

Proper Drug Disposal: Studying a Solution to Household Prescription and Over-the-Counter Drug Abuse

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Abstract

With 6.5 million Americans misusing a prescription drug in 2014 and 12% of American teenagers indicating lifetime use of over-the-counter cold medicine or cough syrup for getting high, misuse and abuse of prescription and over-the-counter drugs remains a major problem in the United States. Prescription and over-the-counter drug abuse often results from unused or unwanted medications remaining in the household cabinet. A potential solution to this problem lies in drug take-back programs which allow individuals to bring unused medications back to designated facilities for safe and proper disposal. In this commentary, we discuss the current state of drug take-back programs and their relevance to prescription and over-the-counter drug abuse. We conclude with suggestions on future directions in drug disposal that can help fight against prescription and over-the-counter drug abuse.

Keywords: Drug take-back programs; Medication disposal; Patient education; Unused medications

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Prescription and Over-the Counter Drug Use in the United States: An Overview

For the average American, prescription and over-the-counter drugs are a standard component of a daily health regimen with 35% of American adults consuming over-the-counter (OTC) medicines on a daily basis [1] and 48.7% of Americans reporting use of at least one prescription drug in a 30 day period [2]. Data indicate that OTC medications serve a crucial role in helping treat a host of common health problems such as pains, aches, sprains, and rashes [1, 3] with 81% of adults utilizing OTC medications as a first response treatment for common medical symptoms [4]. With OTC sales at approximately 31 billion dollars in 2014, OTC drugs importantly provide low-cost treatments to individuals in underserved communities [4].

In a thirteen-year span from 1999 to 2012, prescription drug use in the United States demonstrated a notable increase [5]. Using data from the National Health and Nutrition Examination Survey,

Kantor et al. [5]. found that 51% of US adults reported use of any prescription drug from 1999 to 2000 while 59% reported use of any prescription drug from 2011-2012. A recent Mayo Clinic study estimated that 70% of Americans are on at least one prescription drug [6].

Widespread prescription and OTC medication use in the United States has produced an environment in which drugs are highly present and, thus, readily accessible to any given individual [7]. This ease of access is reflected in many areas. First, OTC drugs can be easily purchased in pharmacies and drug stores. Further, many individuals have access to expired or unused drugs in their home cabinets [8, 9]. These avenues create opportunities for individuals to share excess drugs with friends and family members or to consume the drugs themselves. In many cases, these medications are not consumed as prescribed - specifically, they are consumed at higher doses or by non-intended recipients [10, 11]. Thus, high accessibility can, in turn, contribute to misuse and abuse of prescription and OTC drugs [12].

Abuse of Prescription and Over-the-Counter Drugs

Prescription drug abuse is responsible for the largest percentage of deaths from drug overdosing [13]. Data from the 2014 National Survey on Drug Use and Health suggest that 6.5 million Americans misused a prescription drug in 2014 [14]. Youth may be particularly at risk; historically, prescription and OTC drugs have served as a recreational outlet for teenagers. The MetLife Foundation Partnership Attitude Tracking Study found that nearly one in every four teens has misused or abused a prescription drug at some point in their lives [15]. This represents a 33% increase during a five-year period [16]. Findings from the 2011 Partnership for a Drug Free America survey revealed that 17% of American teens reported misuse of prescription medicine for getting high at least one time in their life while 12% of American teens indicated lifetime use of OTC cough or cold medicine for getting high [17]. In 2005, 4.4 million American teenagers admitted to taking prescription painkillers [13] with 10% of American teens indicating use of Oxycontin and Vicodin in the prior year [17] while, in a 2013 study, 13.7% of 54,000 students in grades 7 through 12 reported lifetime use of prescription drugs without a doctor's prescription [18]. OTC drugs are also subject to abuse among youth; in 2015, cough medicine was abused by 4.6 million 12th grade students [19]. Indeed 56% of teenagers believe that obtaining OTC drugs is easier than obtaining illegal drugs [20].

Data from the Drug Abuse Warning Network suggest that opioids contribute to a greater number of overdose deaths in the United States than cocaine or heroin [21, 22]. Unintentional overdoses may also be on the rise; currently, accidental drug overdose is the primary cause of injury-related deaths in the United States among individuals aged 35-54 and the second most common cause of injury-related deaths in American youth [23]. Due to prescription medication abuse, emergency room visits demonstrated a 45% increase from 2004 to 2010 in individuals under 20 [24].

