discharge in comparison to HQO quality standards.

Methods

This retrospective, observational study examined adults presenting to two ED sites within in a multi-site community teaching hospital. Patients prescribed intravenous (IV)/intramuscular (IM)/subcutaneous (SC) morphine, hydromorphone, and fentanyl were included. Patients were excluded if intubated, palliative or end-of-life, being treated for overdose, multi-fracture trauma, or admitted for inpatient treatment.

Results

Opioids were administered to 200 patients, with 12 patients receiving two different opioids (n=212). The most common opioid was morphine (79.7%), route was intravenous (92.9%), and frequency was as a one-time dose (46.2%). Common indications included abdominal pain (32%), trauma (11%), and renal/biliary colic (10.5%). A median parenteral morphine equivalent (MEQ) of 5 mg (IQR, 4-6.67 mg) was given, with 33.5% of patients receiving concurrent non-opioid pain management. Patients who received hydromorphone (OR 6.37), were prescribed as needed (OR 2.32), scheduled (OR 30.81) or repeated doses (OR 3.95), and had an indication of migraine or headache (OR 8.92) were more likely to receive higher doses. At discharge, one in four patients received an opioid prescription, most commonly for acetaminophen/oxycodone 325/5 mg (46%) or acetaminophen/caffeine/codeine 300/15/30 mg (36%) with a median duration of 3.1 days.

Conclusion

In summary, our organization showed reassuring prescribing patterns, meeting HQO quality standards for dose and duration of discharge prescription.

Introduction

Health Quality Ontario (HQP) reported that in the fiscal year of 2015/2016, close to 2 million Ontarians filled prescriptions for opioids.¹ This equates to one in seven people living in Ontario, or 14% of the province whom filled over 9 million opioid prescriptions over the span of a year. The report highlighted that the number of opioid prescriptions was not decreasing over the prior three years, despite our awareness of the opioid epidemic in Ontario. Although the number of codeine prescriptions had decreased by 7% between 2013/2014 and 2015/2016, oxycodone prescriptions remained unchanged and hydromorphone prescriptions increased by 29% which showed a concerning shift toward more potent opioids.

In 2018, HQO released a quality standard for Opioid Prescribing in Acute Pain.² Using the quality standards, organizations can assess the care they are providing through comparison to various indicators. Quality Statement 3 recommends that people with acute pain who are prescribed opioids receive the lowest effective dose of the least potent immediate-release opioid. A maximum duration of 3 days is preferred, while 7 days or more is cited as rarely indicated. Recommendations also reference a maximum daily dose of 50 mg of morphine for patients with acute pain who are opioid naïve, based on the increased risk of overdose or death with higher doses.^{3,4} Available evidence indicates that the use of opioids for acute pain increases the likelihood of long-term opioid use. Research from the United States shows that prescriptions for duration of 7 days or more, or those with refills, double the risk of opioid use one year later.⁵

Canadian data regarding opioid prescribing in the emergency department is limited. Borgundvaag B. et al assessed Ontario family and emergency physician prescribing in a population-based study using data from 2008-2012.⁶ This study was limited to drug dispensing data for patients covered under the public payer system, which has an impact on its generalizability to other patient populations. Additionally, although the research was published in 2018, many years have passed since the period of data collection. Guidelines and recommendations have changed and it is possible that ED prescribing patterns have also evolved. Our study will expand on previous data by reviewing physician prescribing of opioids to adult patients presenting to the ED of a multi-site community teaching hospital and at discharge.

Methods

Study Design and Participants

We conducted a retrospective chart review utilizing data from the period of July-September 2019. For this study, we reviewed charts from the organizations' two separate emergency department sites within a community teaching hospital. Each hospital campus has approximately 350 beds, with 100,000 emergency department visits per year between them.⁷ Patients were included if they were 18 years or older, and administered at least one dose of morphine, hydromorphone, or fentanyl by intravenous (IV), intramuscular (IM), or subcutaneously (SC) for acute pain. We excluded patients if they required intubation, palliative or end-of-life care, were being treated for drug overdose, multi-fracture trauma, or admitted for inpatient treatment. Patients were identified through the pharmacy medication dispensing system data based on the opioid administered in the emergency department.

