

Safe Opioid Use, Storage, and Disposal Strategies in Cancer Pain Management

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Disclosures of potential conflicts of interest may be found at the end of this article.

Key Words. Opioid • Storage • Disposal • Cancer pain • Opioid misuse • Opioid abuse

ABSTRACT

Opioids are required by a majority of patients with advanced cancer. Oncologists and palliative care clinicians are faced with the challenge of safely prescribing opioids in the current environment of an opioid crisis. Many patients with cancer use opioids unsafely, store them in unsecure locations, and do not dispose of unused opioids, leading to increased availability of these opioids for others to misuse. More than 50% of people who misuse opioids obtain

the drugs from a friend or relative with or without their consent. Patient and provider education has been shown to improve safe opioid use, promote secure storage, and also increase disposal of unused opioids safely in drug take-back programs that are now widely available. This article highlights the importance of patient education and cautious opioid prescribing in patients with cancer. *The Oncologist* 2019;24:1410–1415

Implications for Practice: The current opioid crisis makes it challenging to effectively manage cancer pain. Providers play a prominent role in minimizing opioid misuse. Cautious prescribing with limits enforced on the quantity of opioids prescribed, close follow-up, and consistent and frequent provision of opioid education are a must. Evidence points to the impact of patient education in promoting safety around opioid use. Most people who misuse prescription opioids obtain them from family or friends. Storing opioids in the open or not disposing of unused opioids increases the availability of these opioids for misuse by others. The importance of not sharing, always locking up, and disposing of unused and expired opioids must be highlighted as part of the opioid education that must be delivered every time that opioids are prescribed. Information about local drug take-back programs may also help increase disposal of unused opioids.

INTRODUCTION

It is estimated that more than 11.1 million people misused prescription opioids in the past year [1]. Patients with advanced cancer require opioids to treat their pain and improve their quality of life. It is estimated that up to 90% of patients with advanced cancer experience pain, and opioids are the preferred drugs to treat the pain [2–4]. The current opioid crisis makes it important that providers prescribing opioids are taking the necessary precautions and participating in patient education to help minimize misuse and sharing of the opioids they prescribe. This is especially important because the majority of the abused prescription opioids are prescribed to friends and acquaintances of those that abuse them [1]. Patients with cancer are also at risk for improper use of opioids along with patients with chronic pain [5]. The adoption of safe practices associated with opioid use was observed after education of these

patients, which further shows the need for consistent patient education [6]. The purpose of this narrative review is to highlight the challenges faced by providers amid the opioid crisis situation. We also suggest simple solutions, such as patient education, which may increase safe opioid use, storage, and disposal of unused opioids and thereby may minimize the abuse of patients' opioids by others.

BRIEF SUMMARY OF THE OPIOID CRISIS

Prescribing opioids safely in the current environment of opioid crisis has increasingly become challenging. The 2017 National Survey on Drug Use and Health (NSDUH) for national indicators of substance use and mental health revealed that 30.5 million people in the U.S. used an illicit drug in the past 30 days and among those 3.2 million were

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Received March 29, 2019; accepted for publication April 17, 2019; published Online First on May 16, 2019. <http://dx.doi.org/10.1634/theoncologist.2019-0242>

current misusers of prescription opioids [1]. The Surgeon General in 2016 made a call to action to end the opioid epidemic, urging providers nationwide to join him in this mission [7]. Recognizing the need to minimize prescription opioid abuse, the U.S. Food and Drug Administration (FDA) introduced the Risk Evaluation and Mitigation Strategy for extended-release and long-acting opioids [8]. Around the same time, the Centers for Disease Control and Prevention (CDC) released guidelines for prescribing opioids for chronic pain, with a primary goal to help improve the safety and effectiveness of opioid therapy for chronic pain [9, 10]. Recent public opinion polls reveal that 81% of those polled perceived addiction to prescription opioids to be a major problem or a national emergency and 63% believed that addiction to prescribed drugs has increased in the past year. Among those polled, 47% believe that medical and mental health community bear the most responsibility for fighting the problem of addiction to prescription pain medications and 33% feel physicians who inappropriately prescribe opioids are mainly responsible for the current opioid crisis [11]. In a national survey designed using probability and address-based sampling to come up with a national representation of U.S. adults with recent opioid prescription, 21% of the 1,032 surveyed reported sharing their pain medications with others [12]. The primary reason for sharing was reported as helping to manage pain in others (73%). Approximately 20% said they would likely allow relatives or friends to use their pain medications in the future. Equally alarming was the NSDUH report that more than 50% of people who abused prescription painkillers obtained them from friends or relatives [1]. The previously mentioned national survey also revealed that only 9% of the 1,032 surveyed locked up their pain medications, more than half expected to have leftover medications after their pain improved, and a majority would keep rather than dispose of the opioids in case the need arises to take them again in the future. Almost half did not receive education about safe storage or disposal of opioids [12].

