



Removing abuse-prone prescription medication from fueling the national opioid crisis through community engagement and surgeon leadership: results of a local drug take-back event

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ABSTRACT

Background: To address the national opioid and death from overdose crisis in the United States, take-back programs were created to collect and properly dispose of unused abuse-prone drugs.

Methods: Surgeons at Central Michigan University College of Medicine led a community prescription medication take-back drive, administered surveys, characterized event participant demographics, prescription indications, and type and quantity of medications dropped off for disposal.

Results: A total of 74,363 dosing units of unused medication were brought in from the homes of 104 event participants. Returned opioids were often prescribed after surgery. Hydrocodone was collected most. Unused opioids were frequently available in homes with children or youth. Collected opioids and benzodiazepines alone had an estimated trademark retail value of over \$20,000.

Conclusion: This surgeon-led public health initiative helped properly dispose a significant amount of unneeded abuse-prone prescription medicine. It highlighted the presence of excess opioid prescribing in a typical Midwestern community. Issues related to improved physician prescribing, utility of take-back drives, and proper drug disposal to avoid misappropriation and abuse by younger generations are discussed.

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Introduction

We can no longer ignore it: We are in the midst of an officially recognized national opioid crisis [1]. Every day, about 46 Americans in the United States die from an opioid prescription overdose [2]. In addition to concerns about overdose and death from opioids, there is real worry about the growing recreational use of prescription drugs in teens and young adult [3]. Many factors have contributed to this growing epidemic, and health care providers, with their prescribing practices, are implicated in the mix. The high emphasis placed on pain assessment and management has not been without its drawbacks [4,5]. With the increased focus on pain control, there has been a notable rise in the number of opioid prescriptions written in the United States [6,7]. Emergency department visits for opioid misuse and overdose

have also increased over the last decade, leading to calls for physicians to control the amount of opioid prescribing [8,9].

After initial dispensation for medical purposes, prescription drugs can fall subject to misuse, even by individuals for whom they were never intended [10,11]. Prescription opioids appear to be involved in more overdose deaths than any other drugs [12]. In 2014, more than half of the estimated 28,000 opioid overdose deaths were related to prescription opioids, and the trend continues [13,14]. It is alarming that people 12 years or older in the United States, including the youngest adolescents, seem more likely to use prescription opioids nonmedicinally than most other substances of abuse [10]. It is also concerning that exposing opioid-naïve individuals to opioid analgesics prescriptions for acute pain management, after surgery for example, has been reported to be associated with the emergence of new chronic opioid users [15,16]. As such, surgeons are becoming increasingly aware of the problem of unused opioid prescriptions after surgery as evidence emerges [17].

Recognizing this problem and the positive roles surgeons can have during this opioid epidemic, members of the department of surgery at Central Michigan University (CMU) College of Medicine decided to

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take part in an innovative local solution to remove unused prescription drugs from the community. By doing so, the main objective was to channel opioids and abuse-prone medications away from misuse and toward proper disposal. In May 2017, we organized our community's first medication take-back drive to help empty homes of unneeded opioids and other prescription drugs.

Through our first pilot medication take-back drive in the region, our goal was to gauge the degree of community response to this public health initiative and put our finger on the pulse of the opioid problem in our own backyard, in a typical Midwestern US small urban and neighboring rural environment. We aimed to collect, count, and classify the types of turned-in medications; and we hypothesized that, in our practice area, there is an excess of unused prescribed opioids in people's possession. We also suspected that surgical procedures would be the main reason why opioid analgesics were originally prescribed.

Methods

The CMU Department of Surgery sponsored a community medication take-back drive, which was organized in collaboration with a team from the Michigan Opioid Prescribing Engagement Network (M-OPEN) at the University of Michigan who has the lead role, grant support, and institutional review board approval for their work including recruiting and supporting these take-back activities across the state of Michigan. The collaboration also included local law enforcement officials; CMU College of Medicine volunteers acting as the Dean's ambassadors; and other department of surgery, community members, and local volunteers in Saginaw Township, MI. The chosen site for the event was outdoors on the street-visible lawn of a centrally located high school in Saginaw Township on a May Saturday morning.

To ensure the event complied with federal and state laws and Drug Enforcement Agency (DEA) regulations, local Saginaw Township police supervision was present at all steps of the process while medication was handled. Members of the public were informed of police presence in advance. The event was promoted weeks in advance, and this took various forms: flyers identifying the purpose of the public health initiative, declaring police presence for safety and proper handling of scheduled substances, and encouraging public participation were distributed in the community. Local schools and health practices and businesses were targeted with the flyers. Local TV and radio ads days before the event were helpful in spreading the word. Large signs were also placed on street corners and strategically visible areas to direct traffic to the event. Upon arrival, visitors dropped off their unused or expired medications at designated police guarded drop-off stations. Trained volunteers would greet the visitors and obtain their consent to participate in an anonymous survey. Volunteers would then help administer a brief study survey to the visitors without capturing identifying information. They would then take the unused medication for processing and finally have the drugs placed in the medication drop-off box for collection, all under police supervision. The survey and the submitted batch of drugs were assigned a unique study identifier. The survey sheets were collected and filed for postevent processing by separate personnel. The event-associated research conducted was focused on the observation of public behavior, and the administered surveys were anonymous and did not capture identifiable information linking data to human research subjects. No additional local institutional review board approval was required.