Patient and medication related data was extracted from emergency department records. We recorded patient characteristics including age, sex, past medical history which could increase the risk of

respiratory depression or overdose with opioid use (chronic obstructive pulmonary disease, sleep apnea, psychiatric disorder and substance use disorder), and high-risk medication use prior to admission (opioid and benzodiazepine).^{8,9} The opioid administered in emergency department was identified, along with the route of administration, dose, frequency of administration, and whether non-opioid pain medications were given. Indications for opioid use were grouped into broader categories to allow for assessment of common indications. Finally, we identified whether a prescription for an opioid was given at discharge, and the length of the prescription provided. All opioid doses were converted to morphine equivalents to allow for analysis between groups when a different opioid was administered.

The study was reviewed and approved by the institution's research ethics board.

Statistical Analysis

Descriptive statistics were used to summarize the collected data. Continuous variables were reported using means/standard deviations and medians/interquartile ranges. Categorical variables were reported as percentages. A linear regression model was utilized with a step-wise model selection to identify factors that predicted the higher doses of opioid administered in the ED. The patients administered fentanyl were excluded from the regression, given the small sample (n=4). Analysis was completed using SAS and R statistical software.

Results

Of the 486 patient charts that were reviewed using data from July-September 2019, 200 patients (41.2%) were administered at least one dose of parenteral opioid within the ED without being admitted as inpatients. The majority of patients were female (65.5%) and the median age was 45.5 years. A quarter of the patients had a psychiatric disorder (21%), who are at a higher risk of non-fatal/fatal overdose, even at doses of less than 20 MEQ daily.⁹ Chronic obstructive pulmonary disease, obstructive sleep apnea, and substance use disorders were observed less frequently. Prior to admission, 16% and 7% of patients were taking opioids or benzodiazepines, respectively (Table 1).

Two hundred patients received at least one dose of opioid, 12 of which received additional doses of a different opioid, accounting for 212 opioid events. All 12 patients received morphine initially, followed by hydromorphone. Morphine was the most common opioid prescribed (79.7%), followed by hydromorphone (18.4%) and fentanyl (1.8%). Opioids were predominantly administered intravenously (92.9%) and prescribed as one-time doses (46.2%) or on an as-needed basis (41%). The median parenteral MEQ was 5 mg (IQR, 4-6.67 mg). About one third of patients received a non-opioid for pain control (Table 2). The most common indications for opioid use within the emergency department included abdominal pain (32%), trauma (11%), renal or biliary colic (10.5%) and musculoskeletal/idiopathic pain (10%). A significant number of indications were classified as other (13.5%), which comprised of cysts, esophageal food boluses, miscarriage, pyoderma gangrenosum and other indications that could not be classified in the broader categories (Table 3).

A regression analysis was completed to identify factors that predicted a higher dose of opioid within the emergency department (Figure 1). Patients who were administered hydromorphone received a significantly higher morphine equivalent than those who received morphine (OR 6.37, 4.55-8.19, p <0.001). In terms of frequency, as needed dosing, repeated one-time doses, and scheduled dosing

predicted higher doses compared to a single one-time dose. Patients who experienced migraine and headache received significantly higher doses than all other indications (OR 8.92, 2.36-15.47, p=0.008).

At discharge from the ED, one quarter of patients received a prescription for an oral opioid (Table 4). Acetaminophen/oxycodone 325/5 mg (46%) or acetaminophen/caffeine/codeine 300/15/30 mg (36%) were the most common discharge opioid prescriptions. The median number of days provided was 3.1.

Discussion

In this retrospective chart review, we assessed the opioid prescribing patterns in our ED. Compared to previously published research by Borgundvaag et. al, our findings are consistent with current guideline recommendations.⁶ Our median parenteral morphine equivalent dose was 5 mg. When converted to an equivalent oral morphine dose of 10 mg, we showed a 74% reduction compared to previous data showing emergency physicians prescribing a median of 38 MEQ. Although not a direct comparison, as data from Borgundvaag et. al focused on outpatient prescriptions written by ED physicians, it is reassuring to see reduced doses are being given in the ED. Additionally, only 3 (1.5%) of our patients received more than the recommended 50 MEQ compared to 30% in the aforementioned study. Compared to Borgundvaag et. al showing ED physicians prescribed opioids for indications for which they were not indicated as first-line (ie. dental pain, pharyngitis), most of the indications for opioid use in our study were consistent with current prescribing or guideline recommendations. Opioids are reasonable pain management for the most common indications including trauma, fractures, and renal/biliary colic. Lastly, we observed a baseline patient population with lower incidence of mental illness (21 vs. 57%) and concurrent benzodiazepine use (7 vs. 19.4%). Their results regarding concurrent benzodiazepine use may have been overestimated as they assessed use within the previous 180 days, while we assessed use prior to admission.

