Aesculapius Journal (Health Sciences & Medicine)

Volume 5 Article 4

April 2024

Opioid Prescribing Habits of Emergency Department Providers in Response to an Educational Intervention

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Cover Page Footnote

The authors have no financial or other disclosures.

Opioid prescribing habits of Emergency Department providers in response to an educational intervention

Background

Abuse and dependency of prescription opioids has been an escalating epidemic in the United States over the past several decades. An estimated 4.7 million individuals in the United States had used opioids outside of their prescribed purpose in the month prior completing their survey[1]. Another study found that 10% of individuals in the United States abusing substances report prescription drugs are their drug of choice[2]. Beyond these concerns for abuse and dependency, overdose on prescription and non-prescription opioids is a rising concern within the United States. In 2019, the National Safety Council found that the odds of dying from an opioid overdose in the US are now greater than those of dying in a motor vehicle collision: 1 in 96 compared to 1 in 103[3]. While the majority of deaths due to opioid overdose are caused by non-prescription products such as heroin or fentanyl, an individual who is addicted to prescription opioids is 40 times more likely to develop a heroin dependency[4].

Many of these initial opioid prescriptions are written in the Emergency Department (ED), with an estimated 9.7% of outpatient visits resulting in an opioid prescription, compared to 24.4% of ED visits[5]. The conversion rate (percentage of patients who become persistent or high-risk users of opioids) after a single prescription in the ED is 13.7% within 12 months of receiving the prescription, compared to 3.2% for those who had not received a prescription. Conversion rates of 37.3% were found among patients who were prescribed 350 Morphine Milligram Equivalents (MME) or more[6]. Acute pain complaints are the most common presentations in the ED, contributing to 70% of ED visits[7], with back, head, and abdominal complaints being among the most common and the most highly associated with an opioid prescription[8]. Additionally, variability in prescribing habits has also been shown to affect long-term opioid use. In a 2017 study, providers were split into high and low intensity groups based on their history of opioid prescribing. It was found that rates of long-term opioid use were significantly higher for opioid-naïve patients who received a prescription from a high-intensity opioid prescriber[9]. This mirrors the results of a similar study done in 2018 in which patients seen by high-intensity prescribers received opioid scripts at a rate of 24.1% compared to 7.3% of patients seen by a low-intensity prescriber. Long-term opioid use for high-intensity versus low-intensity prescribers were 1.51% and 1.16%, respectively[10].

Educational interventions regarding opioid prescription and abuse not only decreased opioid MME numbers prescribed and overall numbers of opioid prescriptions, but also reduce variability in prescribing habits. Prior studies have evaluated provider prescribing habits in response to an educational intervention[11, 12]. One such study evaluated the prescribing habits of surgeons in the post-operative period and found a reduction in the number of opioid prescriptions as well as in the variability of prescribing habits after an educational intervention[11]. In a separate study, patient education for opioid prescriptions was given in a five-minute one-on-one intervention to 30 different ED providers. Post-intervention, their patients received more information regarding both written opioid instructions as well as appropriate post-discharge follow-up. Additionally, there was a significant decrease in overall opioid prescriptions with an increase in non-opioid therapies[12]. These prior studies have brought forth promising evidence that educational interventions on the topic of opioid risks and prescribing habits reduce the overall number of opioid prescriptions written, as well as the variability in prescribing habits[11,12]. Thus, a focus on prescribing habits of ED providers for acute pain management may prove to be a significant area of improvement to reduce opioid dependency in the United States. The purpose of

this project is to evaluate opioid prescribing habits of ED providers in southeast South Dakota in the year before and year after an educational intervention was given regarding appropriate opioid prescription. It is hypothesized that the educational intervention provided to ED providers will result a reduction in the number of opioids prescribed.

Methods

Procedure

A retrospective analysis was performed using charts of patients presenting with complaints of pain to an ED in southeast South Dakota from April 7, 2014 - April 7, 2016. An educational intervention regarding appropriate opioid prescription was given on April 7, 2015. The educational intervention consisted of a presentation reviewing American Academy of Emergency Medicine (AAEM) pain guidelines with an in-depth discussion on the topic that followed. The duration of the intervention was approximately thirty minutes. The intervention consisted of a PowerPoint (Microsoft) presentation. A copy of the presentation and educational materials was also given to providers to further review on their own.

Inclusion/Exclusion Criteria

Due to their more common presentation to the ED, patients with a primary diagnosis of back, head, and abdominal pain were used in this study[13]. Diagnosis codes included lumbago, dorsalgia, backache not otherwise specified, headache, generalized abdominal pain, right lower quadrant abdominal pain, right upper quadrant abdominal pain, left lower quadrant abdominal pain, left upper quadrant abdominal pain, periumbilical abdominal pain, epigastric abdominal pain, pelvic pain, and unspecified abdominal pain.