Although some visitors arrived in small families or groups, only 1 person dropping off medication from that group was counted as an event participant and surveyed. Any medication or substance not in its original container or packaging was classified as unknown and placed in a mixed batch for counting only. For identifiable medication with information on the prescription label or package, the medication name, dosage, pill count, and prescription date were recorded. Names of patients or prescribers on the labels were stricken with black marker

strikerthroughs for anonymity. Medication containers were not counted but were placed in a recycling box designated for such containers after contents were emptied and patient identifiers were removed off the labels as mentioned. Nonidentifying data were collected on individual visitor survey forms on the day of the event and were later entered into a Microsoft Excel spreadsheet for an after event analysis. Survey questions focused on the following: event visitor age, race, and zip code; whether there were youth in the same home where the returned medications were present; whether narcotic or opioid analgesics were included in the mix brought to the event; and the reason narcotics were prescribed if known by the person dropping off the batch of medication. Often, individuals bringing medications to the event were doing so for other family members or had medication bottles that accumulated over time and could not provide reliable information relating to the indications for prescriptions issued.

Survey responses and medication data were tabulated; descriptive and parametric statistics were used to describe data and report means and standard deviations for continuous variables. Identifiable medications were classified by category, and substances with a potential for dependency and abuse were analyzed separately. Specifically for this report, we examined information related to dependency prone drugs such as opioids, schedule II substances, and benzodiazepines. An estimate of the morphine milligram equivalent (MME) of all identified opioids was calculated using standard opioid equivalency conversion values. Our local hospital pharmacy provided cost data to allow for an estimation of the prescription dollar value of collected opioids; and costs were provided as average wholesale prices obtained from the hospital-purchasing supplier for opioids and from an institutional subscription online Lexi-comp for the other nonopioid medications. In addition, an attempt was made to calculate the street value for the opioid prescription drugs collected during the drive. The current (reported over the last 2 weeks from the time of lookup) street value in Michigan was checked online for each of the collected opioids in this study using reported values from the streetrx.com Web site [18].

Results

The event was held on a Saturday morning in May 2017 between 1000 and 1400 hours. There were 104 separate participant units who turned in medications and completed the participant survey onsite. Each participant unit, hereafter referred to as *participant*, represented 1 or more individuals whose unused prescriptions were pooled and brought in together for take-back in 1 batch and submitted by 1 person representing the group. Fifty-seven percent of the participants were female. Age appeared normally distributed on a frequency distribution plot, with the minimum participant age being 23 years and maximum being 94 years. The median age was 64 years, with the parametric mean and standard deviation being 63 ± 15 years. By ethnicity, most event participants were white (82%) and older than 60 years (64%). This senior white demographic also constituted the largest group that returned opioids for disposal at the event (Table 1 and Fig 1). The medication take-back drive drew in visitors from a radius of about 23 miles, with the majority being from Saginaw Township and nearby counties (Fig 2).

The total number of pills, tablets, capsules, and others. (otherwise referred to hereinafter as *dosing units*) collected and counted during the event was 74,363 dosing units; this included unused, expired, or unneeded prescription and nonprescription medications, vitamins, and supplements that people brought back for disposal. By weight, we collected 80 lb of solid-form dosing units and left them in police custody for proper disposal at the end of the event. Of the total, only 57,499 dosing units were sufficiently labeled for analysis.

There were 1798 individual opioid dosing units collected and identified in the prescription drug category. When available, the most common overall reason for opioid prescriptions was for postsurgical or postprocedural analgesia: 25% (19/77). Chronic pain management was

Table 1
Study participants and local community demographics.