The regression analysis identified predictors of higher opioid doses, which can provide guidance for prescribing or creation of order sets. For example, morphine should be encouraged as the initial opioid over hydromorphone to limit the daily MEQ. Intuitively, one-time doses provided the lowest MEQ, however in this analysis, repeated one-time doses resulted in a higher MEQ. As needed dosing appeared preferable to repeated one-time doses, although the difference was not statistically significant. Order sets should avoid scheduled dosing and encourage as needed dosing. Migraine/headache was the only indication that showed a statistically significant higher MEQ. Despite availability of guidelines from the Canadian Association of Emergency physicians for acute management of migraine headaches, reviews have shown that opioids continue to be the mainstay of treatment in the ED.^{10,11} The management of migraine headache in the ED is an area for quality improvement, and this data will support the development of an order set including non-opioid pharmacotherapy like 5-HT receptor agonists.

In comparison to the HQO Quality Standards, our organization was well below the maximum of 50 MEQ daily for acute pain.² Our discharge prescription also nearly met the preferred 3-day duration, with a median of 3.1 days. Findings indicated the need for increased non-opioid pain management in the emergency department. Although HQO Acute Pain Guidelines suggest the use of a multi-modal therapeutic approach, including non-opioid pharmacotherapy in addition to opioids, only about a third of patients in this sample were administered non-opioids.² These included acetaminophen, non-

steroidal anti-inflammatory agents, and 5-HT receptor agonists for migraines. Emerging treatment modalities including regional blocks or low-dose ketamine were not observed.¹²

Our study has contributed valuable information regarding opioid prescribing, however some limitations were identified. Considering the data was extracted from patient charts, the information is limited by the quality of documentation. Given the fast-paced environment in the emergency department, variables including the significant past medical history and opioid or benzodiazepine prior to admission may not have been recorded completely, which could have underestimated our percentage of patients who are at a higher risk when administered opioids. Additionally, the discharge prescription given to the patient was not consistently recorded in the chart. This was evidenced by comments in the nursing notes stating that a discharge prescription was given to the patient, without any documentation of the prescription. This may have underestimated the frequency of opioid prescriptions given at discharge. Indications in this study relied on the diagnosis, as our organization does not record indications for each medication. This may have led to inaccuracies in the indication for use. Lastly, a higher pain level may have been a predictor for choice of opioid or MEQ, however this was not the focus of our research.

Our research has highlighted areas for optimization of opioid prescribing including standardization of order sets to include morphine as the initial parenteral opioid with an as needed frequency. Further opportunities include creation of an order set to aid in acute management of migraine and headache in the ED. In summary, our organization showed reassuring prescribing patterns, meeting HQO quality standards for limiting dose to 50 MEQ in 98.5% of patients and duration of discharge prescription to 3.1 days.

