

Prediction of pharmacist intention to provide medication disposal education using the theory of planned behaviour

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Abstract

Rationale, aims and objectives Lack of familiarity with proper medication disposal options among patients can lead to personal and environmental safety concerns, besides signalling non-adherence. Given that community pharmacists are in a position to educate patients, this study assessed community pharmacists' knowledge on medication disposal and examined the utility of the theory of planned behaviour (TPB) in predicting their intention to provide medication disposal education to their patients.

Methods A cross-sectional, self-administered survey was distributed to community pharmacists in California. Descriptive statistics were reported for all survey items. Cronbach's alpha and Pearson correlation were used to determine the reliability for the four TPB constructs (attitude, subjective norm, perceived behavioural control and intention). Multiple linear regressions were performed to predict intent using the other three TPB constructs. **Results** Pharmacists ($n = 142$) demonstrated a positive intention to provide education (mean = 5.91 ± 1.22 ; range: 2 to 8), but most (67.9%) provided this information once a month or less. Attitude ($\beta = 0.266$, $P = 0.001$), subjective norm ($\beta = 0.333$, $P < 0.001$) and perceived behavioural control ($\beta = 0.211$, $P = 0.009$) were significant predictors of intention, accounting for 40.8% of the variance in intention to provide disposal education. Scale reliability ranged from 0.596 to 0.619 for the four constructs. Few pharmacists accurately selected all of the appropriate recommendations of disposal for non-controlled and controlled substances (15.9% and 10.1%, respectively).

Conclusion Pharmacists showed favourable attitude, subjective norm, perceived behaviour control and intention in providing such education. However, their knowledge in this area may be lacking and they are not consistently providing this information to their patients.

Introduction

Consumer disposal of unused prescription drugs has become a challenge, especially as the number of prescriptions dispensed to patients continues to increase [1]. In 2013, there were 4.2 billion

prescriptions dispensed in the United States [2], and it has been reported that consumers waste between 45% and 66% of their medications [3,4]. This translates to wastage of approximately 2 out of 3 prescription medications and a national projected loss of up to \$2.4–\$5.4 billion [3]. This large proportion of unused medi-

Table 1 Medication Disposal Recommendations by Federal agencies [12,18,36–39]

| Federal agency | Recommendations |
|---------------------------------------|---|
| Food and Drug Administration (FDA) | <ul style="list-style-type: none"> • Only flush medication down the sink or toilet if <i>specifically</i> instructed to do so according to the prescription drug labelling or patient information accompanying the medication. • Community drug take-back programme (i.e. DEA-sponsored Drug Take-Back Day) • Remove medication from original container. Mix with an undesirable substance (used coffee grounds or kitty litter). Place mixture in a sealable bag or empty can |
| Environmental Protection Agency (EPA) | <ul style="list-style-type: none"> • Drug take-back events • Take medication out of original container. Mix with an undesirable substance. Put into a disposable container with a lid. Throw it into the trash. |
| Drug Enforcement Agency (DEA)* | <ul style="list-style-type: none"> • Collection receptacles at DEA-authorized locations • DEA-authorized mail-back programme • Local take-back events |

*Specific for controlled substances.

cations indicates the potential underlying problems of medication non-adherence, as well as waste of health care dollars [5]. Unused medications can pose significant concerns related to society and the environment. When medications are stored in the home, there is the potential for accidental ingestion by children or drug abuse by teenagers [6,7]. Over 70% of people who use prescription pain relievers for nonmedical purposes say they obtained them from friends or relatives [8]. Improper disposal of these medications by flushing them down the sink or toilet could affect the environment, wildlife and humans when they enter the water system [9–13].

At present, recommendations on medication disposal methods vary between Federal agencies such as the Food and Drug Administration (FDA), Drug Enforcement Administration (DEA) and Environmental Protection Agency (EPA) (Table 1). The availability of disposal locations at hazardous waste collection sites and local sheriff or police stations also vary among cities or communities [14–16]. As a result, inconsistency of many disposal options could lead to confusion among consumers on how to properly dispose of medications. A study conducted in 2006 showed that 35% of consumers considered flushing medications down the toilet was acceptable, and 67% reported taking medications back to the pharmacy was appropriate. In addition, 70% of participants expressed it was not appropriate to store medications in the home, yet over 50% of them were storing them in their homes and flushing them down the toilet [17].

