Provision of a Drug Deactivation System for Unused Opioid Disposal at Surgical Dismissal: Opportunity to Reduce Community Opioid Supply

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Abstract

Objective: To determine the impact of a drug deactivation system to post-surgical patients on the rate of opioid prescription disposal.

Patients and Methods: Two hundred post-operative patients discharged after inpatient surgery at a large academic medical center. This study was conducted August 20, 2018, through November 30, 2018. Patients were provided with a drug deactivation system (DDS) and instruction sheet along with their opioid prescription. Three to 4 weeks after dismissal, patients were surveyed about quantity of opioids remaining, use of DDS or other disposal methods, and satisfaction with DDS if used.

Results: One hundred forty-nine of 200 (74.5%) patients were surveyed. One hundred six reported leftover opioids and 29 (27.3%) had disposed of these medications. By the time of survey, 23 (21.2%) participants with leftover opioids had used the DDS to destroy their remaining supply and an additional 33 (31.1%) participants reported plans to use the disposal bag on a future date. Of the 23 participants who used the DDS, 22 (96.0%) reported that they were very satisfied with the disposal process.

Conclusion: Participants are willing to use a DDS and are satisfied with the process; however, additional education is needed to ensure timely disposal.

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of total controlled substances dispensed in the area were disposed of through take-back programs.4

If take-back programs are unavailable, the FDA recommends mixing medications with unpalatable substances in a plastic bag and throwing in the trash, or for opioids specifically, flushing is recommended, as the risk of the accessible unused supply is greater than the risk to the environment.5 This recommendation is contrary to the US Environmental Protection Agency’s recommendations.5 A study comparing the unpalatable substances suggested by the FDA found that hydrocodone had zero deactivation by coffee grounds, cat litter, or sawdust, and oxycodone had 5.3% deactivation by coffee grounds and zero deactivation by cat litter or sawdust.6 Therefore, this technique may reduce diversion, but it does not fully remove the risk. In contrast, activated carbon in drug deactivation products have been used to deactivate 99.6% to 100% of medications such as hydrocodone and oxycodone as well as liquid medications and medication patches.6

Our institution has implemented many opioid-sparing techniques including multimodal anesthesia, minimization of opioid prescribing at discharge, and passive disposal education in discharge paperwork and institutional patient education materials. Despite these strategies, we hypothesized that many patients would have leftover opioids. The objective of this study was to evaluate if a simple, single intervention, (ie, the provision of a drug deactivation system [DDS]) could increase opioid disposal rates in surgical patients at a large academic medical center.

PATIENTS AND METHODS

Eligible patients were identified from August 2018 through November 2018 when they picked up an oxycodone or hydromorphone prescription at a single outpatient pharmacy upon dismissal from an inpatient surgical unit. All patients were at least 18 years old, English-speaking US residents who underwent gynecologic, urologic, general, breast, plastic, or colorectal surgery during their admission.

Demographic information was collected retrospectively through a chart review. Chronic pain was defined as diagnosis of chronic pain condition in hospital problem list (neuropathic pain, fibromyalgia, endometriosis, etc) and/or use of non-opioid pain medications such as gabapentin, pregabalin, etc, at doses consistent with pain indications. Patients who used opioids before admission were excluded.

Patients were provided a DDS and an education sheet explaining how to use the DDS along with their opioid prescription. No additional patient education was provided by the dispensing pharmacy. The DDS used in this study was a 12-oz Deterra bag. Additional education about opioid disposal was left up to the surgical service per usual practice; our institution did not require disposal education at the time of the study. Our hypothesis was that patients in this study would have higher disposal rates compared with historical trends at our institution.

Patients were surveyed using a 30-question scripted survey by phone 3 to 4 wks after dismissal by our facility’s professional survey center. Questions asked were related to quantity of opioids received, quantity remaining, use of DDS or other disposal methods, and satisfaction with DDS if used. Prescription quantities were gathered by chart review. To minimize recall bias, patients were asked to use their medication bottles as a reference while answering survey questions. The primary outcome was bag usage measured by patient report in a survey.

Continuous and categorical variables were summarized as median (interquartile range [IQR]) and frequency (percent), respectively. Comparisons between those with a past or present cancer diagnosis to those without a cancer diagnosis were performed using Kruskal-Wallis and Pearson’s χ2 tests for continuous and categorical variables, respectively.

This study was approved by the Mayo Clinic Institutional Review Board under IRB 18-002230. Need for informed consent was waived for this study.

RESULTS

Two hundred bags were dispensed to participants between August 2018 and November 2018; 149 patients (74.5%) were reached by phone survey. Seven of these patients self-reported prior opioid use at hospital admission, eight did not recall receiving a DDS,
and one stated no opioid prescription was picked up. These patients were included in the surveyed patient population.

Demographic characteristics are shown in Supplemental Table 1 (available online at http://www.mcpiqojournal.org). Of the 149 patients surveyed, the most common types of surgery were urology (n=56, 37.5%) and gynecology (n=49, 33.0%), median age was 59 y (IQR, 47-66 y), and 94 (63.0%) of participants were male. Within the population sample, 85 (57%) of patients had an active or past cancer diagnosis.

The median total oral morphine equivalents (OME) for dismissal prescriptions was 112.5 mg (IQR, 75-150 mg); the actual number of pills dispensed ranged from 5 to 55; 140 of 149 prescriptions were for oxycodone. Participants reported taking prescription opioid medication for a median of 5 d after dismissal (IQR, 3-8 d); participants who had used the DDS to destroy remaining medications took pain medication for a median of 3 d (Supplemental Table 2, available online at http://www.mcpiqojournal.org). Ten of the total surveyed patients reported that they had used pain medication within 3 days of the survey. Only 36 of 149 (24.2%) participants reported taking the full opioid prescription given at dismissal, and 39 (26.2%) had taken no doses of the prescription. From the 149 survey participants, 1199 pills (53.1%) of the total supply of 2258 tablets were not taken.