A variety of factors may lead individuals to misuse and abuse prescription or OTC drugs. Some individuals may consume excess medications as a way of coping with their stress or anxiety [25]. Others may experiment with prescription and OTC medications as a means of satisfying boredom or curiosity [25]. Some may feel social pressure or influence from peers to use prescription or OTC drugs [26]. Rural communities may be particularly at risk with studies finding time spent with peers outside of the school day and lack of participation in extracurricular activities to be associated with the recreational use of prescription drugs among youth [27]. Finally, many individuals may not recognize the dangers of prescription or OTC drug abuse [7, 28]. Data from the National Institute of Drug Abuse (NIDA)'s 2014 Monitoring the Future survey demonstrated that, though teens did not misuse or abuse prescription stimulants at higher rates than in the past, there was an overall decline in perceived risk of doing so. While 69% of teens believed prescription stimulant abuse to be dangerous on a 2009 survey, only 55% of teens perceived that same risk on the 2014 survey [29].

Certain strategies can help eliminate the effect of environmental stressors on prescription and OTC drug abuse. Exercise and yoga may reduce levels of stress and anxiety that lead people to misuse prescription and OTC drugs [30, 31]. Extracurricular classes (e.g. courses in art or music) can help remove feelings of boredom [32]. Prosocial connections with teachers and non-substance using fellow students may protect youth against prescription drug abuse [18]. Further, strong connections with parents who instruct against substance abuse may also prevent teenagers from abusing prescription drugs [18].

In recent years, there has been a trend towards decreased prescription and OTC drug abuse. Findings from the 2014 NIDA Monitoring the Future survey of drug abuse indicate that abuse of prescription and OTC drugs has declined among American youth [33]. Further, social pressure to misuse drugs may be on the decline. The 2011 Partnership for a Drug Free America survey revealed that nearly 58% of American teens strongly disapprove of peer use of prescription medicine for getting high; this represents a 6% increase from the 2010 survey [17].

Though there have been demonstrated improvements in national prescription and OTC drug abuse, additional solutions are needed to eradicate this epidemic. Proper drug disposal may help solve this public health dilemma.

Proper Drug Disposal as a Mechanism for Change

Drug take-back programs and the newly available option for pharmacies to engage in controlled drug disposal may also be an important solution to at-home drug abuse. Many cases of prescription and OTC drug misuse result from exposure to unused medications left in the home or from individuals passing on unused drugs to family members or friends [34, 35]. A systematic program for removing drugs from the home thus has the potential to drastically reduce misuse of OTC and prescription medications [35].

A survey of American individuals revealed that 1.4% of the sample returned unused medication to their pharmacy and that 54% threw their medications in the trash. More than a third, specifically 35.4% of the sample, disposed of their medications in the sink or toilet [36, 37]. Seehusen and Edwards administered a survey to patients (n=301) inquiring as to their medication disposal practices and perceptions [38]. Over half of the survey respondents reported flushing medications down the toilet, with 22.9% indicating that they had brought medications to a pharmacy for proper disposal. Further, fewer than 20% of the patients reported having received any education from a provider as to correct methods for medication disposal [38].

The option for families to return their unused or unwanted prescription medications may importantly supplement other means of reducing prescription drug abuse among youth and adults. Currently, limited drug take-back programs create a potential challenge for recovering addicts who would benefit from removal of prescription and OTC drugs from their homes [39].

Removal of drugs from the home will not be a cure for prescription or OTC drug abuse. As discussed prior, it is important to address underlying issues that may be leading teens to abuse prescription drugs (e.g. unhealthy relationships, inaccurate perceptions of prescription drug abuse risk). However, eliminating unused drugs from the home can help bolster efforts to lower prescription and OTC drug abuse and remove any remaining temptations to abuse prescription or OTC drugs.

Although some pharmacies accept unused or expired drugs to enable safe disposal practices, historically, many pharmacies have not [38]. Bound and Voulvoulis [37] suggest that national policies may have long encouraged improper drug disposal. The U.S. Drug Enforcement Administration manages and regulates the practices for transfers of drugs and controlled substances. Some institutions are able to return medications through organizations associated with the Returns Industry Association [37].

With the aim of promoting proper drug disposal, a federal law was enacted in 2010 allowing states to create take-back programs for unwanted prescription and over-the-counter drugs. Research indicates that Americans are likely to participate in such programs, which suggests that drug take-back programs should be enacted on a larger scale. Kotchen et al. [40] surveyed 1005 residents in southern California and found that individuals were willing to pay a surcharge on prescriptions in order to support the creation of a pharmaceutical disposal program. In a pilot study examining survey respondents' perceptions of a community drug take-back program, Thach et al. [41] found that respondents were more likely to choose a pharmacy that offers to take back unused drugs than one that does not. This effect was evidenced not only among those survey respondents who reported currently using a drug take-back program but also among those who did not report using such a program. However, though interest in drug take-back programs exists, such programs are not universally available or required [40, 42]. Further, widespread awareness of these programs is currently limited [42]. With studies citing the desirability and acceptability of such programs [40, 41], they should be available more widely.