The FDA recommends that consumers who are doubtful about proper medication disposal to consult a pharmacist [18]. In fact, pharmacists are in an ideal position to provide medication disposal information because most patients pick up their medications from a pharmacy. However, there is limited evidence regarding the type and frequency of medication disposal information that pharmacists provide to patients. Data are also lacking regarding if pharmacists themselves are knowledgeable about medication disposal and their intent to provide education on this topic.

The theory of planned behaviour (TPB) was chosen as the psychological model for this study to determine the likelihood of pharmacists providing disposal education [19]. The TPB posits that intention is the most immediate determinant of performing a behaviour. It uses the constructs of attitude (individual's positive or negative feelings about performing a behaviour), subjective norm (SN, individual's perception of whether people important to the individual think the behaviour should be performed), perceived

behavioural control (PBC, individual's perception of the difficulty of performing a behaviour) and behavioural intention (individual's plan to perform a behaviour) to determine the likelihood of the occurrence of a specific behaviour. The TPB has been a common social cognitive theory used to predict behaviour across different health care professions, and was found to explain intention quite well [20,21].

The TPB has also been employed to explain community pharmacists' behaviour in the context of patient care. Examples include supplying non-prescription medicines for fungal infection [22]; provision of medication therapy management (MTM) services [23]; provision of asthma counselling in paediatric patients [24]; reporting of serious adverse drug events (ADEs) to the FDA [25]; and utilization of a prescription drug monitoring programme database (PDMP) [26]. However, no known study has used the TPB to assess community pharmacists' intention regarding the provision of medication disposal education to their patients.

The objectives of this study were therefore to examine: (1) community pharmacists' attitude, subjective norm (SN), perceived behavioural control (PBC) and behavioural intention; (2) the relative contribution of attitude, SN and PBC in predicting behavioural intention; and (3) the knowledge of community pharmacists of appropriate disposal of medications. We hypothesized that pharmacists would show favourable attitude, SN and PBC, all of which should lead to strong intention to perform a behaviour (e.g. provide medication disposal education).

Methods

Design, population and sample

This cross-sectional, descriptive study was approved by the Institutional Review Boards of Western University of Health Sciences (WesternU) and California Northstate University (CNU). Our study population consisted of community pharmacists located around WesternU and CNU. This included four counties in Southern California (Los Angeles, Orange, Riverside and San Bernardino counties); and six counties (Sacramento, El Dorado, Solano, Placer, Yolo and Fresno counties) in Northern California. Convenience sampling was used in selecting these counties for data collection. During the study period, it was estimated that a total of 17 755 pharmacists were working in 6326 community pharmacies in 58

counties in California (J. Emard, email sent to: Hata M, 27 May 2015, Unpublished) [27]. Community pharmacies were identified using a combination of Internet searches with keywords 'pharmacy' and name of each county and city, as well as approaching rotation sites of the two universities, generating a sample of 200 community pharmacists.

Study investigators and data collectors, who consisted of pharmacy faculty members and student pharmacists at WesternU and CNU, received standardized training on investigative materials and study procedures to ensure quality of study conduct. In addition, investigators had immediate access to the principal investigator if any questions were to arise. Pharmacists at these sites were provided paper, self-administered surveys by the data collectors. Data collection was conducted from March 2014 to December 2014.

Survey development and administration

The survey instrument was developed in accordance with the TPB. The survey was pretested with five pharmacists with varied backgrounds and community pharmacy practice experiences to ensure face and content validity and clarity of all questions. Comments from the pre-test group were evaluated, and minor modifications to the phrasing of some items in the survey were incorporated.

The final version of the survey consisted of 12 items that included the four TPB constructs: attitude (five items), SN (three items), PBC (two items) and intent (two items). A 4-point Likert scale of agreement was used for these 12 items, and data were coded as strongly disagree = 1, disagree = 2, agree = 3 and strongly agree = 4. A question about the past experience of providing medication disposal education and the source(s) of the education they received was also included in the survey. In addition, three questions were designed to assess pharmacists' knowledge regarding federal (DEA, FDA, EPA) and local county recommendations for disposal of controlled and non-controlled medications. The following demographic and practice characteristics were examined at the end of the survey: age, gender, highest pharmacy education level, employment status, current practice setting, current pharmacy position and zip code of the current practice site (Table 1).

