Patients’ opinion and practice toward unused medication disposal in Malaysia: a qualitative study

Redhwan Ahmed Al-Naggar¹ and Adel Alareefi²

¹International Medical School, Management and Science University (MSU), Malaysia; ²School of Environmental and Natural Resource Sciences, Universiti Kebangsaan Malaysia (UKM), Malaysia

*Corresponding author: E-mail address: radhwan888@yahoo.com

Abstract:

This study was conducted to explore the opinion and practice toward disposal of unused medication among patients in Malaysia. An in-depth interview conducted during the period from December 2009 until February 2010. A total of 28 patients participated in this study. Once the participants identified, an appointment was fixed to conduct the interview in their house. Due to the small sample size the data were analyzed manually. The majority of them were male 15 (53.6%), older than 55 years old 18 (64.3%), Malay 20 (71.4%) and married 24 (85.8%). The most common diseases reported among the participants were hypertension 11 (39.3%) and diabetes mellitus type II 6 (21.4%). There were three main frequent disposal methods practiced by the respondents, the majority of them threw unused medication into the trash 16 (57.1%), followed by burning the unused medication 4 (14.2%) and storing it in a refrigerator 4 (14.2%). The majority of the participants 17 (60.7%) mentioned that the best way to educate the public about disposal unused medication is through school, university and public campaign. The most method to dispose unused medication among Malaysian patients is a throw of unused medication into the trash.

Keywords: Malaysia; Opinion; Patients; Practice; Unused medication
Introduction

Usually patients may not use all the medications dispensed to them because of many reasons: they may be avoiding unpleasant side effects; the symptoms have been relieved; forgetfulness; dosage changes; side effect intolerance; or medications reaching the expiration date. Unused and expired medications are likely managed in a wide variety of ways. Keeping expired medications in the home or giving them to friends and family which may increase the risk of accidental or inappropriate ingestion. World Health Organization (1999) [1] reported that unexpired and unused medications are considered unsuitable for drug donations. Other methods of disposal of unwanted medications are by rinsing them down a sink, flushing them down a toilet, or throwing them in the trash [2]. Another method also is to return unused medication to the pharmacy. However, a few pharmacists will take unused and expired medications back to facilitate proper disposal of them, the majority will not [3].

There are economic burden and environmental effects of unused medication. Regarding the environmental effects of unused medication, studies indicated that the existence of pharmaceuticals and their metabolites in water has been recognized as potentially dangerous [4,5]. Numerous medications have been found in trace amounts in groundwater [6-8], surface bodies of water [9-11] and treated drinking water [12-15]. Medicine environmental contaminations contribute to development of antibiotic resistance in the environment, or exposure of populations to irritant or mutagenic antitumor drugs [16] and the possible link between endocrine disrupting compounds and falling fertility [17]. Few studies indicated that even trace levels of many of these compounds can have a detrimental effect on the environment by affecting aspects of biological activity [18,19]. Concentrations of unused pharmaceutical compounds may be responsible for environmental effects such as vitellogenin induction in male fish [20], gender and genital abnormalities in fish [21,22] and even population collapse [23]. Some studies suggested that these chemicals can also affect human cells exposed in laboratory settings [24]. European studies reported that trace levels of pharmaceuticals elements were detected in environmental samples, including sewage effluent, surface water, groundwater, and drinking water [4,25-28]. Eliminating the wastewater system as means of unused drug disposal is one of many ways to lessen the impact of pharmaceuticals on the aquatic environment [29].

Regarding the economic burden of unused medication, in the United Kingdom, it has been estimated that around £37 million worth of unwanted medicines are in people homes [30]. In the United States, the value of unused medicines has been placed at over $1 billion per year for elderly patients alone [31] and in Texas. Garey et al. (2004) [32] estimated that annual wastage of medicines was US$106 million per year. A study from Saudi Arabia found that a quarter of medicines kept in the home to be expired, unused or deteriorated with an average value of US$10 per person [33] indicating that medicine wastage is also a significant problem in Gulf Arabic countries.

It is important to remember that these unused medications include analgesics, antibiotics and agents that act on the central nervous system. It is important also to understand why this medication accumulates in order to reduce the potential impact to the environment, potential for diversion and to reduce healthcare spending [34]. Even though developed countries do not have a water system that can remove the pharmaceuticals elements. In USA, the current water treatment systems do not remove many pharmaceuticals elements from drinking water [5,35]. Usually the concentration of these medications is negligible; however, long-term exposure to low levels of multiple medications could be hazardous [15,29,36]. Excretion, through urine and feces, is the primary way in which medications and their metabolites enter the water system. The improper disposal of unused and expired medications represents another easily preventable source of pharmaceuticals entering water supplies.