Targeted instruction on proper drug disposal is essential. Though take-back programs are an important method for reducing improper disposal, the efficacy of such programs hinges on a patient, caregiver, and health care provider community educated on correct disposal methods. Indeed, structured education on drug disposal is essential with research findings demonstrating that a high-level of general education is not sufficient. Law et al. [43] administered a survey to employees at a health sciences institution. Though survey respondents had a high educational level and had occupations in the health care field, they were not necessarily aware of proper drug disposal methods.

Findings from recent studies highlight the need for patient education on safe drug disposal. Seehusen and Edwards [38] found that prior instruction on proper drug disposal was associated with bringing unused or expired medications back to a pharmacy. In addition, those individuals who had been previously instructed on correct disposal methods were more likely to think that returning medications to a pharmacy was

acceptable. More recently, Reddy et al. [44] surveyed cancer patients receiving opioids on their medication disposal practices. 74% of patients were not aware of correct drug disposal methods and 46% of patients had unused drugs in their home. Silvestre et al. [45] also surveyed patients receiving opioids and found that only 13% had received education on safe opioid disposal and 77% indicated the presence and improper storage of unused opioids at home. Maeng et al. [46] conducted a telephone survey of 721 Medicare adults in central Pennsylvania on their unused medication disposal patterns. While 11% of unused medication was disposed of through drug take-back programs, 14% of unused medication was disposed of in the trash, 9% was flushed down the toilet and 55% remained in a household cabinet. Given the large proportion of individuals employing unsafe medication disposal methods across multiple research studies as well as the self-reported lack of patient education on drug disposal, future initiatives in patient communities should focus on addressing this education gap.

Drug disposal education need not be delivered in an in-person format; research findings suggest that education can also be effectively administered online. McCauley et al. [47] provided outpatients (n=62) who had been supplied an opioid medication with a web-based educational intervention focusing on safe storage and disposal of the drug. Before commencing the program, participants completed an assessment of awareness on proper disposal and storage of prescription opioids. Knowledge surrounding proper storage and disposal of prescription opioids significantly improved from pre- to post-intervention with results being maintained at follow-up. [47]

Caregiver education on drug disposal is crucial as many unwittingly underestimate the risks of prescription and OTC drugs. Ross-Durow et al. [8] conducted interviews with 501 American adolescents and found that 73.7% of the sample had unsupervised access to medications with potential for abuse. Similarly, in a set of interviews with parents of teenagers, Friesen et al. [48] found that most parents did not monitor prescription drugs in their homes as they felt that their teenagers would not be interested in using these drugs for non-medical purposes. They also did not believe that prescription drugs could be used to get high.

Many pharmacists are perceived as an accessible knowledge base for medication information and thus are in an optimal position to promote safe drug disposal practices [49, 50]. In order to instruct on these practices, however, it is essential that pharmacists themselves are first educated on these methods. Studies suggest that many pharmacists may lack prior training on safe drug disposal [51-53], highlighting the need for targeted pharmacist instruction in this domain.

In September of 2014, the U.S. Drug Enforcement Administration issued a ruling allowing DEA registrants to accept dispensed controlled substances [54]. This ruling was developed out of mounting concerns that medications in the home may foster non-medical prescription drug abuse [55] or be accidentally consumed by young children [43]. As DEA registrants, pharmacies are now able to participate in controlled substance disposal by

registering through the DEA as “collectors.” Pharmacies have the choice to implement either a “collection receptacle” (e.g. locked containers for dropping unused and/or expired controlled substances) or a “mail-back program” (e.g. pharmacies are supplied with envelopes which are given to patients for their unused medications) [54]. This ruling has profound implications for decreasing drug abuse as current take-back programs are limited in number, which may lead individuals without such programs in their areas to employ incorrect disposal methods [40]. However, even for those who live in proximity to drug take-back programs, such programs may be inconvenient and cumbersome [56]. Take-back programs at local pharmacies would eliminate that inconvenience factor because individuals are likely to regularly visit their pharmacy to pick up other prescriptions or routine products. The unwanted medications could be brought along on such a trip for proper disposal.

Existing data on drug take-back programs suggest that, should these programs be implemented in more locations, they may be widely used. In one Michigan-based drug-take back event, researchers collected 1,824,854 units of medications (e.g. tablets or capsules) [57]. As a result of the creation of Operation Medicine Drop, a drug take-back event based in North Carolina, 69.6 million unit doses of medication were collected [58]. Drug take-back efforts across several cities in Maine were associated with the return of 13,599 medications among 1,049 individuals [59].

In addition, safe drug disposal holds significant public health benefits. Collectively, research findings suggest that individuals’ tendency to dispose of medications in the sink or toilet may substantially contribute to the presence of pharmaceutical compounds in the environment (e.g., water supply) [40, 60]; it is possible that continuous exposure to such compounds could have a cumulative, toxic effect [40, 61].