Data analysis

Data analysis was conducted using IBM SPSS version 21.0 (SPSS, Inc., Chicago, IL, USA). Mean value imputation was used to address constructs with less than 50% response. Constructs with more than half of missed response were not included in data analysis. One item regarding workload in the attitude construct was reverse coded.

Descriptive statistics including frequency, mean, standard deviation, minimum and maximum values were calculated. Summated scales for the four TPB constructs (attitude, SN, PBC and intention) were created. Scale reliability was measured for each of the four constructs using Cronbach's alpha for scales with at least three items, or Pearson's correlation coefficient for scales with only two items. Multiple linear regression analysis was used to regress the three independent variables of attitude, SN, PBC on the dependable variable, intent, to provide medication disposal education. A *P*-value of < 0.05 was considered to be statistically significant.

Results

Demographic and practice characteristics

A total of 142 surveys were returned from 200 pharmacists approached, yielding a response rate of 71.0%. More than half (60.6%) of the respondents were younger than 40 years of age. A majority of the respondents were full-time (86.1%), staff pharmacists (54%) working for a chain, grocery store or mass merchandiser (79.9%). While most of the respondents had a doctor of pharmacy degree (80.9%), many of them did not recall getting medication disposal education through their schooling (38.0%). Instead, they received information about medication disposal from either work (56.3%) or government agencies/professional organizations (45.8%); or never at all (14.2%). Less than 10% of the respondents reported providing this information on a daily basis to their patients. Most of them (67.9%) provided recommendations on medication disposal once a month or less (Table 2) (Fig. 1).

TPB Model constructs

Table 3 shows the TPB scale reliability and correlations. Overall, the TPB model was internally consistent with Cronbach's alpha greater than 0.70, and the items comprising the PBC and intent were strongly correlated. Table 4 lists the descriptive statistics for individual TPB items including the percentage of respondents answering positively (either strongly agree or agree) and negatively (either strongly disagree or disagree) for each statement.

Attitude

Most respondents (85.2% to 99.3%) felt comfortable (mean = 3.22 ± 0.65) providing medication disposal education to their patients. They considered it an important (mean = 3.61 ± 0.50) and valuable opportunity to contribute to their patients (mean = 3.54 ± 0.53) and in moving the pharmacy profession forward (mean = 3.18 ± 0.67). However, about 37% respondents indicated that providing education would increase their workload (mean = 2.60 ± 0.80) (Table 4). The total mean attitude score was 16.1 ± 2.0 (range: 5 to 20), indicating a positive attitude towards providing education (Table 3).

Subjective norm

Over 80% of the respondents believed that patients (mean = 3.09 ± 0.60) and health professionals (mean = 2.99 ± 0.61) would like them to provide medication disposal education. However, only about 52% of the respondents indicated that other community pharmacists were providing education (mean = 2.53 ± 0.70) (Table 4). Overall, respondents had a positive SN (mean = 8.62 ± 1.42 ; range: 3 to 12) (Table 3).

Perceived behavioural control

More than 70% of the respondents expressed that they would have the necessary time to provide medication disposal education regularly to their patients (mean = 2.81 ± 0.73) and keep themselves

Table 2 Sample demographic and practice characteristics (*n* = 142)