References

1. Hqontario.ca. (2017). Opioid Prescribing in Ontario. [online] Available at: <http://opioidprescribing.hqontario.ca/> [Accessed 15 Aug. 2019].
2. Hqontario.ca. (2018). Opioid Prescribing for Acute Pain. [online] Available at: <https://www.hqontario.ca/portals/0/documents/evidence/quality-standards/qs-opioid-acute-pain-clinician-guide-en.pdf> [Accessed 15 Aug. 2019].
3. Hegmann KT, Weiss MS, Bowden K, Branco F, DuBrueler K, Els C, et al. ACOEM practice guidelines: opioids for treatment of acute, subacute, chronic, and postoperative pain. *J Occup Environ Med.* 2014;56(12):e143-59.
4. Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain - United States, 2016. *MMRW Recomm Rep.* 2016;65(1):1-49.
5. Shah A, Hayes CJ, Martin BC. Characteristics of initial prescription episodes and likelihood of long-term opioid use - United States, 2006-2015. *MMWR Morb Mortal Wkly Rep.* 2017;66(10):265-9.
6. Borgundvaag, B., McLeod, S., Khuu, W., Varner, C., Tadrous, M. and Gomes, T. (2018). Opioid prescribing and adverse events in opioid-naïve patients treated by emergency physicians versus family physicians: a population-based cohort study. *CMAJ Open*, 6(1), pp.E110-E117.
7. Wrh.on.ca. (2020). WRH by the Numbers. [online] Available at: <https://www.wrh.on.ca/wrhbythenumbers> [Accessed 10 July 2020].
8. Izrailtyan I, Qiu J, Overdyk FJ, Erslon M, Gan TJ (2018) Risk factors for cardiopulmonary and respiratory arrest in medical and surgical hospital patients on opioid analgesics and sedatives. *PLoS ONE* 13(3): e0194553. <https://doi.org/10.1371/journal.pone.0194553>

9. Busse, J., Guyatt, G., Carrasco, A., Akl, E., & Agoritsas, T. (2017). The 2017 Canadian guideline for opioids for chronic non-cancer pain. Hamilton, ON.
10. Ducharme J. Canadian association of emergency physicians guidelines for the acute management of migraine headache. *J Emerg Med.* 1999;17:137–144. doi: 10.1016/S0736-4679(98)00136-X.
11. Colman I, Rothney A, Wright SC, Zilkalns B, Rowe BH. Use of narcotic analgesics in the emergency department treatment of migraine headaches. *Neurology.* 2004;62:1695–1700. doi: 10.1212/01.WNL.0000127304.91605.BA.
12. Todd KH. A Review of Current and Emerging Approaches to Pain Management in the Emergency Department. *Pain Ther.* 2017;6(2):193-202. doi:10.1007/s40122-017-0090-5.

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Tables

Table 1: Baseline Patient Characteristics	
	Patients (n=200)
Age, median (IQR), year	45.45 (32.25-60.08)
Female sex, (%)	131 (65.5)
Past medical history, (%)	
None	151 (75.5)
Psychiatric disorder	40 (20)
Psychiatric disorder and COPD or OSA	4 (2)
Chronic obstructive pulmonary disease	3 (1.5)
Obstructive sleep apnea	2 (1)
Opioids prior to admission, (%)	32 (16)
Benzodiazepines prior to admission, (%)	14 (7)

Table 2: Opioid Prescribing Characteristics within the ED	
	Opioid Events (n=212)
Opioid, (%)	
Morphine	169 (71.6)
Hydromorphone	39 (17.6)
Fentanyl	3 (1.8)
Route, (%)	
Intravenous	197 (92.9)
Intramuscular	8 (3.8)
Subcutaneous	7 (3.3)
Frequency, (%)	
One-time dose	98 (46.2)
As needed	87 (41)
Multiple one-time doses	26 (12.3)
Scheduled	1 (0.5)
MEQ, median (IQR), mg	5 (4-6.67)
Non-opioid pain management, (%)	67 (33.5)
Opioid prescribed at discharge, (%)	50 (25)
Note: n=200 for non-opioid pain management and opioid prescribed at discharge	

