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A Needs Assessment of Unused and Expired Medication Disposal Practices: A Study from the Medication Safety Research Network of Indiana

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Abstract

Background—Access and availability of unused and expired medication (UEM) due to improper disposal and storage is a serious issue, potentially leading to abuse, environmental concerns, and other.

Objective—To describe the extent of the UEM issue in Indiana (U.S. State), identify patient beliefs about UEM, and determine any association between those beliefs and various personal/demographic characteristics.

Results—A needs assessment was conducted among community pharmacy patients. A convenience sample of 200 patients from 15 community pharmacies that are part of a practice-based research network (PBRN) in Indiana completed a survey concerning UEM beliefs and behaviors from Feb-March, 2014. Approximately 40% of patients were aware of a UEM take-back location in their community, although only 15% had utilized a UEM take-back location. Seventy-seven percent of patients were willing to drive to a take-back location to return UEM. Particularly vulnerable populations to lack of knowledge regarding UEM and access to proper disposal were identified.

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Conclusions—While states have made efforts to increase accessibility for UEM return, there remains a need for more disposal locations for both non-controlled and controlled medication.

Keywords

poisoning; community pharmacy; behavior

Background

The amount of unused and expired medication (UEM) in the U.S. is growing as the population ages and receives a greater number of prescriptions. If UEMs are disposed of by flushing in the toilet or sink, they have the potential to cause environmental contamination in the water supply by passing through treatment systems and entering rivers or lakes.¹ Additionally, UEMs can cause health problems if taken by anyone other than the prescribed patient due to improper disposal or storage. To correctly dispose of UEM in the trash, the U.S. Food and Drug Administration (FDA) recommends mixing the medication in either cat litter or coffee grounds, as well as destroying the patient name and medication information on the label.² Controlled medications, specifically opioid analgesics, are of increased concern, as these medications can lead to illegal drug diversion, and misuse, abuse and overdose. In 2009, unintentional poisoning deaths due to controlled medication, (i.e., overdose) accounted for 20 percent of injury death, surpassing motor vehicle crash as the number one cause of injury death.³ For these reasons, access and availability of non-controlled and controlled UEMs due to improper disposal or storage is a serious issue and continues to gain federal attention.

In response to this growing threat, Congress passed the “Secure and Responsible Drug Disposal Act of 2010.”⁴ Under the auspices of the Act, the Drug Enforcement Administration (DEA) began hosting National Prescription Drug Take-Back events under the direction of state attorneys general. As a result, pharmacies, grocery stores, and other community sites volunteer as disposal locations; however, these take-back events are typically held for one weekend in the spring and fall. In October, 2014, the DEA expanded the options for UEM disposal by designating law enforcement as the lead for collecting non-controlled and controlled medication during times other than drug take-back events.⁵ Due to the risks posed by UEMs, and need to assess current UEM disposal practices in the state of Indiana, a needs assessment was conducted among community pharmacy patients so as to inform future education efforts for patients regarding medication disposal behavior.

Methods

An 18-item survey to query adult community pharmacy patients regarding their medication disposal behavior was developed from lay and peer-reviewed sources. This survey was implemented in the Medication Safety Research Network of Indiana (also known as Rx-SafeNet), a statewide practice-based research network (PBRN) of 181 community pharmacies registered as an affiliate member of the national Agency for Healthcare Research and Quality PBRN registry.⁶ A convenience sample of 200 patients from 15 Rx-SafeNet community pharmacy members completed the survey from Feb-March, 2014. Patients were