| Variables | Frequency (%) |
|---|---------------------------|
| Age (years) (<i>n</i> = 132)* | |
| 21–30 | 36 (27.3) |
| 31–40 | 44 (33.3) |
| 41–50 | 22 (16.7) |
| 51–60 | 21 (15.9) |
| Over 60 | 9 (6.8) |
| Pharmacy practice experience (years) (<i>n</i> = 134)* | 12.9 ± 11.8 ^{††} |
| Gender (<i>n</i> = 137)* | |
| Male | 53 (38.7) |
| Female | 84 (61.3) |
| Highest pharmacy education (<i>n</i> = 141)* | |
| B.S. pharmacy | 23 (16.3) |
| PharmD | 114 (80.9) |
| Others | 4 (2.8) |
| Employment status (<i>n</i> = 137) [†] | |
| Full-time | 118 (86.1) |
| Part-time | 14 (10.2) |
| Relief/per-diem | 5 (3.6) |
| Primary pharmacy practice setting (<i>n</i> = 139)* | |
| Chain (e.g. CVS, Walgreens) | 75 (54.0) |
| Independent | 17 (12.2) |
| Grocery store chain (e.g. Food City) | 14 (10.1) |
| Mass merchandiser (e.g. Walmart, Costco) | 22 (15.8) |
| Outpatient/clinic pharmacy | 10 (7.2) |
| Inpatient pharmacy | 1 (0.7) |
| Position (<i>n</i> = 139) [†] | |
| Staff pharmacist | 75 (54.0) |
| Pharmacy manager/pharmacist-in-charge | 50 (36.0) |
| Pharmacy owner/partner | 8 (5.8) |
| Others | 6 (4.3) |
| Counties (<i>n</i> = 138) [†] | |
| Los Angeles [‡] | 50 (36.2) |
| Orange [‡] | 28 (20.3) |
| San Bernardino and Riverside [‡] | 34 (24.6) |
| Sacramento and neighbouring counties ^{§¶} | 26 (18.8) |
| Past experience in providing medication disposal education (<i>n</i> = 140) [†] | |
| Never | 5 (3.6) |
| About once a year | 19 (13.6) |
| About once a month | 71 (50.7) |
| Every week | 33 (23.6) |
| Every day | 12 (8.6) |
| Source of medication disposal information** (<i>n</i> = 142) | |
| Pharmacy school | 54 (38.0) |
| Work training | 80 (56.3) |
| Continuing education | 46 (32.4) |
| Government agencies/professional organizations | 65 (45.8) |
| Others | 21 (14.8) |
| Have not received any information | 10 (14.2) |

*Numbers may not total 142 because of missing data.

[†]Some percentages do not equal to 100 because of rounding.

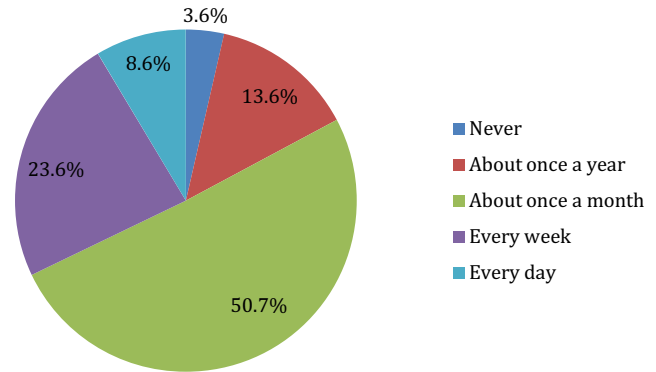
[‡]Southern California counties.

[§]Northern California counties.

[¶]Included El Dorado, Solano, Placer, Yolo and Fresno counties.

**Multiple answers accepted.

^{††}Mean ± SD.

**Figure 1** Frequency distribution of providing medication disposal education to patients (*n* = 140)^a.

^aTotal did not equal to 142 because of missing responses.

Table 3 Scale construct summary statistics

| Scale | <i>n</i> * | Items | Mean | Cronbach's alpha |
|---------------------|------------|-------|------|------------------|
| Attitude | 142 | 5 | 16.1 | 0.613 |
| SN | 138 | 3 | 8.62 | 0.596 |
| PBC [†] | 140 | 2 | 5.74 | 0.612 |
| Intent [†] | 140 | 2 | 5.91 | 0.618 |
| Overall | 138 | 12 | | 0.820 |

*Numbers may not total 142 because of missing data.

[†]Pearson's correlation coefficient was calculated instead of Cronbach's alpha.

up-to-date with the relevant rules and regulations (mean = 2.93 ± 0.63) (Table 4). Overall, respondents showed a positive PBC (mean = 5.74 ± 1.22; range: 2 to 8) (Table 3).

Intention

Many respondents (over 70%) indicated that they intended to include medication disposal education as part of their consultation with patients (mean = 2.85 ± 0.71), and ensure a role for pharmacists in providing education to the community (mean = 3.06 ± 0.64) (Table 4). Overall, respondents demonstrated a positive intention to provide education (mean = 5.91 ± 1.22; range: 2 to 8) (Table 3).

