

Disposal Practices of Unused Medication Among Pharmacists in Libya

Ahmed Atia

Department of Anesthesia and Intensive Care, Faculty of Medical Technology, The University of Tripoli, Libya

Corresponding email: ah.atia@uot.edu.ly

ABSTRACT

Background and objective. Globally, disposing of unused medicines has become a source of concern, as pharmaceutical waste enters the ecosystem, posing a threat to human health and the environment. This study aimed to assess the disposal practice of unused medication among pharmacists in Libya. This study also seeks to determine if pharmacists plan to have their pharmacies serve as assembly points for potential take-back initiatives. **Methods.** A random sample of 150 pharmacists from various government and private pharmacies in Tripoli participated in a self-administered questionnaire about their disposal practices, and knowledge on pharmacies serving as collection points for ideal disposal of unused medicines. Descriptive statistics were used to interpret the data. **Results.** A total of 128 pharmacists completed the survey. The majority of respondents said that throwing discarded drugs in the trash bin was their preferred method of disposal (53.1%), followed by discarding via burn and drug wholesalers (17.2%, 14.8%, respectively). Only 2.1% of the respondents disposed unused medicines according to the WHO guidelines of drug disposal. Moreover, about 65.6% had poor knowledge about Take-Back program. **Conclusion.** Failure to follow the WHO guidelines for drug disposal raises the risk of contamination of our environment and the likelihood of humans and animals ingesting harmful pharmaceutical wastes.

Keywords: Take-back Program, Prescription Disposal, Pharmacist Awareness.

INTRODUCTION

Unused medicines (UMs) are pharmaceutical products that are expired, damaged, or contaminated products and are no longer needed [1]. Inappropriate disposal of UMs causes a variety of health and environmental hazards, including poisoning, air pollution, and contamination of water and food sources. Several drugs have been found in trace quantities in ground water, surface bodies of water, and drinking water, posing a significant threat [2]. Through drinking polluted water, people may be exposed to or absorb traces or contaminants of pharmaceuticals from the atmosphere [3].

According to the World Health Organization (WHO), UMs should always be treated as pharmaceutical waste and should never be used in humans or animals [4]. Many people keep unwanted, unused, or expired drugs in their homes for an unspecified period of time before discarding them in garbage cans, drains, or flushing them down the toilet. It's important to

understand that disposing of unused or expired drugs through these illegal channels puts the environment and the people who live there in danger [5].

Unwanted drugs may be produced in households or through healthcare practices, and there are a variety of factors that contribute to their occurrence. They may be the product of patient noncompliance, manufacturer advertising activities, physician prescribing practices, or dispenser practices. Furthermore, a general increase in individual awareness of health-seeking behavior has resulted in an increase in medication consumption [6]. Previous study investigated and compared the relationship between the disposal of unused medications and environmental awareness in various countries around the world, and found that there were no set policies or guidelines for the disposal of discarded drugs [7]. Unused drugs were also found to be often dumped by being flushed down the toilet or discharged into waterways, posing serious environmental concerns [7].

Because of their proximity and accessibility to health seekers in our communities, good medicine disposal practice is an essential aspect of public health preventive services provided by community pharmacists. Community pharmacies are better equipped than anyone else to collect, sort, and dispose of expired medications in a timely and equitable manner. Since they have been educated in the act of proper drug disposal, they are intended to serve as collection points for expired drugs in the communities where they are based [8]. However, Libya has no policy or take-back program that accept UMs from the public, nor does it have any clear guidelines for obtaining and disposing of returned drugs from the public. This study assesses community pharmacies' disposal practices of expired and unused medicine and their adherence to the WHO standard guideline on the disposal of expired drugs. To the best of our knowledge, no study has been conducted in Libya to address this issue, and public awareness about medication disposal is poor.

METHODS

This was study-involving pharmacists in Tripoli, Libya, which carried out from December 2020 to March 2021. The Research Committee, Faculty of Medical Technology, University of Tripoli, Libya, reviewed and ethically approved this survey-based study (Approval Number. MedTech_ANA2102). Participants were stated that there would be no risks in this research, and that all information collected would be kept private and anonymous. Only the researchers would have access to the information. An informed consent form, explaining the research methodology, attached to each questionnaire was read and signed by the pharmacist, who participated in the survey. Only licensed pharmacists who had certified pharmacy license were included in this study. Other categorize of pharmacy dispensers were excluded.

A structured, self-administered questionnaire was created to assess pharmacist awareness of drug disposal and its effect on health and the environment. A total of 128 pharmacists were participated from the visited pharmacies. The questionnaire was pre-validated with 5 pharmacists using an English version to see if it was clear and how long it took to complete. However, since some pharmacists had trouble interpreting the questions, the questionnaire was also available in Arabic. To prevent repetition, the questionnaire's order was rearranged and certain questions were omitted.

The five pharmacists who participated in the pre-test were excluded from the survey due to significant changes made in the final version of the questionnaire.

The survey was divided into three sections: Section 1 is about demographics. Section 2: Community pharmacies' disposal of various dosage forms and controlled drugs. Section 2: Implementation of a take-back program (FDA Program) (YES or NO). During a visit to the pharmacy's chief pharmacist, the researcher created a sample frame, and a randomized sample was chosen using computerized random tables. The questionnaires and consent forms were then distributed to the respondents. The data were analyzed using descriptive statistics and the chi-square test in SPSS version 22.

