

Effect of CDC Opioid-Prescribing Guidelines in a Community Hospital Emergency Department

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ABSTRACT

The United States continues to battle the addiction and overdose deaths with the opioid epidemic. Prescription opioids are responsible for more than half of these deaths. This before-after study was conducted to assess the effect of the Centers for Disease Control and Prevention's (CDC's) opioid prescription guidelines. Data were abstracted from electronic health records of adult patients presenting with low back pain seen in the emergency department during the study period. SAS statistical software was used to compare opioid prescription practices before and after the intervention. A total of 1006 patients were included in the analysis. Opioid prescriptions decreased by 11% post-CDC guidelines (45% vs 34%). Of patients receiving opioids ($n = 383$), there was a 6% reduction in the number of days (<5 days) for which opioids were prescribed post-CDC guidelines (14% vs 8%). CDC guidelines on opioid prescribing were associated with a significant reduction in opioid prescribing in terms of both quantity and length of time prescribed. Public health policies as guidelines may positively influence provider decision making and behaviors.

KEY WORDS: CDC guidelines, opioid crisis, opioid prescription practices, opioids

Opium is derived from the poppy plant *Papaver somniferum*, reported existing since 3000 BC. Morphine was isolated from opium in 1806 by Sertürner. Several semisynthetic opioids such as heroin, oxycodone,¹ and hydrocodone² and synthetic opioids such as tramadol,² fentanyl, and methadone were formulated by the 20th century. By binding to μ receptors in the

central nervous system, opioids exert their analgesic action. Opioids are highly addictive.¹

Reviews report that pain was undertreated in the 1970s to 1990s. In 1995, a movement was started by the American Pain Society and in 1999 by Veterans Affairs hospital system to better evaluate and treat persons and in particular wounded soldiers suffering from pain.³ The phrase "pain as fifth vital sign" was promoted, stressing the importance of adequate pain management of patients suffering from pain.⁴ The Joint Commission and multiple organizations followed the concept. Health care providers were recommended to assess pain in every patient during every visit and prescribe pain medications accordingly.⁵ This was the beginning of the opioid crisis, compounded by the introduction of long-acting OxyContin (oxycodone) in 1995 by Perdue Pharma, which marketed the drug to be nonaddictive.³

About 10.3 million Americans 12 years and older misused opioids in 2018, including 9.9 million people reported misusing prescription opioids and 808 000 people reported for heroin use.⁶ Studies show that about 80% of heroin users had previously used prescription opioids for nonmedical reasons. Many people who misuse opioids switch to heroin because it is easily available in the black market and less expensive than prescription opioids.⁷ Drug overdose deaths quadrupled from 2000 to 2014, and more than 33 000

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people living in the United States died from opioid overdoses in 2015.⁸ A 2009 report of the total cost of prescription opioid poisoning in the United States estimated the direct costs at \$1.76 billion annually, with indirect costs estimated to be \$13.9 billion annually.⁹

Studies identified high-risk prescribing practices that have contributed to the overdose epidemic and Centers for Disease Control and Prevention (CDC) published guidelines for prescribing opioids for chronic pain in *Morbidity and Mortality Weekly Report (MMWR)*, on March 18, 2016.¹⁰ These guidelines provided recommendations for primary care clinicians who prescribe opioids for chronic non-cancer pain. This study was conducted to evaluate the effect of CDC guidelines on opioid prescription practices of emergency department (ED) physicians in a community medical center in New Jersey, with intention that the results of the study promote stricter guidelines and policies to help mitigate the opioid crisis.