Predictors of intention

Attitude ($\beta = 0.266$, $P = 0.001$), SN ($\beta = 0.333$, $P < 0.001$) and PBC ($\beta = 0.211$, $P = 0.009$) were all statistically significant predictors of intention to provide medication disposal education. The three constructs together accounted for 40.8% ($R = 0.639$, adjusted $R^2 = 0.394$) of the variance in intention to provide education ($F = 30.29$, d.f. = 3, $P < 0.001$) (Table 5).

Knowledge

Most of the respondents (65.5%) recognized that local county agencies had recommendations for medication disposal specific to

Table 4 TPB descriptives and item statements

| Construct | Item statement | <i>n</i> | Mean (SD) | Percent who agreed** | Percent who disagreed†† |
|-------------------------------|--|----------|-------------|----------------------|-------------------------|
| Attitude | I am comfortable providing medication disposal education according to all rules and regulations in my practice area. | 141 | 3.22 (0.65) | 90.8 | 9.1 |
| | It is important to provide education on medication disposal to patients. | 142 | 3.61 (0.50) | 99.3 | 0.7 |
| | Providing education on medication disposal is a valuable opportunity for me to contribute to my patients. | 142 | 3.54 (0.53) | 98.6 | 1.4 |
| | Providing medication disposal education will increase my workload. | 142 | 2.60 (0.80) | 37.4 | 62.7 |
| | Advocating for the provision of medication disposal education will be important in moving pharmacy profession forward. | 140 | 3.18 (0.67) | 85.2 | 13.4 |
| Subjective norm | Patients would like me to provide medication disposal education. | 139 | 3.09 (0.60) | 89.2 | 10.8 |
| | Health care professionals would like me to provide medication disposal education. | 138 | 2.99 (0.61) | 83.4 | 15.8 |
| | Other community pharmacists that I know are providing medication disposal education | 131 | 2.53 (0.70) | 51.8 | 44.6 |
| Perceived behavioural control | I would have the necessary time to provide medication disposal education on a regular basis in my pharmacy. | 139 | 2.81 (0.73) | 72.2 | 27.9 |
| | I would have necessary time to keep up with rules and regulations of medication disposal. | 140 | 2.93 (0.63) | 79.3 | 20.7 |
| Intent | I intend to provide medication disposal education as a part of my consultation. | 139 | 2.85 (0.71) | 72.1 | 27.9 |
| | As a pharmacist, I will actively work to ensure a role for pharmacists in the provision of medication disposal education to community. | 140 | 3.06 (0.64) | 85.0 | 15.0 |

*Included those who strongly agreed.

†Included those who strongly disagreed.

‡Percent may not add up to 100 because of missing data or rounding.

Table 5 Results of multiple regression analysis for the TPB constructs (*n* = 136)*†

| Predictor variable | B‡ | SE‡ | β†† | <i>t</i> | <i>P</i> |
|--------------------|--------|-------|-------|----------|----------|
| Direct measures | | | | | |
| Constant | -0.325 | 0.707 | | -0.460 | 0.646 |
| Attitude | 0.160 | 0.046 | 0.266 | 3.481 | 0.001 |
| SN | 0.285 | 0.067 | 0.333 | 4.286 | <0.001 |
| PBC | 0.207 | 0.078 | 0.211 | 2.667 | 0.009 |

*Total did not equal to 142 because of missing responses.

† $F = 30.29$, *d.f.* = 3, $P < 0.001$, $R = 0.639$, $R^2 = 0.408$, adjusted $R^2 = 0.394$.

‡B, unstandardized regression coefficients.

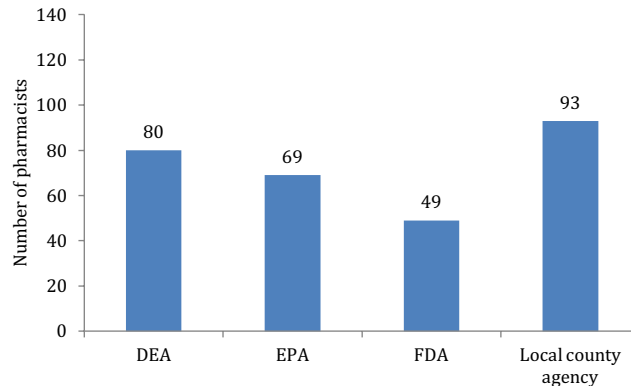
§SE, standard error.