ISSUES REGARDING OPIOID USE, STORAGE, AND DISPOSAL

Improper opioid use, unsecure opioid storage, and lack of appropriate disposal of unused or expired opioids increase the availability of these medications for others to abuse and are major contributors to the current opioid crisis in the U.S. [13]. Of 191 Veterans Administration patients who received one or more opioid prescription in past year, only 6% disposed of unused opioids, 65% saved unused opioids, and 34% engaged in sharing or diversion at least once, mostly involving a family member or friend [14, 15]. Opioids are frequently prescribed in the emergency rooms for patients complaining of pain. In a 2012 study, none of the 20 patients surveyed stored opioids in a locked container or cabinet, and only 1 patient disposed of the opioids [16]. In a public poll, 64% believed that encouraging people to dispose of extra pain medications is an effective strategy to prevent opioid abuse [11]. Postoperative patients also have a high incidence of unsafe opioid related behaviors. In a survey of postoperative patients, 67% of patients had leftover pain medications, and 92% did not receive education regarding proper disposal [17]. Another study showed that in the

postoperative period, higher quantity of opioid prescribed is associated with higher patient-reported opioid consumption [18]. Not surprisingly, in a recent public poll, 45% believed that limiting the amount of prescribed opioids to a 7-day supply or less would be helpful in decreasing opioid abuse and misuse [11]. Another systematic review indicated that more than half of opioid tablets were unused after discharge in the postoperative period. A third of the patients had unused opioids at home and stored the opioids in unsecured locations. A vast majority of postoperative opioids go unused, not locked up, and undisposed of [19–21]. Many households with children reported unsafe storage of opioids that are prescribed to the parent [22]. Young children of mothers prescribed opioids are at increased risk of overdose [23]. Secure storage of opioids is important in all households and especially in those with young children or pets.

PATIENTS WITH CANCER

Patients with cancer often need opioid rotation from one opioid to another to help relieve uncontrolled pain or to help treat opioid-induced neurotoxicity [5]. Approximately 30% of all patients with cancer on opioids will undergo opioid rotation [5]. Development of tolerance to opioids, disease progression, and changes in the tumor burden are all reasons for patients with cancer to frequently undergo opioid titration. Titration in opioid doses and opioid rotation can result in patients possessing a large amount of unused or expired opioids at home. Unfortunately, patients with cancer are also at risk for improper use, unsafe storage, and not disposing of unused opioids. Among 300 outpatients with cancer that our group surveyed, only 9% locked their opioids, 9% shared their opioids with others, 17% reported losing their opioids, 74% were unaware of proper opioid disposal methods, and 46% had unused opioids at home [24]. The same survey showed that patients who had a history of alcoholism identified by positive scores on the Cut-down, Annoyed, Guilty, Eye-opener (CAGE) questionnaire and those with a history of illicit drug use or smoking were more likely to lock their opioids. Patients with a positive CAGE score and those with a history of illicit drug use were also more likely to share or lose their opioids [24]. Approximately 20% of patients with cancer also have a positive CAGE score and are more likely to indulge in inappropriate opioid escalation and abuse [25]. A special consideration for education, vigilance, and frequent follow-up must be made for such patients.