	Study participants	Community population*
Total	104	98,451 (0.03% of US population)
Age	63 ± 15	
<65	53 (51%)	82,013 (84%)
≥65	51 (49%)	16,238 (16%)
Sex		
Male	45 (43%)	46,565 (47%)
Female	59 (57%)	51,886 (53%)
Ethnicity		
White	85 (82%)	61,572 (63%)
African American	7 (7%)	27,986 (28%)
Hispanic	3 (3%)	11,398 (12%)
Missing	9 (8%)	NA
Brought back prescription pain medication		
Yes	77 (74%)	NA
No	27	NA

* Data taken from US Census 2010 (for comparison, total population count considered from the area where majority of participants came from link: <https://www.census.gov/quickfacts/fact/table/carrolltownshipsaginawcountymichigan,saginawcountymichigan,saginawchartertownshipsaginawcountymichigan,US/SEX255217#SEX255217>).

reported by only 5% of participants as the reason the taken-back opioids were originally prescribed. The “reason for prescription” was missing in 65% of those surveyed. Of the 104 separate batches of dropped-off medication, opioid analgesics were reported present in 77 (74%). Youth were reported living in the homes of 24 of the 104 surveyed participants, and people from 21 of the 24 homes with youth (87.5%) reported bringing unused opioids to the drop-off site.

Hydrocodone was the most common collected opioid, making up 43.0%, followed by tramadol (22.6%), oxycodone (14.5%), propoxyphene (5.7%), hydromorphone (5.5%), codeine (4.8%), fentanyl (2.7%), and morphine (1.3%) in decreasing order (Fig 3). Collected dosing units of Fentanyl were in patch form. Although fentanyl was least collected, the greatest MME was contributed to by the fentanyl, followed by the hydrocodone. In total, at least 16,689 MMEs were taken back during the event (Table 2). Collected opioids had an estimated average wholesale price tag of \$2137 when evaluated in their generic formulation and \$9091 in brand name forms. In Michigan, these same opioid quantities can fetch an estimated street dollar value of at least \$5653.

Other dependency-prone medications were collected. In addition to opioids, other DEA schedule II drugs such as the central nervous system (CNS) stimulant Adderall (amphetamine) was present in low quantities. CNS depressant drugs of the benzodiazepine class were collected

in higher amounts, accounting for a total of 1300 dosing units. These benzodiazepines had generic and brand name average wholesale costs estimated at \$1048 and \$11,355, respectively. Alprazolam contributed to the largest proportion of prescribed medication in this class (55%), followed by clonazepam (23%), lorazepam (18%), and others to a lesser degree (Fig 3).

Discussion

Evidence that we are in the midst of an opioid epidemic and death from drug overdose crisis is mounting. Much of it points to the clear and present danger of substances prescribed, with good intention, to alleviate pain and suffering. Yet, these medications ironically end up inflicting the very same harm on the lives of many people exposed to them. In 2015, an estimated 52,404 persons in the United States died from a drug overdose, an increase from 47,055 in 2014; among these deaths, 33,091 involved an opioid, a notable increase from 28,647 in 2014 [13,14]. In addition, these drugs have simultaneously driven up the nation's health care costs. Opioid abuse has been reported to cost the United States approximately \$78.5 billion annually, whether that is related to costs of associated emergency department visits, hospital admissions, treatment programs, or other added cost burdens on the criminal justice system [19].

The true tragedy of this epidemic lies in how it is fueled. Although many factors are thought to contribute to its growth, the role health care prescribers play cannot be overlooked [10]. They are ultimately the source of prescription drugs that end up being used nonmedicinally, causing overdose and death [20,21]. Americans' access to opioids varies across states, but it has been astonishingly increasing over the past 15 years; and in some areas, prescription rates for opioids have nearly quadrupled [22]. The Centers for Disease Control and Prevention report that although many drug categories (like CNS depressants and stimulants) are culprits, prescription opioids continue to be involved in more overdose deaths than any other drugs [12].

It becomes clear why, for the first time in the history of the US Surgeon General's office, a call to action letter was issued to 2.3 million health care professionals in 2016 requesting that they participate in addressing the rising opioid epidemic [23]. Annual opioid prescriptions written in the United States are now roughly equal in number to that of all adults in the population, with varying high per capita rates in different States [22,24]. According to published data from the Michigan Automated Prescription Systems, more than 21 million prescriptions for controlled substances were written in 2014, 4 million more than was the case in 2007, despite a shrinking population over the same