††Beta (β), standardized regression coefficients.

their communities. More than half of the respondents (56.3%) knew that the DEA had recommendations regarding medication disposal and only 49 (34.5%) of them were aware that the FDA did as well. Very few respondents, 19 (13.4%), were aware that all three organizations were information sources for proper medication disposal (Fig. 2).

Only 22 (15.9%) respondents correctly selected all of the appropriate methods of medication disposal that could be recommended to patients in their communities for non-controlled substances. Even fewer (14, 10.1%) were able to recognize all of the appropriate methods of disposal for controlled substance medications.

Most of the respondents were aware that medications could be disposed of at the National Drug Take-Back events. These take-

**Figure 2** Knowledge assessment about organizations that provide information on medication disposal (*n* = 142).

back days were sponsored by the DEA for the primary purpose of removing controlled substances from people's homes. However, more respondents recommended it as a method for non-controlled substances (74%) rather than for controlled substances (67%) (Fig. 3). Despite the fact that non-controlled substances should not be flushed down the toilet or sink, there were a few respondents (4%) who still recommended this to their patients. Seventeen (12%) respondents recommended taking non-controlled medications back to the pharmacy. Almost a third of the respondents (28.2%) recommended other disposal methods for non-controlled

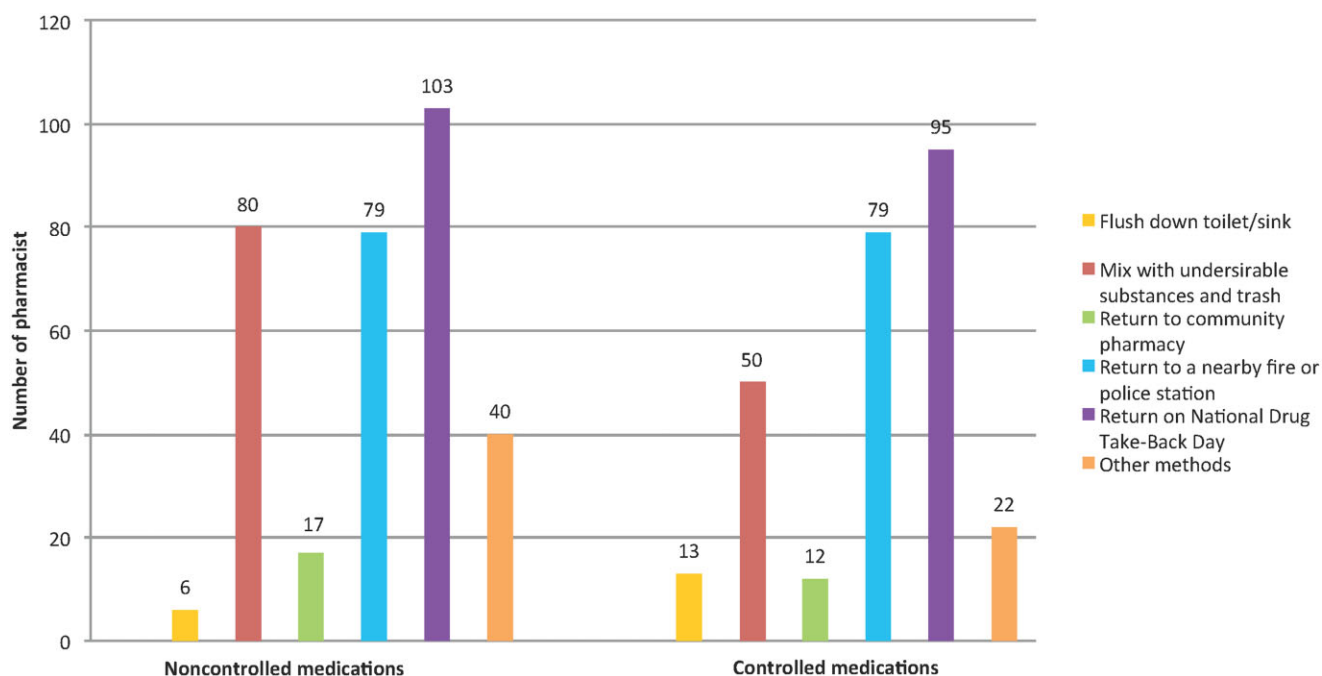


Figure 3 Recommendations for disposal of non-controlled and controlled medications ($n = 142$).

medications, which included hazardous waste disposal sites, waste management and mail back envelopes (Fig. 3).