In another study by our group, 36% of patients with cancer on opioids presenting to the emergency department of a comprehensive cancer hospital stored opioids in the open, and only 15% locked up their opioids [26]. A large majority of the patients surveyed were willing to use a lockbox if given one. These patients who were in favor of lockboxes were also more likely to keep their opioids locked up. Patients who reported that others had asked them for their pain medications were also more likely to keep their opioids locked up. About 12% either shared or lost their opioids. Surprisingly, patients who received more pills than needed were more likely to share or lose their opioids. A large proportion (78%) were unaware of safe opioid disposal practices, and 67% had unused opioids at home. Overall, 77% either shared their

opioids, lost them, stored opioids unsafely, or possessed unused opioids at home [26]. Even hospices are not immune to drug abuse and diversion among their patients and their families. A study revealed that abuse and diversions were fairly common in the hospice setting [27].

CURRENT GUIDELINES FOR STORAGE AND DISPOSAL

The FDA and the Department of Justice Drug Enforcement Administration (DEA) have uniform guidelines regarding using, storing, and disposing of opioids [28, 29]. They strongly recommend locking up opioid medications, keeping them out of sight, and not sharing with others [30]. The FDA recommends that opioids are best disposed of via medicine take-back programs. In the U.S. there are two options for take-back programs. One is through permanent collection sites, and another is through periodically organized drug take-back events. The DEA periodically hosts National Prescription Drug Take Back events during which temporary collection sites are set up in communities for safe disposal of prescription drugs. Local city or county government trash services, hospitals, and pharmacies often participate in prescription drug take-back programs. The DEA and the National Association of Boards of Pharmacy provide easy-to-use websites to locate the nearest drug disposal sites for patients (<https://apps.deadiversion.usdoj.gov/pubdispsearch/spring/main?execution=e1s1>, <https://nabp.pharmacy/initiatives/awarxe/drug-disposal-locator/>) [31, 32].

In the event that no drug take-back programs are available locally, the FDA recommends taking medications out of the original container, mixing the medications with unpalatable substances, such as dirt, coffee grounds, or cat litter, sealing them in a plastic bag, and throwing it in the trash. Additionally, opioids may be flushed down the toilet [28]. “FDA believes that the known risk of harm, including death, to humans from accidental exposure to certain medicines, especially potent opioid medicines, far outweighs any potential risk to humans or the environment from flushing these medicines when a take-back option is not readily available” [28].

The U.S. Environmental Protection Agency (EPA), however, cautions against flushing opioids and other medications [33]. There is controversy over flushing as a means of disposal of unused opioids when take-back programs are not available. Several studies have demonstrated the presence of opiates and other illicit drugs in waste waters and surface waters in Spain, Germany, Italy, Ireland, Wales, and Belgium, in part related to incomplete elimination in wastewater treatment plants as well as leaching into the ground and reaching groundwater sources. This finding supports the EPA’s recommendation against the use of flushing as a means of disposal. The impact on human health is unclear and has yet to be established [34–36].

The CDC, FDA, and DEA strongly support both patient and provider education as one of the most important avenues to help curb the opioid crisis.

MEASURES TO ADDRESS OPIOID USE, STORAGE, AND DISPOSAL ISSUES

Faced with a growing crisis of opioid-related morbidity and mortality, several groups and government agencies have

Table 1. Recommendations for medical providers on safe prescribing

Postprocedure pain: Avoid overprescription and give only enough for the anticipated duration of acute pain.

Chronic pain noncancer pain: Refer to Centers for Disease Control and Prevention guidelines for topics related to initiation, prescribing, monitoring, and evaluation.

Provide simple and consistent educational material on proper use, storage, and disposal.

Set up monitoring system to assess patients at risk for misuse and abuse, such as urine drug screens, prescription drug monitoring programs, and patient screening questionnaires.

put forth research and guidelines regarding best practices that would continue to provide care for patients needing adequate pain control while mitigating the risk these potent medications pose. The FDA has issued the Risk Evaluation and Mitigation Strategy that is designed to provide information or require action items to be undertaken to promote safe use of certain medications, including extended-release opioids [8]. By requiring manufacturers, health care providers, pharmacists, and patients to address medication-specific safety concerns, the risk of harm could be reduced.