Patient encounters from April 7, 2014, through April 6, 2015, were included in the pre-intervention group, while patient encounters from April 8, 2015, through April 7, 2016, were included as part of the post-intervention group. Patient encounters on April 7, 2015, the day of the educational intervention, were omitted given the inability to determine if the encounter occurred before or after the intervention on that day. Encounters where the patient left against medical advice or without being seen were also excluded.

Providers with patient encounters only in the pre-intervention or only in the post-intervention group were omitted from the study, as were providers with fewer than 20 encounters in either group. One provider who was included was not in attendance at the educational intervention but was given the presentation and guidelines to review on their own. In total, seven providers ultimately met the above criteria and were included in the study.

Data Collection

Chief complaint, date of patient encounter, patient birth date and gender, opioid treatment administered in the ED, prescribed opioid treatment, and treating provider were obtained from each chart. Providers were de-identified via a code used throughout the entirety of the research project. All opioid dosages were converted to standardized MMEs using a CDC conversion chart[14,15]. Dosages were calculated for opioids administered parenterally (intravenously and intramuscularly), oral doses administered, oral doses prescribed, and total opioids administered or prescribed at each visit.

Additionally, number of non-opioid treatment modalities at each encounter was recorded. Such modalities included ketorolac, methocarbamol, dexamethasone, NSAIDs, acetaminophen, cyclobenzaprine, and gabapentin.

Primary & Secondary Outcomes

The primary outcome investigated in this study was the number of opioids, in MMEs, being administered parenterally or orally or prescribed in the ED in the year before and after an educational intervention. Secondary outcomes included provider-specific data and number of non-opioid pain treatments administered or prescribed.

Statistical Analyses

The difference in opioid utilization pre-intervention versus post-intervention was calculated using a two-sample t-test. Changes in prescribing habits were compared both in-group by individual provider and against the overall group. Changes in prescribing habits were further analyzed by ICD diagnosis of head, back, or abdominal pain. Use of non-opioid pain modalities was analyzed using a two-sample t-test prior to and after the intervention. Additionally, chi-square analysis was performed to address gender and age as a potential confounding factor.

Results

There were 2432 patient encounters included in this study. The distribution of age and gender of patient in encounters pre- and post-intervention were not statistically significantly different [Table 1]

	Pre-Intervention	Post-Intervention	*p*-Value
Total Group	1164	1268	-
Gender			
Male	452	514	0.41
Female	710	754	
Mean Age (Years)	41.5	42.3	0.10

Table 1. Patient encounters included in the pre- and post-intervention groups and p-value of chi-squared analysis.

Overall, there was no significant difference in mean number of opioids administered parenterally, prescribed, or total opioids utilized between the pre- and post-intervention groups. There was a significant difference in opioids administered orally in the ED in the overall group and by each ICD diagnosis subset (table 2). Also, though not significant, parenteral utilization of opioids did decrease in the post-intervention period overall and in each diagnosis subset. There was minimal significant difference in opioid utilization post-intervention when broken down by specific provider, except in three cases (table 3). While not significant, six out of the seven providers did have a decrease in mean total opioid MMEs and prescribed opioid MMEs.

	Mean MMEs		P-Val
	Pre-Int	Post-Int	
Overall Group:	N= 1164	N= 1268	
Opioids IV/IM	2.17	2.01	0.33
Opioids PO	**1.35**	**1.89**	**0.02***
Opioids Prescribed	31.97	34.42	0.35
Total Opioids	35.47	38.35	0.29
Back Pain Group:	N= 272	N= 185	
Opioids IV/IM	2.28	2.22	0.89
Opioids PO	**2.90**	**0.95**	**<0.01***
Opioids Prescribed	52.15	60.40	0.32
Total Opioids	57.29	63.57	0.46
Headache Group:	N= 236	N= 315	
Opioids IV/IM	1.56	1.18	0.23
Opioids PO	**0.47**	**1.27**	**0.01***
Opioids Prescribed	10.68	15.47	0.15
Total Opioids	12.70	18.02	0.13
Abdominal Pain Group:	N= 656	N= 768	
Opioids IV/IM	2.34	2.30	0.85
Opioids PO	**1.03**	**2.36**	**<0.01***
Opioids Prescribed	31.27	35.93	0.15
Total Opioids	34.27	40.62	0.08

Table 2. Mean opioid MMEs administered and/or prescribed for the overall group of study participants and broken down by patient complaint sub-group

	Mean MMEs		P-Value
	Pre-Int	Post-Int	
Provider A:	N= 229	N= 208	
Opioids IV/IM	1.73	1.62	0.77
Opioids PO	0.59	0.60	0.97
Opioids Prescribed	13.70	20.30	0.12
Total Opioids	15.98	22.55	0.14
Provider B:	N= 273	N= 293	
Opioids IV/IM	1.55	1.49	0.80
Opioids PO	**1.62**	**1.93**	**<0.01***
Opioids Prescribed	35.99	34.12	0.69
Total Opioids	39.16	38.64	0.92
Provider C:	N=96	N=65	
Opioids IV/IM	3.87	3.32	0.55
Opioids PO	0.68	0.66	0.98
Opioids Prescribed	15.73	9.08	0.20
Total Opioids	20.27	13.06	0.18
Provider D:	N= 141	N= 133	
Opioids IV/IM	1.87	1.91	0.94
Opioids PO	1.08	0.86	0.77
Opioids Prescribed	32.65	31.53	0.86