For controlled substances, after the National Drug Take-Back events, the next most recommended method was to return the medications to a nearby police station (55.6%). Fifty (35.2%) respondents recommended the method preferred by all of the national organizations (FDA, EPA and DEA), which is mixing the medications with an undesirable substance and throwing it into the trash. There were a few respondents ($n = 12$, 8.5%) who selected returning controlled substances back to the pharmacy as an appropriate method of disposal; although it must be noted that the DEA changed its ruling allowing pharmacies to take back controlled medications in the midst of the data collection period (Fig. 3).

One of the more popular responses for both controlled and non-controlled medications was for patients to return their medications to their local fire or police station. During our study, LA County had 20 drop boxes, Orange County had nine, San Bernardino County did not have any and Sacramento County had three. For those respondents who said they would make that recommendation to patients for their controlled medications, most (43.5%) did not have a drop box available in the city their pharmacy was located. For those who said they would not make that recommendation to their patients, a few of them (13.0%) did have a drop box located at the police station in their city that they could have referred their patients to (Fig. 4).

Discussion

To the author's knowledge, this is the first study to examine pharmacists' intention to provide medication disposal education using the TPB framework. The study results effectively supported the TPB explaining a significant amount of variance (40.8%) in the

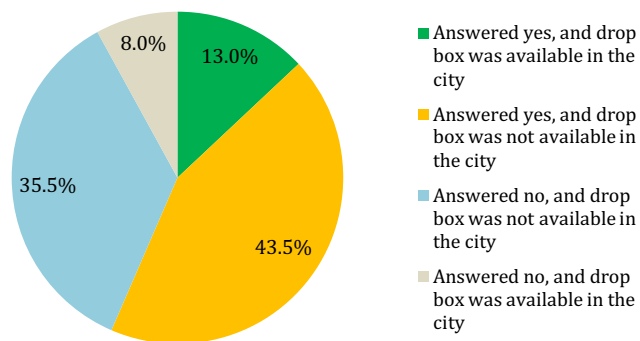


Figure 4 Recommendation of returning controlled substances to local police or fire station ($n = 138$)^a.

^aTotal did not equal to 142 because of missing zip codes.

intention to provide such education; similar to the average variance (39%) in intention reported in a meta-analytic review of the efficacy of the TPB [28]. A majority of our respondents showed a positive intention to provide such education as part of their consultation and to actively work to ensure they would take part in providing such education. This trend has evolved because of the growing use of prescription medications in the country, recent focus on medication take back programmes and the lack of knowledge regarding appropriate medication disposal among patients [29]. The positive intention found in our study is also encouraging as previous studies have found intention to be a good predictor of subsequent behaviour, particularly for behaviours that are under one's volitional control [20,30,31].

The study results show that pharmacists expressed favourable attitudes towards providing medication disposal education.

However, some pharmacists (37.4%) considered workload a challenge in providing the education, which may discourage them from doing so despite its benefit to patients. Similar to other studies that examined pharmacist intention in providing medication-related services [23–25], subjective norm was found to be the strongest predictor. This indicates that expectation from other health professionals and the visibility about their roles in providing medication disposal education may be an impetus for pharmacist intention. Therefore, it may be particularly useful to develop policies aimed at pharmacists' SN pertaining to medication disposal education provision. For example, discussions, workshops or seminars at conferences which allow pharmacist interactions with other health professionals may exert a positive influence on pharmacists' subjective norm and intention.

Perceived behavioural control was significantly related to pharmacists' high intention while controlling for attitude and subjective norm. In other words, if pharmacists can devote more time (e.g. with reduced workload from other duties) to medication disposal education or easily incorporate it into their counselling sessions, their intention to provide the education would potentially grow stronger. A review of literature showed mixed results about the role of perceived behavioural control in predicting intention in the pharmacy profession. Perceived behavioural control was found to be a significant predictor of intention in MTM services provision, asthma counselling and PDMP utilization [23,24,26], whereas it was not a significant predictor for ADEs reporting to the FDA [25]. While more TPB studies should be conducted to examine the significance of perceived behavioural control in the pharmacy profession in the future, this current study supplements the literature in supporting the impact of perceived behavioural control in predicting pharmacists' intentions.