Efforts have also focused on educating medical providers with proper prescribing practices [37]. In a cohort of patients after Cesarean section and thoracic surgery, investigators found that majority reported taking half or less of the prescribed medication (83% Cesarean section vs. 71% thoracic surgery) [21]. Similar patterns of overprescription were reported in patients ($n = 276$) after a urological surgery, in which 67% of patients had excess pills and 92% had no instructions for disposal [17]. In one Veterans Administration study of patients receiving opioids from 2004 to 2005, patients with higher opioid doses were associated with a greater risk of death from opioid overdose [38]. Careful consideration of the quantity of medication prescribed should be explored further, as unused doses can increase the likelihood of unintended secondary opioid exposure such as diversion, misuse of opioids, and accidental ingestion. Table 1 outlines basic recommendations for medical providers on safe opioid prescribing.

Routine screening for patient risk factors for opioid misuse, whether it be related to underutilization or overutilization, is an important part of improving overall safe opioid practice for patients. Patients with a history of alcoholism, tobacco, and illegal drug use are at increased risk for inappropriate opioid escalation and abuse [25]. Successfully addressing other symptoms that contribute to pain expression and increased opioid use, coupled with opioid education, has prevented further escalation in such patients [39]. Opioid underutilization occurs in about 10% of patients with cancer who are prescribed opioids and presents as ineffective pain control [40]. Patients may defer taking opioids out of concern for function and excessive drowsiness, inability to do certain tasks such as driving or performing their regular jobs, or fear of addiction. Proper assessment and management for causes of underutilization are important steps in education and improved patient-reported outcomes.

The last 5 years have seen an increased interest in patient-based interventions. Patient education has been

Table 2. Recommendations for patients for safe opioid use, storage, and disposal

Safe use	Safe storage	Safe disposal
Only use medications prescribed for you by your medical provider.	Store your pain medication in a safe place that is not visible to others besides yourself or a designated caregiver who helps manage your medicines.	Use take-back programs in law enforcement offices, hospitals, and pharmacies in your community.
Do not share pain medications with others.		Visit the Drug Enforcement Administration (DEA) Web site (www.deadiversion.usdoj.gov) to look for the next Prescription Drug Take Back day in your area.
Only take medications as prescribed.	Place pain medications under lock and key.	
Call your medical provider if pain is not controlled, and do not change the dosage yourself.	Store pain medications away from young children, adolescents, and pets.	Do not share or give unused pain medications to anyone.
Do not stop taking pain medications without talking to your medical provider.	Do not tell others that you are taking pain medications.	Mix unused medication with undesirable material, such as cat litter and discard in a sealed container.
Do not take alcohol and other illicit drugs when taking pain medications.	Keep track of the number of medicines you have used. Report any missing medicines to law enforcement authorities.	Some medications may be flushed in the toilet if other disposal options are not readily available. The flush list includes buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, and tapentadol.
Give your medical provider a complete list of medications you take.		Fold sticky ends of a fentanyl patch together before disposal.

shown to improve knowledge on proper opioid use, storage, and disposal while at the same time changing behaviors and utilization patterns. Interventions have been shown to be effective in various types of practice and clinical settings. Major medical societies and federal, state, and local agencies have information on their Web sites useful for patients on opioids and their families [28, 30, 33, 41, 42]. Implementation of a Web-based educational format focused on proper use, storage, and disposal of opioids was shown to be successful in improving patients' knowledge at 1 week and 1 month follow-up. Reductions in self-reported misuse behaviors were also observed [43]. In a group of patients with cancer who were receiving opioids, those who received education materials were more aware of proper disposal methods, less likely to share their opioids with someone else, less likely to practice unsafe use of opioids, and more likely to be aware of the danger of their opioids when taken by others. Patients who received these materials were also less likely to have unused medications at home and more likely to keep their medications in a safe place. This highlights the important role that consistent and simple education initiatives play in improving safe opioid practices in targeted patients [6]. In a similar study surveying adult patients who had undergone hip and knee replacement surgery, providing education pamphlets showed improvement in the number of patients who practiced proper disposal but no improvement in safe storage practice [44]. One randomized controlled trial looking into the impact of an educational intervention that included education materials on hydrocodone, followed by phone calls conducted 4 to 7 days after the visit to assess patient knowledge of the drug, reported that this intervention improved knowledge about the drug and reduced the incidence of driving while