Methods

This study was given exemption by the institutional review board of the medical center where the data were collected and the University of Pennsylvania where the study was conducted. This is a before-after study conducted to evaluate opioid prescription practices of ED physicians in a community medical center, in reference to CDC opioid guidelines. De-identified sample data were abstracted from electronic medical records of the medical center. Study subjects were adults who presented to the ED with acute musculoskeletal low back pain. The diagnosis codes of *International Classification of Diseases, Ninth Revision (ICD-9)* 724.2 and *International Classification of Diseases, Tenth Revision (ICD-10)* M54.5 were used, and both codes contained equivalent diagnoses of lumbago, lumbalgia, low back syndrome, and low back pain.

The pre-CDC guidelines group was selected from June 19, 2015, to March 18, 2016 (9 months pre-CDC guidelines), and post-CDC guidelines group from March 19, 2016, to December 31, 2016 (9 months post-CDC guidelines). The transition from *ICD-9* to *ICD-10* happened on September 15, 2015. During the review of the study sample, it was found that there were a spuriously low number of subjects (just 7) with *ICD-9* diagnosis code of 724.2 from June 19, 2015, till September 15, 2015. The study was hence conducted on subjects with *ICD-10* diagnosis code of M54.5 only and the study period modified to the starting date of September 16, 2015, for pre-CDC guidelines group and the rest of the study periods unchanged.

The study included adults 18 years or older who visited the ED for mechanical low back pain (diagnosis code of M54.5) without hospital admission during the time period of September 16, 2015, until December 31, 2016. The pain medication prescriptions given at the time of ED discharge were studied. The study also included the subjects who were discharged without pain medication prescription. Children, pregnant women, and subjects who presented with low back pain from other causes, for example, cancer-related pain or renal pain, were excluded. If the subjects were administered opioids in the ED, it was not considered in the study. The subjects who were admitted were not included in the study. The variables collected were date of ED visit, age, gender, city of residence, and pain medications prescribed (type, strength, frequency, and number of days).

This study was conducted on de-identified data from electronic health records and no human participants.

Statistical analysis

To determine differences in opioid or nonsteroidal anti-inflammatory drug (NSAID) prescriptions pre- and post-CDC guidelines, chi-square or Fisher's exact tests were used. Logistic regression models were employed to examine trends over the 2-year time period (separated into 3-month periods) while adjusting for age and gender (Figure 2). All analyses were performed using statistical analysis software (SAS, version 9.4; SAS Institute, Cary, North Carolina).

Results

During the study period, 1006 patients with lower back pain presented to the ED, 361 and 645 patients pre- and post-CDC guidelines, respectively. Overall, 483 patients (48%) were female, average age of 44 ± 14 years, with 632 (63%) Black/African American, 200 (20%) Hispanic/Latino, 143 (14%) White, and 31 (3%) other races. Most patients were from the city where the medical center was located (81%), and the rest of them from surrounding cities. There were no statistically significant differences in the distribution of age, sex, and race in the pre- and post-CDC guidelines groups ($P > .40$ for all variables).

During the study period, there were 383 opioid prescriptions, the most common prescription being tramadol (Ultram) ($n = 181$; 47%), followed by oxycodone (Percocet) ($n = 140$; 37%), hydrocodone-acetaminophen (Norco/Vicodin) ($n = 42$; 11%), and acetaminophen-codeine (Tylenol #3) ($n = 20$; 5%). The NSAIDs included in the nonopioid prescription group were ketorolac (Toradol), naproxen, ibuprofen,

and meloxicam (Mobic). Acetaminophen (Tylenol) was also included in this group.

The percentage of opioids prescribed significantly decreased by 11% in the post-CDC guidelines group (45% vs 34%, pre- and post-CDC guidelines groups, respectively; $P < .001$; Figure 1), while there was no significant change in NSAID prescribing (alone or with opioid) (52% vs 54%; $P = .39$; Figure 1) or in patients receiving neither an opioid nor a NSAID (17% vs 22%; $P = .102$; Table). In addition, there was a 6% decrease in the percentage of opioid prescription of more than 5 days in the post-CDC guidelines group (14% vs 8%; $P = .06$), but this did not reach statistical significance (Table).