Past research showed that pharmacists received limited training related to medication disposal during pharmacy curricula or continuing education (CE) [32], which is consistent with the findings of the current study. Therefore, it might be helpful to include or strengthen the educational component on this topic in the pharmacy curricula. While most of the pharmacists in our survey were able to recognize that at least one of the federal/state/local agencies had information about proper medication disposal, very few of them were aware that all of the organizations were resources for this type of information. In addition, most of them incorrectly identified all of the appropriate methods of medication disposal available in their communities. Inconsistencies in the recommendations provided by different organizations could contribute to the confusion among pharmacists. More CE programmes should be made available for practising pharmacists to keep abreast of the latest regulations on medical disposal and pharmacists should make an effort to update themselves on proper disposal methods available in their community.

Prior to the DEA's change in ruling on 9 September 2014, which authorized pharmacies and clinics to be collection locations, only sites with a law enforcement officer present were allowed to accept controlled substances. Therefore, one possible option for patients was to return medications to a collection receptacle at their local police or sheriff station. However, not all law enforcement stations have the resources to take back medications, and many pharmacists in our study did not know if their local police station could receive medications. Patients have reported they would prefer to take their medications back to pharmacies com-

pared to other sites (i.e. police stations and take-back events) [3]. However, because of the regulations one must comply with in order to be an authorized collection location, many pharmacies cannot justify the cost of offering this service to their patients [33]. Some pharmacists are also hesitant to provide this service because of the increased risk of theft and possible diversion associated with receiving controlled substances. The lack of pharmacy participation in medication disposal programmes could explain why the pharmacists in this study chose not to recommend it to their patients.

Most pharmacists appropriately identified national drug take-back events as a method of disposal for medications. However, in conjunction with the ruling change, the DEA decided to discontinue their nationally sponsored drug take-back events [34]. This leaves most of the pharmacists in our study without a proper method to recommend to their patients for medication disposal. Therefore, it is even more important for pharmacists to stay updated on accurate information regarding local collection sites.

Even if pharmacists are able to provide patients with information on all the appropriate and available methods of medication disposal, many are not providing this information to patients on a consistent basis. Despite hundreds of medications that get dispensed on a daily basis, most of the pharmacists in our study were counselling patients on medication disposal only once a month or less. Another survey study showed that less than 20% of the patients had ever been given medication disposal advice by a health care provider [17]. The lack of engagement in providing such education despite having favourable intention, attitude, SN and PBC warrants further study. Possible reasons may include a lack of patient requests for such education and a focus on other important medication-related points during the counselling session, as well as other pharmacy operational issues. Posting signs or having brochures and fliers available in the pharmacy with medication disposal information could be useful tools for providing patient education. The point of dispensing is an opportunity for pharmacists to counsel their patients on medication disposal [17,35]. Encouraging pharmacists to ask their patients about medication disposal or incorporating this information into the counselling session could create opportunities to provide this information more frequently. This would also help to establish pharmacists as a resource for medication disposal information among their patients.

The results of this study should be interpreted in light of several limitations. First, the use of convenience sampling and small sample size might result in limited generalizability of the study. Collection of data using a self-report approach might also result in social desirability bias of the respondents. However, this study was anonymous to minimize this threat. Acquiescence bias is also possible as all our survey questions are positively worded except the one that assessed the perception for workload; however, providing a mixture of negatively worded responses may confuse respondents. This cross-sectional study design is not able to investigate any changes in pharmacists' intention and the other TPB constructs, and causality among variables cannot be derived in this study.

Conclusion

This study found that the TPB model was useful in explaining pharmacist's intention to provide medication disposal education. Attitude, perceived behavioural control and subjective norm were

all significant positive predictors of intention. However, despite positive intent, pharmacists have insufficient knowledge in this area and are not providing recommended, up-to-date information to their patients on a regular basis. Programmes focused on improving pharmacist knowledge about medication disposal and providing strategies that enhance patient–pharmacist interaction on this topic should be advocated in the future.

Conflict of interest

The authors declare no conflict of interest.

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