on the medication [45]. A survey of 301 patients at an outpatient pharmacy reported higher rates of proper opioid disposal by those patients who received counseling (46% vs. 17%) [46]. Simple and practical dos and don'ts incorporated in opioid educational materials (Table 2), such as hiding medications away from children and pets, waiting for a few days on immediate release opioids before attempting to drive, and carefully handling fentanyl patches (e.g., by folding the sticky sides together and flushing down the toilet), may sometimes need to be emphasized multiple times for patients to remember. Improvements have been shown to be better in patients with more educational exposure opportunities [41]. Other patient-centered education initiatives were more targeted in scope. A structured educational program incorporated in a methadone maintenance clinic focusing on proper opioid storage showed that among patients who received the education, 92% reported practicing safe storage by keeping medications out of reach of small children, and 82% kept their medications hidden or locked up [47]. In a survey of 301 patients, providing education geared toward proper opioid disposal by returning unused medications to the pharmacy resulted in more patients returning unused opioids to pharmacy [46]. Overall implementation of patient educational programs in different forms has been shown to improve knowledge and behaviors on safe practices involving these high-risk medications and should be integrated in routine patient care.

In an effort to reduce the supply of opioids that can be used for diversion and accidental ingestion, safe opioid storage using lockboxes has been encouraged by federal agencies and professional associations [30]. Community organizations in a number of hard-hit areas of the country are providing prescription drug lockboxes [48]. With an increase in awareness

and scale of the opioid crisis, we have seen federal and local authorities step up in creating more drug take-back facilities and programs that make it easier for patients to return unused medications [31]. Easier access and availability to both lockboxes and take-back programs are much needed to curb the risk that these unused medications pose in opioid diversion and accidental ingestion. The current evidence shows that patient education improves knowledge and alters behavior regarding proper opioid utilization, storage, and disposal. More research is needed to look into other engaging and creative models of education for different patient populations.

CONCLUSION

Providers play a prominent role in minimizing opioid misuse among patients with cancer. We are often at the front lines of the opioid epidemic along with the pharmacists. Cautious prescribing, with limits enforced on the quantity of opioids prescribed—especially in the postoperative period—along with close follow-up and consistent and frequent provision of opioid education are necessary. Evidence points to the impact of patient education in promoting safety around opioid use. Most people who misuse prescription opioids obtain them from family or friends either with or without

their permission. Storing opioids in the open or not disposing of unused opioids increase the availability of these opioids for misuse by others. The importance of not sharing, always locking up, and disposing of unused and expired opioids must be highlighted as part of the opioid education that must be delivered every time that opioids are prescribed. Educational materials that are widely available online from the CDC, DEA, FDA, and other sources can help foster safe behavior around opioids. Information about local drug take-back programs may also be provided along with the educational materials that may help increase disposal of unused opioids.

AUTHOR CONTRIBUTIONS

Conception/design: Akhila Reddy, Maxine de la Cruz
Provision of study material or patients: Akhila Reddy, Maxine de la Cruz
Collection and/or assembly of data: Akhila Reddy, Maxine de la Cruz
Data analysis and interpretation: Akhila Reddy, Maxine de la Cruz
Manuscript writing: Akhila Reddy, Maxine de la Cruz
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DISCLOSURES

The authors indicated no financial relationships.