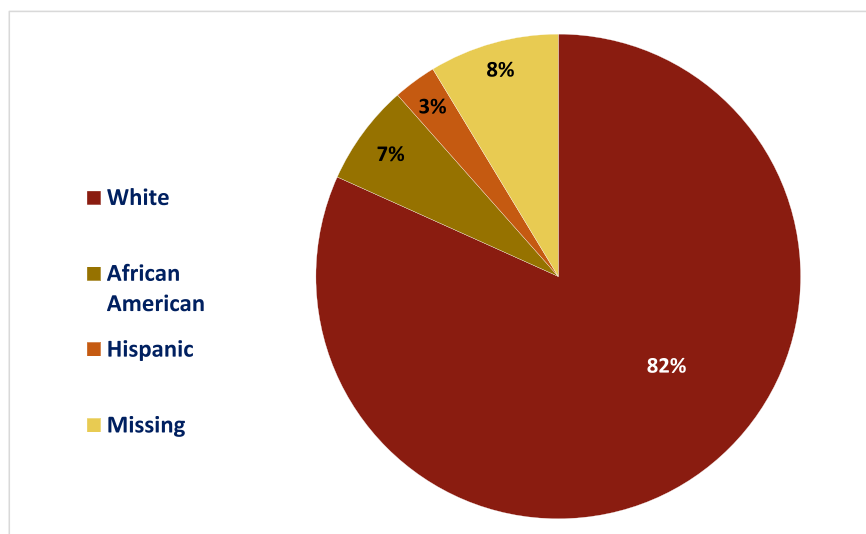
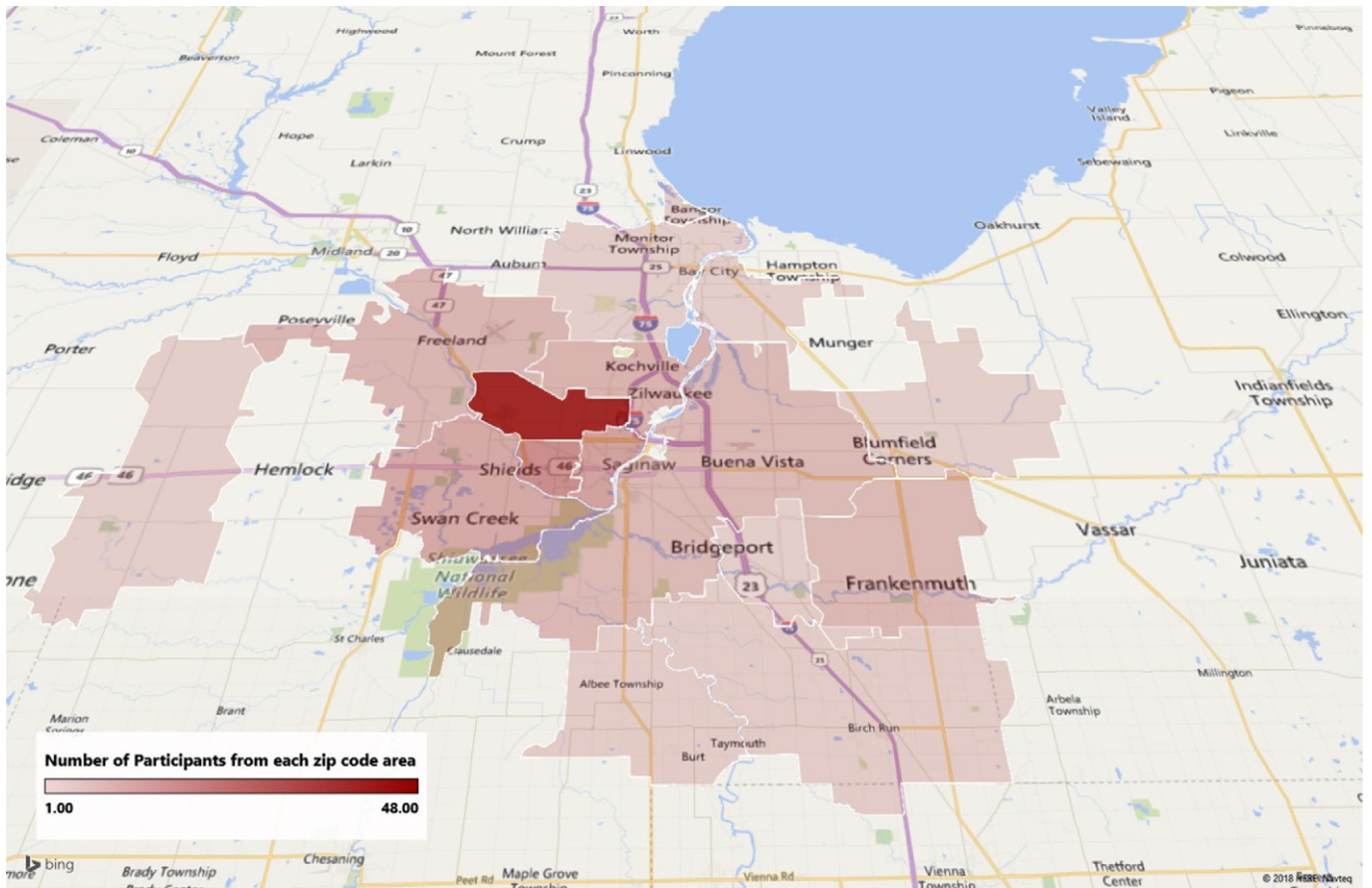


Fig 1. Ethnic distribution of medication take-back drive participants.