eligible to participate in the survey if they were an adult patient of the pharmacy, and reported affirmatively to ever having UEMs. Community pharmacies were chosen using purposive sampling to reflect the population distribution throughout Indiana. Specifically, quota sampling was utilized, as the number of surveys administered in each pharmacy was relative to the population of the city or town in which the pharmacy was located. Subsequently, the population of each city or town included in data collection was divided by the total population of the 15 cities or towns (using the 2012 estimated Census) and multiplied by the sample size, resulting in the number of surveys to be administered in each city. In cities where there was more than one Rx-SafeNet community pharmacy, the number of surveys administered was divided approximately evenly among those pharmacies. Further, to approximate proper sampling according to gender, race and age of the pharmacy patients, estimated county demographics based on the 2012 Census were used. Indianapolis contained the city and all suburbs of the city comprising the metropolitan area. The anonymous survey was either completed by the patient or read to the patient for efficiency, while s/he was dropping-off or picking-up a prescription. Patients who completed the survey received a pill box for their time and participation. Inferential statistics were computed using chi-square and t-tests, as appropriate, to examine the association between predictors and independent variables (i.e., number of medications, age, gender, race, zip code and education). All predictor variables with significant associations (defined a priori as $p < 0.2$) were then entered into binary logistic regression models to predict each dependent variable. All computations were performed in SPSS v. 22 (IBM, 2014). This study was approved by the Purdue University Institutional Review Board.

Results

A total of 200 surveys were completed across 15 community pharmacies. Seven of the pharmacies were located in Indianapolis, including four urban and three suburban. The remaining eight pharmacies were located elsewhere and included two urban community pharmacies; and six rural independent pharmacies. Table 1 summarizes demographic characteristics of the patient population. The majority of patients were female Caucasians, with a mean age of 53.6 years, and prescribed a mean of 5.4 medications daily. Table 2 summarizes associations between demographic variables and patient-reported beliefs and behaviors about UEM. Table 3 presents information about patients receiving information or being aware of a take-back location in the community and their contribution to UEM disposal.

Discussion

Although some community pharmacy patients reportedly received medication disposal information or were aware of at least one take-back location in their community, the majority of patients did not dispose of UEMs in accordance with best practices put forth by the U.S. EPA and FDA. Several previous studies examining patients' awareness and behavior regarding appropriate UEM disposal reached a variety of conclusions to explain why patients do not dispose of UEM correctly. One reason cited may be a lack of knowledge about proper UEM disposal by health care providers whom improperly counsel their patients, or fail to counsel. As such, a survey of New Jersey physicians found that 68 percent

of responding physicians were unaware of medication disposal guidelines and 75 percent lacked training on correct medication disposal.⁷

Alternatively, UEM disposal unawareness may be related to properties of take-back locations. Specifically, take-back locations and events may be inconveniently located and/or available only during limited times of the year. For example, Indianapolis, the largest city in Indiana, has limited take-back locations and availability; only one large grocery store chain collects non-controlled medication in the spring and fall as of September, 2014. As part of a new national rule promulgated in October 2014 by DEA, 91 percent of Indiana counties (including Marion County where Indianapolis is located), have at least one law enforcement agency office available for disposal of non-controlled and controlled medication during business hours.⁸ The new rule also allows 24-hour receptacles for the purpose of collecting controlled and non-controlled medication at these offices.

Some state initiatives have overcome this access barrier by providing alternative methods for medication take-back. For example in Maine, a medication mail-back program was established to allow residents to send non-controlled medication by mail at no cost and at their convenience.⁹ Similarly, Utah's Department of Environmental Quality provides grants to law enforcement agencies to install permanent medication collection bins, entitled the "Use Only as Directed" program.¹⁰ States have had varying levels of success with the number of participating collection sites, law enforcement participation and total weight (in pounds) collected.¹¹ While states have made efforts to increase accessibility for UEM return, there remain limited avenues for disposing of controlled medications. In a recent study concerning unused opioids, investigators found that thirty-four percent of patients shared their medication or participated in medication diversion, an issue that is concerning given the alarming rate of opioid abuse.¹² In another study querying discharged emergency department patients, all of the participants reported they failed to safely store their opioid medication from others.¹³ Similarly, among the patient population in the current study, a large proportion may be at risk for diversion and unsafe storage due to non-awareness or failure to follow proper UEM disposal recommendations.