In Malaysia, the pharmaceutical industry is expanding at a high rate and has amounts of US$ 652.8 million in 2007 [37]. It is common to find that the unused portions of medicines and tablets prescribed are left on shelves in the houses long after the need for them is ended. In Malaysia, the extent of the problem of unused
or expired medicines in the home and public disposal practices are largely unknown. This study was conducted to explore the opinion and practice toward disposal of unused medication in Malaysia.

**Methodology**

This was an in-depth interview qualitative study conducted during the period from December 2009 until February 2010 among parents of Management and Science University students who was older than 35 years old. A total of 28 patients from different states of Malaysia namely: Selangor, Kuala Lumpur, Penang and Johor Bharu agreed to participate in this study. University students were approach to the objective of this study and asked to identify their parents who have chronic diseases to be interviewed in their houses. Once the participants identified, an appointment was fixed to conduct the interview in their houses. Before interviewing the participant, the purpose of this study was introduced and consent was obtained from the participants. The questions consisted of socio-demographic characteristics and the type of the disease. Then questions about their opinion and practice toward disposal of unused medication were asked which are: “have you heard about proper disposal of unused medication”, “how do you dispose your unused medication”, “do your medical practitioner tell you how to dispose the unused medication”, “do you know the effect of improper disposal of unused medication to environment”, “in your opinion, what is the best way to manage unused medication” and what is the best way to educate the public about unused medication. The interview talked approximately 40-60 min. Due to the small sample size the data analyzed manually.

**Results**

A total of 28 patients participated in this study. The majority of them were male 15 (53.6%), older than 55 years old 18 (64.3%), Malay 20 (71.4%) and married 24 (85.8%) (Table 1). The most common disease reported among the participants was hypertension 11 (39.3%), followed by diabetes mellitus type II 6 (21.4%), gout 3 (10.7), and depression 2 (7.1%), others such as Parkinson 1 (3.6%), cancer 1 (3.6%), renal failure 1 (3.6%), blepharospasm 1 (3.6%), pneumonia and migraine 1 (3.6%).

**Table 1** Socio-demographic characteristics of the participants (n = 28)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15 (53.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>13 (46.4%)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>≤55</td>
<td>10 (35.7%)</td>
</tr>
<tr>
<td>&gt;55</td>
<td>18 (64.3%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>20 (71.4%)</td>
</tr>
<tr>
<td>Chinese</td>
<td>1 (3.6%)</td>
</tr>
<tr>
<td>Indian</td>
<td>5 (17.9%)</td>
</tr>
<tr>
<td>Kadaan</td>
<td>2 (7.1%)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>24 (85.8%)</td>
</tr>
<tr>
<td>Single mother</td>
<td>2 (7.1%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>2 (7.1%)</td>
</tr>
</tbody>
</table>

**Opinion toward disposal of unused medication among participants**

Most of the respondents mentioned that return the unused medication to the hospital was the best way to dispose the unused medication 9 (32.1%), followed by throw the unused medication into a trash 6 (21.4%), recycle 5 (17.9%), being buried in the ground 3 (10.7%) and burn 3 (10.7%). The method to dispose unused medication that had the lowest percentage was pumping the medication to the toilet 2 (7.1%). One of the participants said:

“Government should provide special plastic and location only for unused medication in order to recycle the medication in a proper way in every state in the country.”

(Male, Malay, 51 years old, diabetes patient)

**Practice of unused medication disposal among participants**

There were three main frequent methods practiced
by the respondents, the majority of them threw the unused medication into the trash 16 (57.1%), followed by burning the unused medication 4 (14.2%) and storing it in a refrigerator 4 (14.2%). Other respondents said that they have returned the unused medication to hospital 1 (3.6%), buried in the ground 1 (3.6%) and flush it down the toilet 1 (3.6%). Three of the participants 1 (3.6%) did not dispose the medication at all.

Health care workers and proper way to dispose unused medication
Most of the respondents 27 (95%) mentioned that they were not informed about the proper way to dispose the unused medication by their physician or pharmacist. One of them said:

“Usually there will be no information given to us about disposing unused medication by health care workers.” (Female, Indian, 55 years old, asthma patient)

Another respondent said:

“Doctor has to tell the patients on how to dispose the unused medication properly because the patient doesn’t know.” (Female, Malay, 50 years old, hypertension patient)

Only 1 (5%) of the respondent mentioned that his physician informed him about the proper way to disposed unused medication.