Zoomed out map:

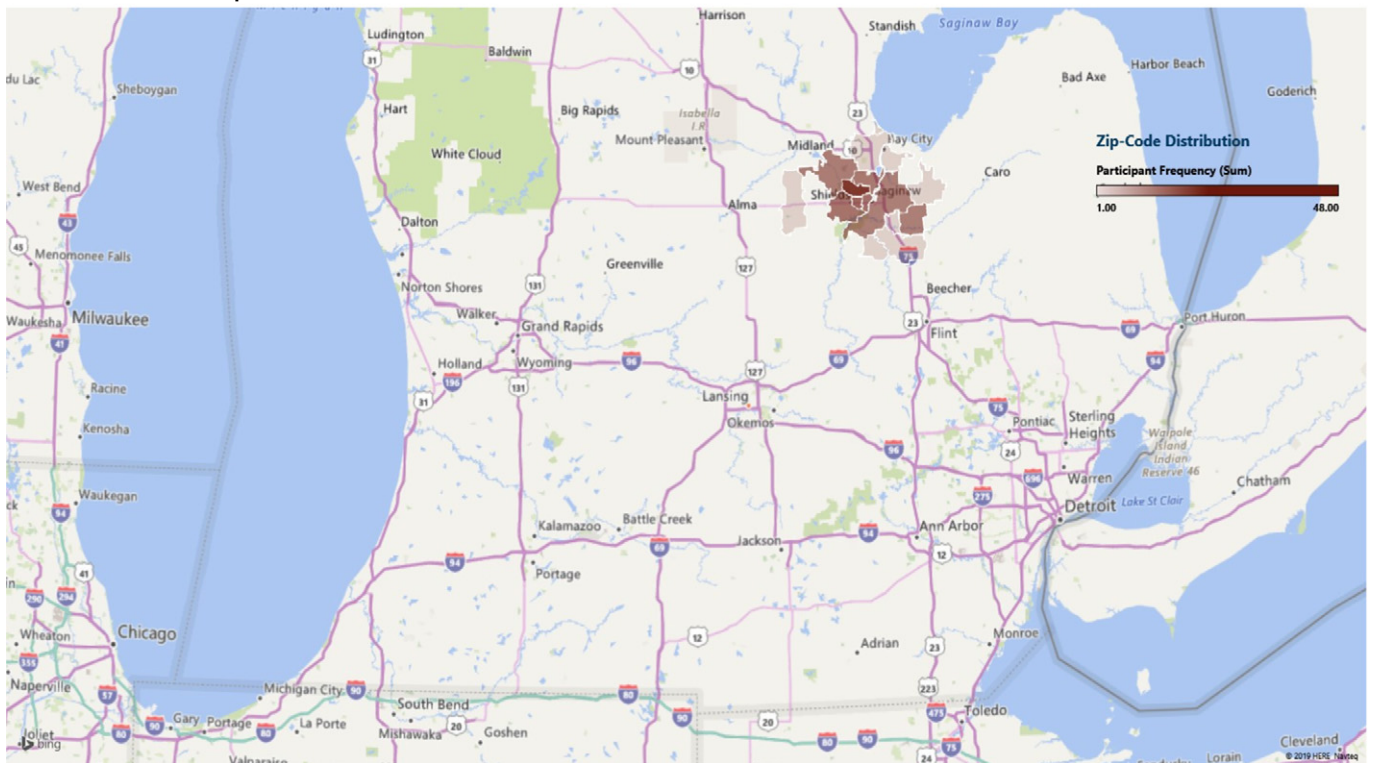


Fig 2. Medication take-back drive geographic draw area. Zoomed out map.

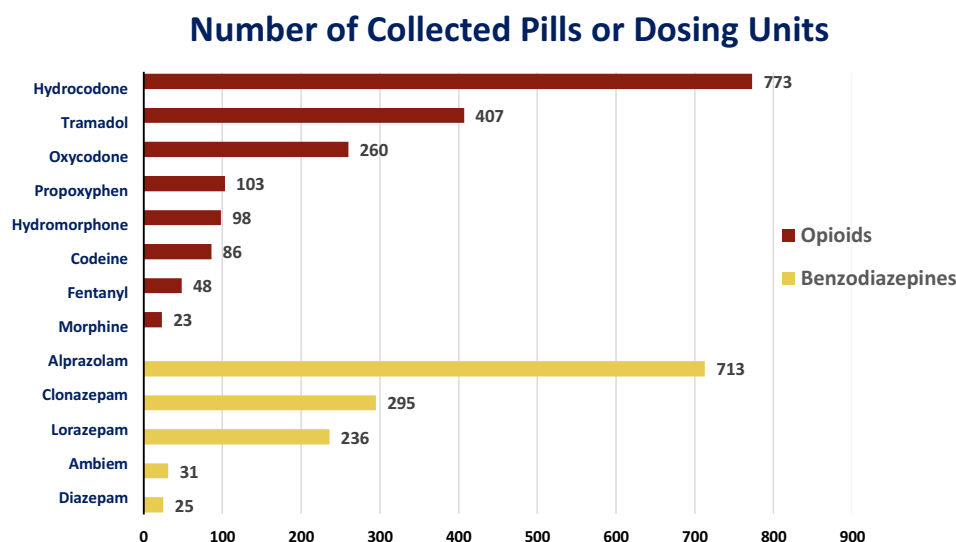


Fig 3. Abuse-prone opioids and psychotropic medication collected and counted during medication take-back drive.