After the implementation of the CDC guidelines, odds of opioid prescribing decreased overall in the post-CDC guidelines period by 37% (95% CI, 0.48–0.81; $P < .001$) adjusted for age and gender. To see whether the decrease was maintained in 3-month increments, a second model was constructed. Although all 3-month periods in post-CDC guidelines period showed a decrease (odds ratio range, 0.61–0.75), only the first and third 3-month intervals showed statistical significance (Figure 2).

Discussion

Although the CDC guidelines were focused on primary care clinicians prescribing opioids, they are relevant in certain acute care settings such as the ED.¹¹ Through collaborative pain management with specialists, pharmacists, and behavioral health providers, these guidelines can be used across other health care settings.¹¹ Although this study addressed prescribing

TABLE
Number of Prescriptions NSAIDs and Opioids and Number of Days of Opioid Prescription Given

	NSAID Prescriptions Only	Opioid Prescriptions	Neither Prescribed
Pre-CDC guidelines group	135 (37%)	163 (45%) ≤5 d 140 (86%) >5 d 23 (14%)	63 (17%)
Post-CDC guidelines group	283 (44%)	220 (34%) ≤5 d 203 (92%) >5 d 17 (8%)	142 (22%)

Abbreviations: CDC, Centers for Disease Control and Prevention; NSAID, nonsteroidal anti-inflammatory drug.

practices for acute pain, inappropriate initial prescription of opioids could lead to continuation of injudicious prescribing behavior, when patients continue to seek treatment of pain. There are many physicians who believe that long-term opioid therapy can lead to addiction.¹¹

The sample size in the pre-CDC guidelines group is smaller than in the post-CDC guidelines group and is due to shorter time period (6 months instead of 9 months for the pre-CDC guidelines group). No significant differences were found in variables such as age, sex, and race in either group. The number of days the opioids were prescribed was also addressed in this study, as prolonged use of opioids could lead to opioid dependence and misuse. In addition, the New Jersey governor passed a law (effective February 15, 2017) mandating initial opioid prescription be written for 5 days or less.¹² Although the time period of our study was prior to this state law, it may provide

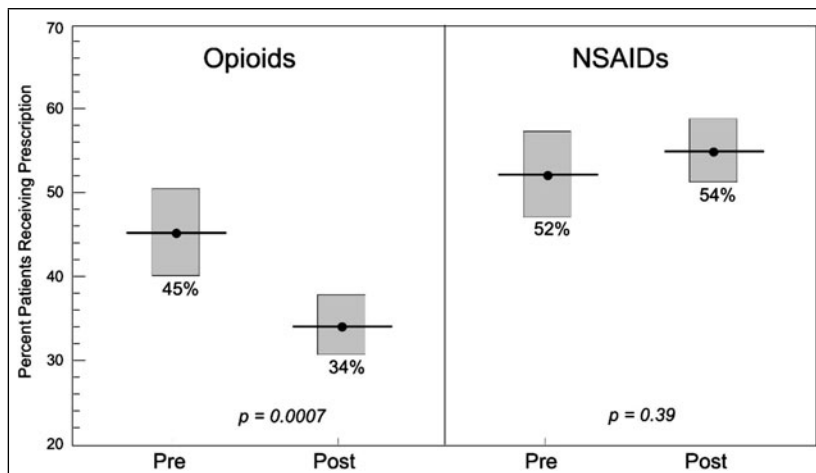


FIGURE 1 Changes in Opioid and NSAID Prescribing Patterns Pre/Post-CDC Guidelines
 Abbreviations: CDC, Centers for Disease Control and Prevention; NSAID, nonsteroidal anti-inflammatory drug.