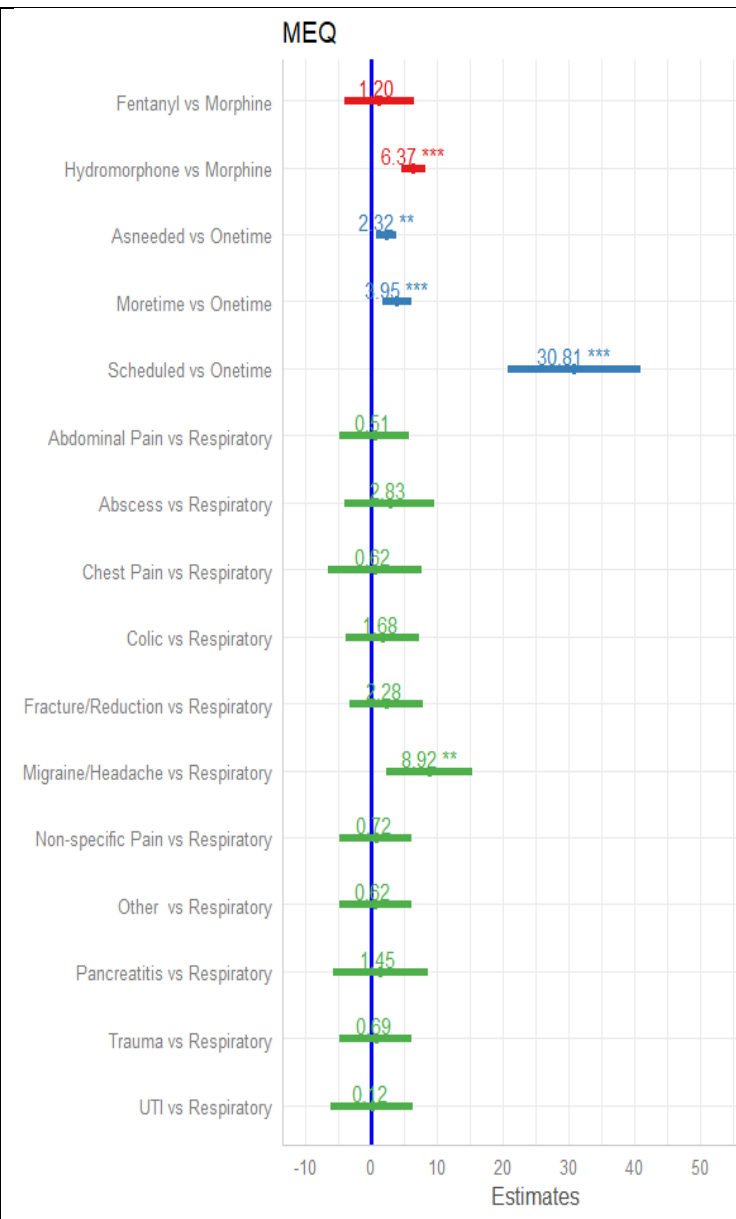
Table 3: Indications for Opioid Use in the ED	
Indication (%)	Patients (n=200)
Abdominal pain	64 (32)
Other	27 (13.5)
Trauma	22 (11)
Renal/biliary colic	21 (10.5)
Non-specific pain	20 (10)
Fracture or reduction	16 (8)
Urinary tract infection	8 (4)
Migraine or headache	6 (3)
Pancreatitis	4 (2)
Abscess	4 (2)

Respiratory	4 (2)
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Table 4: Discharge Prescription Characteristics	
	Patients (n=50)
Opioid at discharge, (%)	
Acetaminophen/oxycodone 325/5 mg (Percocet)	23 (46)
acetaminophen/caffeine/codeine 300/15/30 mg (Tylenol #3)	18 (36)
Morphine	4 (8)
Hydromorphone	5 (10)
Number of days, median (IQR)	3.1 (2.5-3.8)

Figure 1: Regression Analysis for Morphine Equivalent Dose

MEQ			
Predictors	Estimates	95%CI	p-value
(Intercept)	2.30	-2.93 – 7.54	0.387
Opioid (reference = morphine)			
Fentanyl	1.20	-4.08 – 6.48	0.654
Hydromorphone	6.37	4.55 – 8.19	<0.001
Frequency (reference = one-time dose)			
As needed	2.32	0.79 – 3.85	0.003
Multiple one-time doses	3.95	1.73 – 6.16	0.001
Scheduled	30.81	20.73 – 40.89	<0.001
Indication (reference = respiratory)			
Abdominal pain	0.51	-4.75 – 5.78	0.848
Abscess	2.83	-3.95 – 9.61	0.411
Chest pain	0.62	-6.54 – 7.77	0.866
Renal/biliary colic	1.68	-3.88 – 7.24	0.552
Fracture or reduction	2.28	-3.28 – 7.85	0.419
Migraine or headache	8.92	2.36 – 15.47	0.008
Non-specific Pain	0.72	-4.82 – 6.26	0.798
Other	0.62	-4.85 – 6.08	0.824
Pancreatitis	1.45	-5.75 – 8.64	0.692
Trauma	0.69	-4.75 – 6.14	0.802
UTI	0.12	-6.10 – 6.33	0.971
Observations	212		
R ² / R ² adjusted	0.413 / 0.365		



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