time period [25]. Nearly 11 million of the 21 were for Schedule II drugs, classified by the DEA as having a high potential for abuse and dependence (most opioids are listed on this Schedule II). Surgeons are certainly implicated in this crisis, especially when one considers that about 40% of all outpatient prescriptions surgeons write are for narcotic analgesics; this is a rate that is second only to that seen with pain medicine specialists [26]. Surgeon stewardship of the opioid crisis becomes important, as surgeons can certainly use different strategies to address the epidemic [27]. We at the CMU Department of Surgery decided to heed the calls for action with an innovative community engagement approach and lead a local public health initiative designed to address the opioid epidemic and gauge the extent of the problem relating to prescription opioid excess in our own backyard.

By hosting our first medication take-back event, we wanted to engage the community and provide physician-led education on proper medication use and disposal of unused excess people may have in their homes. We suspected that there was a gap in education regarding proper disposal, and this hypothesis was supported by the early work of others [28]. We aimed to raise public awareness about the opioid crisis and provide an opportunity for proper drug disposal to remove addictive substances from potential diversion into the hands of our youth and other community members, where they may result in harm or death. Diversion of legitimate prescription drugs occurs when a portion of the prescribed amount remains unused and ends up being shared with others, or simply discovered and used by an acquaintance or family member [29–31].

We observed that unused prescription medications, including potentially addictive psychotherapeutics like opioids and benzodiazepines, exist in extremely large quantities in the homes of people in our area. We demonstrated that these abuse-prone substances could be removed from fueling the opioid crisis through an organized medication

take-back event. Finally, we appreciated that the physician-led drive was found to be very much welcome by our community members, as evidenced by those who came out in large numbers during a short window of time on a May weekend to participate in the event. Despite being held mid-day for only 4 hours on a spring weekend, more than 104 event participants (representing 1 or more family members and friends visiting together) stopped by to drop off their medication. More than 74,000 solid-form countable dosing units, or pills, were collected during that time, weighing about 80 lb in total. This was a remarkable, unexpected amount of medication taken back in a few hours and reflected the utility and value of such a medication “Spring Cleaning” event for our community. Participants left inquiring when the next event will take place for them to come again and invite others. This is not surprising and consistent with some survey evidence of favorable user perceptions toward such medication take-back services [32].

In our study, most the surveyed event participants were white or senior citizens older than 60 years. This is mostly a reflection of the general demographic in the immediate vicinity of where the event took place in Saginaw Township, MI. Nevertheless, the venue drew in participants from over a 23-mile radius in the mid-Michigan, Great Lakes Bay Region; and this geographic reach covered urban areas where different ethnicities resided in higher proportions than was observed turning out on the day of the take-back drive. It is not clear from this pilot data alone whether seniors or white people are more likely than others to participate in drives dedicated to removing prescription pain medication and addictive substances from the community. This is a limitation of the study design and pre-event outreach planning. Having these drives in different locations, at different times of the year, and with adequate pre-event advertising would help better describe the true demographic that would more likely respond and use these services to clean up homes of unused psychotherapeutic substances. The effect of the presence of the police, which cannot be avoided in such events, cannot be determined from the study. What our data do suggest, however, is that adults of all ethnicities and ages, particularly seniors, have abundant quantities of medications that sit unused in their homes. This raises questions as to why this unused excess exists in the first place.

Prescriptions for schedule II controlled substances [33] have nearly quadrupled in Michigan over a period of 7 years (2007 to 2014), and Michigan ranked 10th among all states in per capita prescribing rates of opioid pain relievers in 2012 [34]. Our study indicates that significant quantities of these opioids remain unused and are at risk for misuse. The amount of opioid drugs collected during the event was remarkable: 1798 different identifiable opioid dosing units or pills were counted,

Table 2
Identified opioids collected during the medication take-back drive and their MME.

Opioids	Pill quantity	MME
Hydrocodone	773	4275
Tramadol	407	1797
Oxycodone	260	2250
Propoxyphene	103	515
Hydromorphone	98	784
Codeine	86	387
Fentanyl	48	6336
Morphine	23	345
Grand total	1798	16,689

and this does not include some opioids that were part of an unidentifiable mix of medications dropped off in unlabeled batches or bags. The identifiable and counted opioids equated in potency to 16,689 MMEs or about 17 g of morphine, with a total economic value of up to US \$9091 in their individual formulations. The estimated street value of \$5653 alone points to why such medications, when present in excess and are easily accessible in homes, might be subject to diversion and misappropriation.