The survey results found that of 106 patients who reported having leftover opioids, 29 (27.4%) of had disposed of the remaining medication; 23 of those patients used the DDS as their method of disposal. These disposals resulted in 290 pills (24.2% of 1199 leftover pills) removed from the community. Of the 106 patients who reported leftover opioids, 73 reported that they were keeping the medication for future use. Thirty-three participants reported that they planned to use the disposal bag on a future date; however, the survey was not repeated in these patients to assess use. Of the 23 patients who used the DDS, 22 (95.6%) reported that they were very satisfied with the disposal process. Satisfaction scores were only assessed in patients who used the DDS.

DISCUSSION

In general, opioid disposal rates are less than 10% in adult and pediatric patients with leftover opioid supply with no education or encouraged disposal.2,7-9 Studies evaluating the impact on a specific intervention have yielded a wide variation in opioid disposal rates, ranging from 18% to 57%.5,10,11 Differences in patient assessment design, patient population, and dispensed opioid quantities likely contribute to this variation. The goal of our study was to determine if providing patients with a simple, convenient method of disposal would increase disposal rates. Our study found that the majority of patients were keeping medication for a future use despite no longer needing it for pain control. Future studies could look at strategies to increase this number further such as targeted education about the risks of leftover medication.

A study performed in Michigan compared the effectiveness of opioid take-back education and provision of an activated charcoal disposal system in outpatient surgical patients.12 At baseline, this system found that 21% of patients self-reported disposal, which was higher than the 10% baseline found at our institution as previously published.2 Compared with usual care, 33.3% of participants who received education about drug disposal locations and 57.1% of patients who received an activated charcoal disposal system reported opioid disposal.12 Additionally, a similarly designed study in pediatric surgical patients found that 86% of participants with leftover opioids and that were provided with a DDS disposed of the leftover medication, compared with 65% of participants with leftover opioids who received disposal education only.13 The higher rates of disposal in these studies may be related to institutional opioid prescribing guidelines, survey timing, different baseline rates of opioid disposal, and differences between pediatric and adult patient populations. However, if participants who reported plans to use the DDS are added to the reported disposal rates in our study, our results are comparable.

Regular distribution of DDS for opioid prescriptions does pose certain challenges. The cost of the available disposal systems
varies from $1.50 to $5.00 or more, which would incur a significant cost if absorbed by patients, insurance plans, or individual organizations. Currently, patients may purchase these disposal systems out-of-pocket, and a small number of insurance companies provide members with disposal systems at no charge. In our study, 23 of 106 patients who had remaining opioids at the time of survey, or 21.2% of the study population, used the provided disposal system. Opportunities for future research could identify which patients may be most likely to use disposal bags to help reduce waste.

As awareness of the growing opioid crisis has increased, many interventions have been made by health care systems and governing bodies to reduce access to prescription opioids such as prescription drug monitoring programs, opioid prescribing guidelines, laws limiting opioid prescription quantities, and public education about opioid takeback and disposal options. However, a model based on National Survey on Drug Use and Health and US Centers for Disease Control and Prevention data found that even substantial reduction in prescription opioid misuse would reduce opioid-related overdose deaths by only 5% through the year 2025. While prescription opioid exposure was once a major factor leading to chronic opioid abuse, more recent trends indicate that more people are initiating opioid use with illicit opioids instead. However, this model may not apply to all communities, and interventions to reduce the quantity of prescription opioids available for diversion may still be worthwhile.

Our study design is unique in several ways. First, we were able to use a large patient sample from a previous study at our institution to provide a baseline disposal frequency at our institution. Another unique aspect of our study was the inclusion of a large sample of patients with a current or past cancer diagnosis. This group was not less likely to dispose of opioids and, in fact, more reported remaining pills compared with those without a cancer diagnosis. Many opioid-related initiatives exclude oncology patients, including the US Centers for Disease Control and Prevention guidelines published in 2016; however, our results and others from the surgical literature challenge the need for these blanket exclusions. Few studies have evaluated opioid disposal methods, and our study was the only one to our knowledge that assessed participant satisfaction with the use of a DDS.

Study Limitations
Our study had certain limitations. The majority of patients in our study were opioid-naïve, which may limit the ability to extrapolate our findings to all surgical patients. Before this study, our institution enacted conservative opioid prescribing guidelines, and a pharmacist performed dismissal medication reconciliation on most participants. These interventions are intended to limit opioid prescription quantities to patients most likely to need pain medication. These changes in prescribing practices may limit our ability to compare our disposal rate to historic data from our institution. Therefore, the prescription reduction may have led to reduced need for disposal compared to health systems without these interventions and may limit external validity. Finally, our study was a single-arm study, which limited our ability to perform comparative statistical analysis.

CONCLUSION
Provision of an opioid disposal system and educational document increased the opioid disposal rate in surgical patients. Participants who used the disposal system reported high satisfaction with the process. Government and private insurance coverage plans could consider covering DDSs with acute opioid prescriptions to encourage disposal in addition to other measures such as disposal education and conservative prescribing.

SUPPLEMENTAL ONLINE MATERIAL
Supplemental material can be found online at http://www.mcpiqojournal.org. Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

Abbreviations and Acronyms: DDS = drug deactivation system; FDA = US Food and Drug Administration

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