Total Opioids	35.60	34.30	0.84
Provider E:	N= 257	N=246	
Opioids IV/IM	**2.77**	**1.78**	**0.02***
Opioids PO	1.28	1.00	0.44
Opioids Prescribed	23.89	16.21	0.11
Total Opioids	27.93	18.82	0.07
Provider F:	N= 64	N=26	
Opioids IV/IM	3.20	3.17	0.98
Opioids PO	2.15	3.08	0.65
Opioids Prescribed	69.72	59.23	0.67
Total Opioids	75.07	65.48	0.71
Provider G:	N= 113	N=310	
Opioids IV/IM	**1.55**	**2.45**	**<0.01***
Opioids PO	2.60	2.92	0.69
Opioids Prescribed	64.92	61.13	0.68
Total Opioids	68.98	66.59	0.80

Table 3. Mean opioid MMEs administered and/or prescribed broken down by specific provider

One unexpected finding in this study was the significant difference in non-opioid pain medications administered and prescribed after the educational intervention. Prior to the intervention, the average number of non-opioid pain medications prescribed per patient encounter was 0.797; after the intervention, the average was 0.890 (p=0.02). This indicates an increased use of non-opioid pain medications for the treatment of acute pain episodes presenting to the ED after the educational intervention.

Discussion

The purpose of this study was to investigate whether an educational intervention provided to physicians in a small community hospital in southeastern South Dakota would be associated with a significantly different number of opioids being administered in the ED or prescribed. No significant difference was noted in the number of opioids being administered parenterally or prescribed after the intervention overall, within the diagnosis subsets, or among individual providers. A secondary investigation point was to study whether the educational intervention was associated with a significant difference in non-opioid pain modalities. There was a significant difference in the number of non-opioid pain medications being administered or prescribed, with an increase in the mean number of non-opioid pain medications prescribed after the intervention.

The results of this study indicate a variable response to education on provider prescribing habits for presentations of pain to the ED. While the number of opioids administered orally did significantly increase overall in the headache and abdominal pain sub-groups, overall opioid utilization and number prescribed did not differ significantly. This may reflect a lack of effectiveness of the educational intervention in general or a potential information “decay” with temporal distance from the education. Prior studies showing decreased opioid utilization after an educational intervention typically used a shorter post-intervention window to evaluate intervention effectiveness. It is possible that in the immediate post-intervention period, there was an initial difference in the number of opioids prescribed

or administered for acute pain presentations that was not sustained throughout the entirety of the study window. The increase in the number of non-opioid pain treatments administered or prescribed in the post-intervention period could be indicative of a partial response to the educational intervention. It is possible that, while overall opioid utilization did not differ between the two study groups, providers opted to utilize more non-opioid options in the post-intervention group to achieve better pain management.

Avenues for future research may include implementing quarterly education sessions on opioid prescribing guidelines to reduce the potential of information decay. Prescribing habits could be studied in the year prior to the first intervention and throughout the year with quarterly interventions occurring. Furthermore, there has been some evidence that dual implementation of clinician education on alternatives to opioids and Prescription Drug Monitoring Programs (PDMPs) with clinician prescribing tracking have reduced ED opioid prescriptions[16]. Further research could also include development and utilization of a tracking system that enables providers to review their monthly opioid prescribing practices relative to their colleagues. This could lead to decreased variability in prescribing habits as well as reduced overall opioid utilization.

This study did have some notable limitations. First, there was one provider included in the study who did not attend the initial educational intervention session. That provider was given the educational materials discussed and encouraged to review them, but it is possible that this could have impacted retention of the material compared to those who attended the session in person. Additionally, the study may have been limited by ICD coding because the hospital switched from ICD-9 to ICD-10 midway through the study. Medical records which contained specified primary diagnoses such as dorsalgia, lumbago, RUQ abdominal pain, etc. were queried. It is possible that a large number of charts that should have been included were missed due to diagnostic coding changes. Lastly, pain is attributed to somatic causes for many cases of back pain, while gastrointestinal and head pain is more often attributed to visceral pain. Opioids have been shown to have greater effects for somatic pain. Thus, this may confound opioid utilization when investigated by diagnostic code.

Conclusion

Overall, the educational intervention on the topic of opioid prescribing guidelines did not have the expected impact on amounts of opioids administered or prescribed during the study period. Total opioids utilized and opioids prescribed did not vary between the pre- and post-intervention groups overall, by subset diagnosis, or by provider. There was, however, an increase in utilization of non-opioid treatment options that could be indicative of a partial response to the educational intervention. Further research is necessary to investigate whether the lack of response is due to ineffectiveness of the intervention or information decay with temporal distancing from the intervention.

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