Although fentanyl was collected in small amounts during our drive, it contributed to the greatest amount of MMEs and can result in serious overdose if misused. Fentanyl patch overdose can occur for various reasons: confusion between 2 dose strengths, forgetting to remove the patch, accidental transfer of the patch to another person, application of more than 1 patch, cutting the patches, self-medication, and ingestion [35].

In our study, hydrocodone topped the list of opioids, representing 43% of all dosing units collected. Hydrocodone is a commonly prescribed narcotic analgesic. Although Americans constitute only 5% of the world population, they are reported to consume 80% of the global opioid supply and 99% of the global hydrocodone supply [20]. Since the Michigan Automated Prescription Systems was created, hydrocodone was noted as the most prescribed drug, accounting for 32.2% of all prescriptions written in Michigan in 2012 [2]. In their study on postoperative narcotic prescriptions, Bates et al also observed that hydrocodone was prescribed most often, followed by oxycodone [28]. They also noted that 67% of patients had surplus medication beyond need. This is consistent with our observation of the presence of a significant amount of excess hydrocodone in our community available for disposal. Although we collected oxycodone in high quantities, we found that tramadol, not oxycodone, was the second most common narcotic collected—almost half as much as the collected hydrocodone.

Tramadol is not often specifically mentioned in statistical reports on opioid use or misuse. Perhaps, this is because it is generally considered a weak or atypical opioid. Tramadol appears to produce less constipation and dependence than equal analgesic doses of strong opioids, and its use has been advocated to reduce pain resulting from trauma, renal or biliary colic, and labor, and also for the management of chronic pain of malignant or nonmalignant origin, particularly neuropathic pain. The pharmacology of tramadol is such that abrupt cessation increases the risk for both opioid and serotonin-norepinephrine reuptake inhibitor withdrawal syndromes [36,37]. Hence, this drug has dependency and abuse potential; and our findings indicate that it is being commonly prescribed, and notable quantities remain unused in people's possession, putting this medication at risk for nonmedicinal use as well.

In addition to opioids, benzodiazepines were collected in significant quantities during our take-back event: 1300 dosing units were counted, and alprazolam [38,39] represented the majority and far outnumbered clonazepam and lorazepam, the second and third most common unused psychotherapeutic sedatives collected. These medications are also involved in misuse, overdose, and emergency care, forming part of the prescription drug crisis [31,32]. The brand name average wholesale price for all the benzodiazepines collected exceeds \$11,000. Together with the collected opioids, the entire psychotherapeutic group had an estimated brand name value of more than \$20,000 dollars. Considering that this was taken back from 104 participants, this represents about \$200/participant. So, beyond concerns relating to risks of misuse or diversion of these compounds, one must ask whether patients and payers should incur costs for medications that end up unused for the medicinal purpose for which they were intended. Looking at this from another perspective and considering that the event took 4 hours, a prescription opioid and tranquilizer take-back event like ours can be thought of as having an economic value of capturing back about \$5000/h, adding an impressive economic value to its social worthiness.

It is concerning that legitimately prescribed medications are being misappropriated into the general population and used by persons other than holders of the initial prescription [11]. The problem is

compounded when one considers the diversion and misuse occurring by adolescents. The opioids collected during our event were available in homes where teenagers or children lived or frequented in more than 87% of cases. The 2013 National Survey on Drug Use and Health reports that 8.8% of youths aged 12–17 were current illicit drug users, and 2.2% of those used psychotherapeutic drugs and pain relievers nonmedicinally. Although the reasons are unclear, perhaps it is related to ease of access or because they consider these medications safe to use because they see that health professionals prescribe them for legitimate reasons.

The Monitoring the Future Survey is a long-term study involving 45,000 American adolescents in grades 8, 10, and 12 across 372 US schools. In 2016, this survey reported that 12% of 12th graders admit to misuse of prescription medication [40]. The alarm is raised when one considers that, in an assessment of illicit drug abusers, most heroin users reported that nonmedicinal prescription pain medication use preceded their use of heroin [41,42]. As to the ease of getting these drugs, it is noteworthy that many reported easy access to these medications when they would like to obtain them. In youth 12 years or older, who used pain relievers nonmedically in the past year before being surveyed (2012–2013 study period), 53% indicated that they most recently obtained the drugs from a friend or relative for free and not directly from a doctor prescribing to them. Another 14.6% indicated that they bought or simply “took” the drugs from a friend or relative. Strikingly, 83.8% of nonmedicinal users in the survey reported that their friend or relative obtained the drugs from just 1 doctor. It becomes clear that drug dealers are currently neither the only nor the important source of these types of drugs for nonmedicinal users. The results of these large-scale surveys, taken along with our study findings of unused psychotherapeutics available in homes frequented by youth, highlight the importance of better physician prescribing practices to encourage appropriate use, reduce excess prescribing, and provide avenues for appropriate disposal to remove drugs from the path of diversion.