Knowledge about the bad effect of improper disposal of unused medication
The majority of the participants 16 (55%) mentioned that they did not know the bad effect of unused medication. The reason given by the respondents that they believed that all the medication did not give any bad effect to human or environment because it was a medicine, used to heal disease and would not cause any harm. About 13 (45%) of them mentioned that they know the bad effect of improper disposal of unused medication. The bad effects mentioned by some respondents were poison, pollution, drug abuse, and overdose. One of the participants said:

“The effect of improper disposal of unused medication, it can cause pollution to the environment and cause poisoning to the children.” (Female, Malay, 57, diabetes and hypertension patient)

Opinion about how to educate the public regarding unused medication
The majority of the participants 17 (60.7%) mentioned that the best way to educate the public about disposal unused medication was through schools, universities and public campaign. Some participants mentioned that educating the physicians about the disposal of unused medication was the best way to spread the knowledge among the patients. Two of the participants (7.1%) suggested that employing the drama to educate the public about unused medication. Educate pharmacist 1 (3.6%), pharmaceuticals companies should put the correct steps to dispose unused medication on box or the cover of the medicine 1 (3.6%) and establish recycle unit for unused medication 1 (3.6%). Some of them said:

“Government should make a campaign and teach the public the right way to dispose unused medication starting from school level, universities level and community.” (Male, Malay, 51 years old, diabetes patient)

“Pharmaceuticals companies should put the correct steps to dispose unused medication on every medication box and cover.” (Female, Malay, 57 years old, diabetes and hypertension patient)

“Educate the public through advertisement in the newspaper and through the drama.” (Male, Kadazan, 64 years old, renal failure patient)

“Government should establish unit to recycle the unused medication.” (Female, Malay, 47 years old, gout patient)

Discussion
This study showed that the majority of the participants 16 (57.1%) threw the unused medication into the trash. Where no system exists for unused medication collection in Malaysia, disposal of medication in garbage destined for landfill is accepted as more environmentally friendly than flushing them down the
drains [3,29]. Similar finding reported by Kuspis and Krenzelok [2] was that more typical disposal methods were throwing unused medication out in the trash (54%). A study conducted by Statistics Canada (2005) [38] reported that about a quarter of Canadian households generated leftover medications. Of the households with unused medications, the portion that continued to practice disposal via the sewer, trash, or burial was significant, ranging from 20-70%. Similar study from Kuwait showed that three quarters of respondents reported that they discarded unwanted medicines in the trash [39]. A study in 2005, showed that 63% of the respondents in UK discarded unused medications in the household waste, 11% emptied them into the sink or toilet and 22% returned them to a pharmacy [40]. A recent study from New Zealand showed that between 13 and 24% of medications were returned to a pharmacy [41]. Opposite finding reported in a recent Swedish study that no one of the study participants flushed the drugs down the drain [42]. This might be due to that the pharmacists in Sweden supply special transparent plastic bags with informational text where unused drugs preferably should be placed [42]. Opposite finding reported from Canadian study that 46% of the respondents disposed unwanted medication down the drain [43]. The differences in the above studies may reflect the disparity between regulations and advice in the different regions.

In this study, the majority of the participants 17 (60.7%) mentioned that the best way to educate the public about disposal unused medication was through schools, universities and public campaign. Similar study reported that mass-media campaigns tended to be more effective in educating and empowering populations [44]. Similar study reported that involvement of the Pharmaceutical Associations would be essential and public education through the mass media [39].

The results of this study suggest that there is a role for patient education on the proper disposal of unused and expired medications. Previous education was highly associated with the prior “return” of medications to a pharmacy or a provider for proper disposal. Since frequent visits to the pharmacy were associated with previous returns to a pharmacy and currently being on more medications was associated with previous return to a provider, patient education may be a factor. Any visit to the pharmacy can provide opportunities for patient education.

There are several possible ways that this education could be conducted. For example, providers and pharmacy personnel could discuss medication disposal with patients, and written education could be distributed with medications in a manner similar to what was described above. Or, innovative solutions, such as placing disposal information on medication labels or pill bottles, might prove effective [29]. Future research should focus on how to most effectively educate patients on proper disposal techniques.

**Limitation of the study**

The limitation of this study is natural in qualitative study designs; its purpose was not to generalize the present findings to the general population. Instead, this qualitative method provided an in-depth meaning of the perceptions of patients toward unused medication disposal. Another limitation of this study is that the conclusion and recommendations were based on stakeholder (consumers) without considering other involved parties such as government and pharmaceutical industry. Further quantitative and qualitative studies involving government and pharmaceutical industry are needed.

**Recommendation**

Government should establish pharmaceutical collection programs to reduce the quantity of unused and unwanted medicines entering the environment and reduce the amount of drugs available for diversion, theft, or accidental poisoning. Health care workers and public education regarding unused medication are needed. National guidelines on the appropriate disposal of unwanted household medicines need to be prepared and disseminated to the public.

**Conclusion**

This study showed that the majority of the
participants did not know the bad effect of unused medication. The most method to dispose unused medication among Malaysian patients is a throw unused medications into the trash. The majority of the respondents mentioned that they did not inform about the proper way to dispose the unused medication by their physician or pharmacist.

References

[25] C. G. Daughton, and T.A. Ternes. Pharmaceuticals and