Limitations

There are several limitations to this assessment. First, the survey was not pilot-tested nor measured psychometrically for validity or reliability. Second, the number of patients approached for participation, but ineligible (i.e., reported never having UEM in the past year) was not tracked, and thus, a response rate was not calculated. Third, survey responders were recruited from brick-and-mortar community pharmacies only, and as such, the majority of patient participants did not obtain prescriptions from mail-order pharmacies; this limits the generalizability of the findings, as those who utilize mail-order may receive unwanted medications (due to automatic prescription fill and mail programs) more often than those patients who visit a community pharmacy. Fourth, these findings may not be generalizable to the population of Indiana outside of Rx-SafeNet nor other states. Fifth, as the respondents were those only to have reported UEM in the past year, any assessment might underestimate paucity of knowledge and ill-advised behaviors of medication users, in general.

Conclusion

The findings reflect that patients frequently report improper methods for UEM disposal. Thus, educating patients about the options for proper UEM disposal is warranted with particular attention focused on potentially vulnerable patients, including those with less than a college education or of African American race. Also, it is important to consider how federal mechanisms designed for non-controlled and controlled UEM disposal may be tailored for communities while taking into account available resources.

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Table 1
Characteristics of Community Pharmacy Patients Surveyed Regarding Unused and Expired Medications (UEM)

Characteristic	n (%) or Mean $\pm$ SD n = 200
Female	111 (55.5)
Age	53.6 $\pm$ 15.0
Caucasian	133 (66.5)
Live in metropolitan Indianapolis	126 (63.0)
Education less than College	126 (66.7)
Number of medications taken in past week	5.4 $\pm$ 5.6
On a controlled medication	61 (30.5)
<i>Drug disposal practice</i>	
Flush in sink/toilet	44 (22.0)
Store at home	81 (40.5)
Throw in trash	75 (37.5)
<i>How often disposed of UEM: past year</i>	
Zero	54 (28.0)
Once	79 (40.9)
Twice or more	60 (31.1)
Aware of take-back location	67 (33.5)
Received information on take-back location	79 (39.5)
Have taken UEM to take-back location	30 (15.0)
Willing to drive to take-back location	154 (77.0)
<i>Number of miles</i>	8.0 $\pm$ 6.0
Willing to pay to dispose at local pharmacy	80 (40.0)
<i>Amount willing to pay/trip</i>	\$0.85 $\pm$ 0.77

Table 2
Inferential Statistics for Patient Beliefs and Behaviors Concerning Unused and Expired Medications (UEM): n (%) or Mean $\pm$ SD

	Indianapolis	Outside Indianapolis	p-value
Aware of take-back location in community	32 (25.4)	35 (47.3)	0.002
Received information on take-back location	44 (34.9)	35 (47.3)	0.085
UEM disposal information provided by pharmacist	14 (11.1)	21 (28.4)	0.010
Did not dispose of UEM in past year	48 (38.1)	6 (8.1)	<0.001
	Less than College	College Degree	p-value
Aware of take-back location in community	34 (26.6)	30 (46.9)	0.005
	African American	Caucasian	p-value
Aware of take-back location in community	10 (16.9)	54 (40.6)	.001
Received information on take-back location	15 (25.4)	60 (45.1)	.009
UEM disposal information provided by pharmacist	2 (3.4)	31 (23.3)	.007
Did not dispose of UEM in past year	21 (36.8)	33 (25.6)	.123
Drive to dispose of UEM	35 (59.3)	111 (83.5)	<.001

Table 3
Predictors of UEM Disposal

Dependent Variable	Significant Predictors ^a	p-Value	Parameter Estimate of B	Odds Ratio (95% Confidence Interval)
Received information on take-back location ^b	Caucasian race	0.033	0.790	2.204 (1.066 - 4.560)
Received take-back information from TV or newspaper ^c	Caucasian race	0.009	-1.979	0.138 (0.032 - 0.605)
	Indianapolis	0.014	-1.723	0.178 (0.045 - 0.708)

^aNo significant predictors for taking UEM to take-back location, received UEM disposal information from pharmacist, pay to dispose of UEM, flush, throw in trash or store UEM, or controlled medication were identified on bivariate analyses; therefore, no model was evaluated.

^bOverall model $p < 0.025$, $R^2 = 0.051$; variable also included was Indianapolis resident.

^cOverall model $p < 0.024$, $R^2 = 0.281$; variable also included was number of weekly prescriptions.