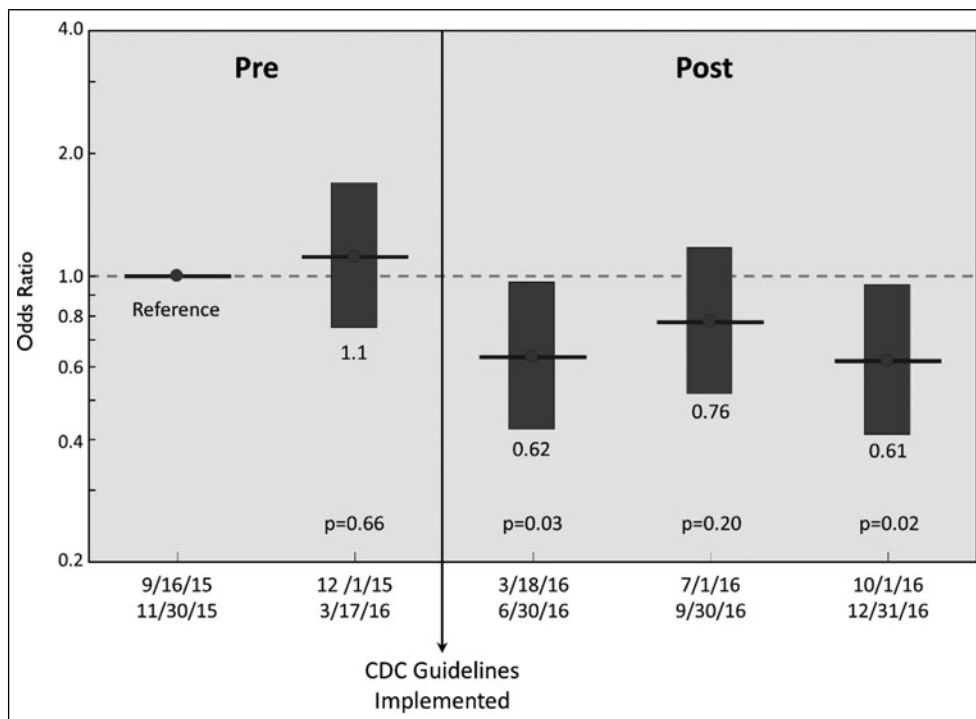


FIGURE 2 Odds of Receiving an Opioid Prescription Pre/Post-CDC Guidelines^a

Abbreviation: CDC, Centers for Disease Control and Prevention.

^aModel adjusted for age and gender. Reference time period is September 16, 2015, to November 30, 2015.

information that can be useful in future studies. More studies are needed across other health care settings to evaluate the impact of CDC guidelines and to promote judicious opioid-prescribing practices.

Implications for Policy & Practice

- Policies and programs that impact public health can make changes in a positive way and improve the health of our communities.¹⁰ A multilevel approach is needed to fight the opioid crisis, including prescriber education and accountability, policies at the local and higher levels, patient education on prescription use and misuse, and availability of rehabilitation services for opioid dependence.
- Physicians should be aware and offer alternative pain management remedies to patients.
- Almost all US states have Prescription Drug Monitoring Programs—both prescribers and pharmacists should strictly follow their respective programs.¹⁰
- Using the prescription monitoring programs, pharmacists monitor and alert providers if they observe red flags, as well as periodic evaluation of individuals for tendencies of addiction, probing risk factors for addiction and their management would be needed.¹³

Conclusions

The implementation of CDC guidelines on opioid prescribing was associated with a significant reduction in opioid prescribing in terms of both quantity and length of time prescribed. Prescribing trends of opioids were evaluated within the group and between the 2 groups before and after the implementation of CDC guidelines. The first measure to combat opioid epidemic should be judicious opioid prescribing by health care providers supported with these new CDC guidelines. Patient education about the negative effects of chronic opioid use and misuse should also be carried out. The state prescription monitoring programs help physicians and pharmacists to be vigilant and look for red flag signs of opioid misuse.¹⁰ Further studies are needed for implementing these opioid-prescribing guidelines in various health care settings and for other pain conditions.

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