REFERENCES

- Bose J, Hedden SL, Lipari RN et al. Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health. Rockville, MD: Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services; 2018. <https://www.samhsa.gov/data/report/2017-nsduh-annual-national-report>. Accessed May 7, 2019.
- Portenoy RK, Lesage P. Management of cancer pain. *Lancet* 1999;353:1695–1700.
- Caraceni A, Hanks G, Kaasa S et al. Use of opioid analgesics in the treatment of cancer pain: Evidence-based recommendations from the EAPC. *Lancet Oncol* 2012;13:e58–e68.
- Cancer pain relief and palliative care. Report of a WHO Expert Committee. *World Health Organ Tech Rep Ser* 1990;804:1–75.
- Reddy A, Yennurajalingam S, Pulivarthi K et al. Frequency, outcome, and predictors of success within 6 weeks of an opioid rotation among outpatients with cancer receiving strong opioids. *The Oncologist* 2013;18:212–220.
- de la Cruz M, Reddy A, Balankari V et al. The impact of an educational program on patient practices for safe use, storage, and disposal of opioids at a comprehensive cancer center. *The Oncologist* 2017;22:115–121.
- Murthy VH. Ending the opioid epidemic—A call to action. *N Engl J Med* 2016;375:2413–2415.
- Risk Evaluation and Mitigation Strategy (REMS) for extended-release and long-acting opioids. U.S. Food and Drug Administration Web site. <https://www.fda.gov/drugs/information-drug-class/opioid-analgesic-risk-evaluation-and-mitigation-strategy-rems>. Updated September 27, 2018. Accessed May 7, 2019.
- Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain - United States, 2016. *MMWR Recomm Rep* 2016; 65:1–49.
- Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain - United States, 2016. *JAMA* 2016;315:1624–1645.
- Blendon RJ, Benson JM. The public and the opioid-abuse epidemic. *N Engl J Med* 2018;378:407–411.
- Kennedy-Hendricks A, Gielen A, McDonald E et al. Medication sharing, storage, and disposal practices for opioid medications among US adults. *JAMA Intern Med* 2016;176:1027–1029.
- Lipari RN, Hughes A. How People Obtain the Prescription Pain Relievers They Misuse. The CBHSQ Report. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2013:1–7.
- Lewis ET, Cucciare MA, Trafton JA. What do patients do with unused opioid medications? *Clin J Pain* 2014;30:654–662.
- McCabe SE, West BT, Boyd CJ. Leftover prescription opioids and nonmedical use among high school seniors: A multi-cohort national study. *J Adolesc Health* 2013;52:480–485.
- Tanabe P, Paice JA, Stancati J et al. How do emergency department patients store and dispose of opioids after discharge? A pilot study. *J Emerg Nurs* 2012;38:273–279.
- Bates C, Laciak R, Southwick A et al. Overprescription of postoperative narcotics: A look at postoperative pain medication delivery, consumption and disposal in urological practice. *J Urol* 2011;185:551–555.
- Howard R, Fry B, Gunaseelan V et al. Association of opioid prescribing with opioid consumption after surgery in Michigan. *JAMA Surg* 2018 [Epub ahead of print].
- Bicket MC, Long JJ, Pronovost PJ et al. Prescription opioid analgesics commonly unused after surgery: A systematic review. *JAMA Surg* 2017;152:1066–1071.
- Bicket MC, White E, Pronovost PJ et al. Opioid oversupply after joint and spine surgery: A prospective cohort study. *Anesth Analg* 2019; 128:358–364.
- Bartels K, Mayes LM, Dingmann C et al. Opioid use and storage patterns by patients after hospital discharge following surgery. *PLoS One* 2016;11:e0147972.
- McDonald EM, Kennedy-Hendricks A, McGinty EE et al. Safe storage of opioid pain relievers among adults living in households with children. *Pediatrics* 2017;139:e20162161.
- Finkelstein Y, Macdonald EM, Gonzalez A et al. Overdose risk in young children of women prescribed opioids. *Pediatrics* 2017;139: e20162887.
- Reddy A, de la Cruz M, Rodriguez EM et al. Patterns of storage, use, and disposal of opioids among cancer outpatients. *The Oncologist* 2014; 19:780–785.
- Dev R, Parsons HA, Palla S et al. Undocumented alcoholism and its correlation with tobacco and illegal drug use in advanced cancer patients. *Cancer* 2011;117:4551–4556.
- Silvestre J, Reddy A, de la Cruz M et al. Frequency of unsafe storage, use, and disposal practices of opioids among cancer patients presenting to the emergency department. *Palliat Support Care* 2017;15:638–643.
- Blackhall LJ, Alfson ED, Barclay JS. Screening for substance abuse and diversion in Virginia hospices. *J Palliat Med* 2013;16:237–242.