Surgeons are among the highest prescribers of opioids, and they have been implicated in a number of prescriptions written for people who have died from prescription drug overdose [43]. So along with other physicians, surgeons must reevaluate their opioid prescribing practices to realign prescribed quantities with patient need and outcomes. In their analysis of postoperative pain medication consumption and disposal, Bates et al showed that 67% of patients in their study had surplus from the initial prescription, and 91% kept the medication at home [28]. Because our study demonstrates that opioid excess is present in our community, we, as surgeon prescribers, are motivated to explore how our postoperative prescribing habits may be contributing to the crisis. Knowing that patients who are prescribed opioids after surgery are at higher risk of becoming chronic opioid users also motivates us to examine our role in the epidemic [15,44]. Early evidence in the surgical literature suggests that improved opioid prescribing after common surgical procedures is achievable with targeted research and educational efforts. Hill et al documented the wide variability in opioid prescriptions issued after common general surgical procedures [45]. With their follow-up work, they demonstrated how an educational intervention focused on disseminating research findings and opioid-prescribing guidelines in their institution resulted in decreased opioid prescribing by more than half, without increasing needs for prescription refills [46]. As a professional body and community of surgeons, the American College of Surgeons (ACS) Division of Advocacy and Health Policy and the ACS Division of Education have been working diligently to address the opioid epidemic. They have published the ACS Statement on the Opioid Abuse Epidemic, outlining a series of guiding principles to usher in an era of improved patient safety and surgeon practices pertaining to prescription opioids [27].

Although our study represented an attempt to learn from an organized public health initiative designed to engage and educate the public on proper disposal of excess prescription medication, it had limitations as briefly mentioned above. It was descriptive and cross-sectional in

nature, allowing us to gain an initial glimpse of the extent of the excess opioid prescribing problem in our community without identifying specific targets for intervention. Initially, our goal was to demonstrate the utility and low-cost feasibility of such a rewarding community engagement and volunteer-driven endeavor. The event budget was less than \$1000 and proved most welcome by volunteers and visitors alike. It resulted in the removal of a significant amount of unused medication away from potential misuse and diversion and encouraged us to continue involvement in similar community events for this purpose. The survey data were limited and nongranular because of the anonymous nature of the study design, allowing for its efficient implementation on the day of the event. The clinical practice patterns in our community are typical of Midwestern urban and rural primary care practices and the broad range of general and specialty surgical services offered in university-affiliated community hospitals. Our study as designed and conducted did not allow for the identification of what surgical cases were associated with the prescriptions returned during the take-back drive. This pilot initiative paves the way for developing a more indepth research protocol to go beyond the descriptive nature of the problem and help identify actionable targets for intervention. With future design, attempts can be made to identify the source of the opioids, specific indications, utilization, and need for refills, and correlate that with prescriber patterns and patient specific characteristics, such as opioid or other medication use and health conditions. The “boots on the ground” approach allows a rich opportunity for collecting end-user data for experimental protocols designed to assess patient-reported utilization and outcomes.

Conclusion

Since most nonmedicinal users of prescription drugs get it through methods of diversion from people for whom the medicine was legitimately prescribed [10], we were motivated to be part of the solution to the opioid crisis and organize an event to remove excess medication in our community from being misappropriated. Through surgeon-led community engagement and public health initiatives like setting up open, visible medication take-back drives, we have demonstrated that opioids do exist in excess in people's possession. These opioids, which are often originally prescribed for postprocedural analgesia, tend to be available in homes where youth or children are present, placing them at risk of exposure and misuse. A simple surgeon-led and focused medication take-back drive has proven to be a rewarding initiative, appreciated by both community members and event volunteers alike. It helped remove abuse-prone drugs from fueling the current opioid and death from overdose crisis in our community. It also highlighted the importance of reexamining our surgical prescribing habits to adequately meet patient needs. The drive represents only one of many strategies surgeons can use to address the clear and present danger of the current opioid crisis.

Author Contributions

Fady Moustarah: study design, study implementation (medication take-back event volunteer), data collection and analysis, summarization, manuscript write-up, manuscript review, editing, and finalization.

Jay Desai: study implementation (medication take-back event volunteer), data collection and analysis, manuscript review and content editing.

John Blebea: study design and implementation (medication take-back event volunteer), manuscript review.

Conflict of Interest

All authors have no study related financial interests or other conflicts of interest to disclose. The community medication take-back event was organized and executed by unpaid volunteers from the department of

surgery at Central Michigan University College of Medicine, including all the authors.

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