Conclusion and Future Directions

In February 2016, Walgreens announced the creation of a safe medication disposal program with disposal kiosks to be available in more than 500 drug stores across the United States [62]. In creating this program, Walgreens joins other pharmacies such as CVS [63] and Rite Aid [64] in offering medication disposal programs. However, despite the recent increase in and reported efficacy of drug take-back programs, recent studies suggest that the mere presence of such programs is not sufficient. Many individuals continue to employ incorrect drug disposal methods, which can largely be attributed to a lack of education on safe disposal practices [44-46]. Overall, we propose that reduced prescription and OTC drug abuse hinges on a combined effort that integrates education, growth and expansion of drug disposal programs, and elimination of environmental stressors (refer to Figure 1) Education should involve targeted instruction in patient, caregiver, and provider communities on the risks of prescription

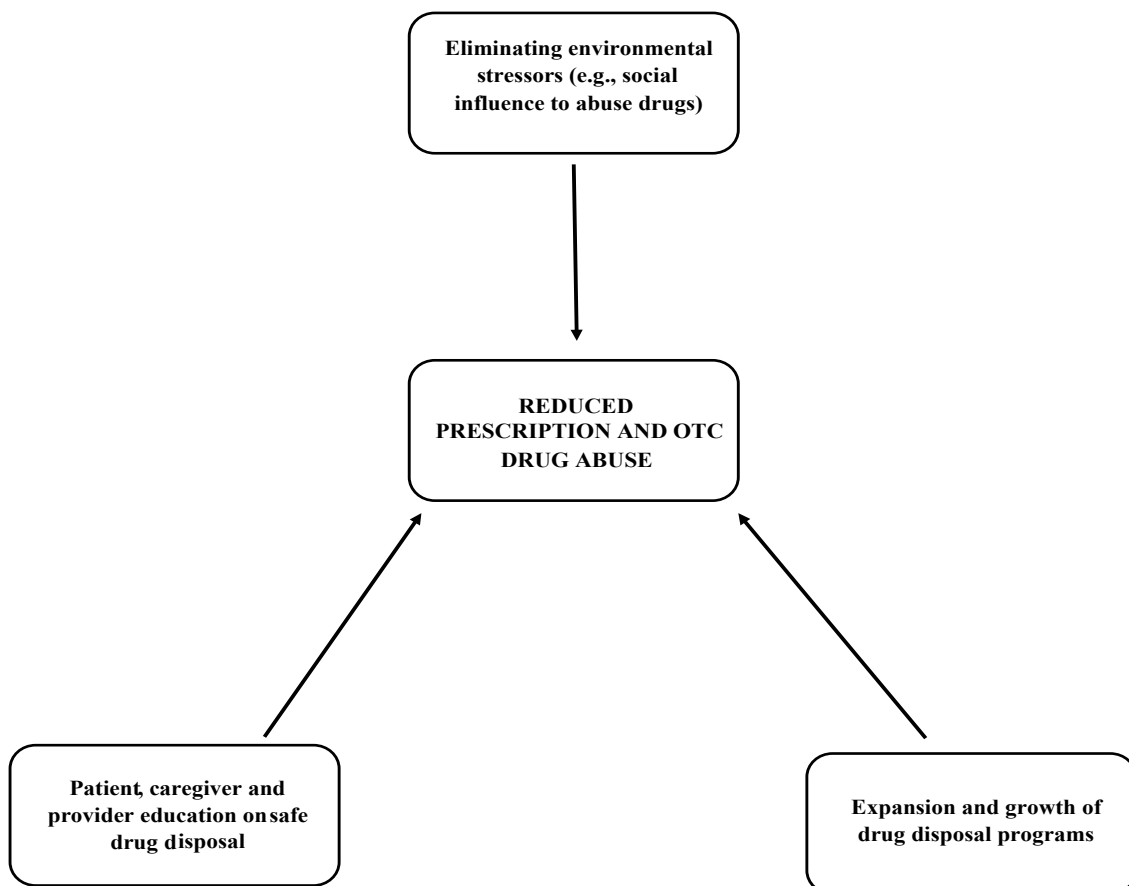


Figure 1 Eliminating prescription and OTC drug abuse: Targets for future research and treatment initiatives.

and OTC drugs as well as safe methods of drug disposal. Initiatives in drug disposal programs should focus on expanding existing programs as well as establishing additional take-back and mail-back programs or collection receptacles across the United States to ensure ease of access to proper disposal methods. These efforts should occur in tandem with attempts to eliminate the environmental stressors leading individuals to abuse prescription and OTC drugs such as increased access to psychosocial treatment for drug addiction, group fitness courses, and meditation programs. Indeed this integrated approach may be the most effective in reducing prescription and OTC drug abuse across the United States.

Declaration of Interest

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Ms. Gold has no competing interests to report.

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