- 28.** Disposal of unused medicines: What you should know. U.S. Food and Drug Administration Web site. <http://www.fda.gov/Drugs/ResourcesForYou/Consumers/BuyingUsingMedicineSafely/EnsuringSafeUseofMedicine/SafeDisposalofMedicines/ucm186187.htm>. Updated February 2019. Accessed May 7, 2019.
- 29.** Drug disposal information. Office of Diversion Control, Drug Enforcement Administration, U.S. Department of Justice Web site. http://www.deadiversion.usdoj.gov/drug_disposal/index.html. Accessed March 30, 2019.
- 30.** Lock it up: Medicine safety in your home. U.S. Food and Drug Administration Web site. <https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm272905.htm>. Accessed May 7, 2019.
- 31.** Controlled substance public disposal locations - search utility. Diversion Control Division, Drug Enforcement Administration, U.S. Department of Justice Web site. <https://apps.deadiversion.usdoj.gov/pubdispsearch/spring/main?execution=e2s1>. Accessed May 7, 2019.
- 32.** Drug disposal locator. National Association of Boards of Pharmacy Web site. <https://nabp.pharmacy/initiatives/awarex/drug-disposal-locator/>. Accessed May 7, 2019.
- 33.** U.S. Environmental Protection Agency. How to Dispose of Medicines Properly [flyer]. Washington, DC: U.S. Environmental Protection Agency; 2011. <https://archive.epa.gov/region02/capp/web/pdf/ppcpflyer.pdf>. Accessed May 7, 2019.
- 34.** Boleda MA, Galceran MA, Ventura F. Monitoring of opiates, cannabinoids and their metabolites in wastewater, surface water and finished water in Catalonia, Spain. *Water Res* 2009;43:1126–1136.
- 35.** Lin AY, Wang XH, Lin CF. Impact of wastewaters and hospital effluents on the occurrence of controlled substances in surface waters. *Chemosphere* 2010;81:562–570.
- 36.** Terzic S, Senta I, Ahel M. Illicit drugs in wastewater of the city of Zagreb (Croatia) - Estimation of drug abuse in a transition country. *Environ Pollut* 2010;158:2686–2693.
- 37.** Kline TV, Savage RL, Greenslade JH et al. Affecting emergency department oxycodone discharge prescribing: An educational intervention. *Emerg Med Australas* 2019 [Epub ahead of print].
- 38.** Bohnert AS, Valenstein M, Bair MJ et al. Association between opioid prescribing patterns and opioid overdose-related deaths. *JAMA* 2011;305:1315–1321.
- 39.** Parsons HA, Delgado-Guay MO, El Osta B et al. Alcoholism screening in patients with advanced cancer: Impact on symptom burden and opioid use. *J Palliat Med* 2008;11:964–968.
- 40.** Nguyen LM, Rhondali W, De la Cruz M et al. Frequency and predictors of patient deviation from prescribed opioids and barriers to opioid pain management in patients with advanced cancer. *J Pain Symp Manage* 2013;45:506–516.
- 41.** National Prescription Drug Take Back Day. Diversion Control Division, Drug Enforcement Administration, U.S. Department of Justice Web site. https://www.deadiversion.usdoj.gov/drug_disposal/index.html. Accessed May 7, 2019.
- 42.** Safe use, storage, and disposal of opioid drugs. familydoctor.org Web site. <http://familydoctor.org/familydoctor/en/drugs-procedures-devices/prescription-medicines/safeuse.printerview.all.html>. Updated October 17, 2016. Accessed May 7, 2019.
- 43.** McCauley JL, Back SE, Brady KT. Pilot of a brief, web-based educational intervention targeting safe storage and disposal of prescription opioids. *Addict Behav* 2013;38:2230–2235.
- 44.** Rose P, Sakai J, Argue R et al. Opioid information pamphlet increases postoperative opioid disposal rates: A before versus after quality improvement study. *Can J Anaesth* 2016;63:31–37.
- 45.** McCarthy DM, Wolf MS, McConnell R et al. Improving patient knowledge and safe use of opioids: A randomized controlled trial. *Acad Emerg Med* 2015;22:331–339.
- 46.** Seehusen DA, Edwards J. Patient practices and beliefs concerning disposal of medications. *J Am Board Fam Med* 2006;19:542–547.
- 47.** Winstock AR, Lea T. Safe storage of methadone takeaway doses - A survey of patient practice. *Aust N Z J Public Health* 2007;31:526–528.
- 48.** Lock Your Meds. Informed Families: The Florida Family Partnership Web site. <http://www.informedfamilies.org/campaigns/lock-your-meds/>. Accessed May 7, 2019.