RESULTS

About 92 (71.9%) of the 128 pharmacists who responded to the survey questionnaire were from community pharmacies, whereas 36 (28.1%) were from polyclinic pharmacies. The sample consisted of a higher proportion of females (81.2%) than males, and a higher proportion of Libyans (90.6%) than non-Libyans, with ages ranging from 19 to 44 years (median =29 years). The majority of participants (34.4%) had length of experience between 2 to 4 years, and approximately 28.1% of them had less than 1 year of experience (Table 1).

Table 1 Demographic characteristics of the pharmacists

variable	Number(n)	Percent (%)
Gender		
Male	24	18.8%
Female	104	81.2%
Age (year)		
19 – 24	36	28.1%
25 – 34	76	59.4%
Above 35	16	12.5%
length of practice as a pharmacist (year)		
Less than year	36	28.1%
2 – 4 Y	44	34.4%
5 – 7 Y	32	25%
8 – 10 Y	16	12.5%
Nationality		
Libyan	116	90.6%
Non-Libyan	12	9.4%

Table 2 depicts the various disposal practices of different visited pharmacies in Tripoli. Their various routes of disposal were through a rubbish bin, burn, drug wholesaler, landfill, and sink. In general, the majority (53.1%) of the participants discarded unused medicines through rubbish bin,

followed by discarding via burn and drug wholesalers (17.2%, 14.8%, respectively). Few respondents (14.8%) throw their waste through the sink and others (6.3%) discarded by landfill. There was actually no consistency in the respondents' disposal patterns.

Table 2 Disposal pattern of drugs by pharmacists

Drug Disposal Methods	Number 128	Percentage %
Rubbish bin	68	53.1
Burn	22	17.2
Drug wholesaler	19	14.8
Sink	11	8.6
landfill	8	6.3

In Table 3, the majority of participants (69.8%) did not follow the WHO guidelines for disposing of unused drugs. Only 2.1% of the respondents followed the guidelines completely. Meanwhile, some (28.1%) of respondents only partially followed the guidelines. The partial compliance means that those who responded had two methods of disposal, one through WHO and the other through other means.

Table 3 Respondents' adherence to the WHO guideline on the disposal of unused drugs

Compliance status	n(%)
Noncompliance to guideline	99 (69.8%)
Partial compliance	59(28.1%)
Full compliance	34 (2.1%)

Table 4 shows the knowledge of pharmacists on take back program. About 65.6% had poor knowledge about the Take Back program. Approximately 62.5% of respondents agreed that there is no educational barrier in applying the take back program. However, about 31.3% of pharmacists believed that there is a cost barrier in implementing the take back program, and the majority 59.4% did not believe that the take back program was time barrier.

Table 2 Applying a take-back program (FDA Program)

Item	Number (n)	Frequency (%)
Do you have a knowledge regarding take back program?		
Yes	11	34.4%
No	21	65.6%
Is there a take back program education barrier?		
Yes	12	37.5%
No	20	62.5%

Take back program cost barrier?		
Yes	10	31.3%
No	22	68.8%
Take back program time barrier?		
Yes	13	40.6%
No	19	59.4%

DISCUSSION

Currently, drug disposal and waste management are of concern, as it has been exposed that improper disposal can contaminate the nearby areas and pose a threat to air, water, the food chain, and even agricultural products [7]. The role of a pharmacist has evolved from compounding and dispensing drugs to providing care to patients. As a result, there is a pressing need to improve pharmacist awareness of drug usage and disposal. The proper collection and recycling of expired and unused drugs by well-designed systems have consequences for community safety and environmental protection. In some countries, drug take-back programs are well established, with pharmacies and pharmacists playing important roles as collection points and advocates for proper drug disposal [9]. A drug take-back program is desperately needed in Libya, and adequate data from studies on the practice and knowledge of drug disposal among healthcare professionals and the general public are required to support such programs. The FDA and WHO published guidelines for proper drug disposal, and this study assessed pharmacists' understanding of these guidelines [10,11].

In the current findings, pharmacists disposed UMs mostly in trash followed by burning and disposal by drug wholesalers. These practices are similar to the practices followed by the public in Iraqi and Kuwait [12,13]. The disposal pattern of various dosage forms revealed inconsistency in disposal practices across the various drug dosage forms. This was in agreement with earlier report on awareness, attitude, and practice toward medication disposal among healthcare professionals in Ghana found that participants were very confused about how to properly dispose drugs [14].

The presence of nationwide rules for UMs disposal has a significant impact on how people discard them [15]. As a result, in the absence of instructions on how to handle returned drugs from the public, most pharmacists in the current study dispose medication in the dustbin. In general, throwing UMs in the trash or sink are not the best option [16]. Hence, a policy from the Ministry of Health is urgently needed to enable pharmacists to accept returned UMs from the public and to instruct pharmacists on how to properly dispose them in Libya. In addition, only a few pharmacists followed WHO criteria when disposing of UMs. This low level of compliance necessitates further investigation.

Similarly, in developed countries, pharmacists' contributions to UMs discarding seem to be inadequate [17]. In a survey conducted in Iraq, more than two-thirds of participants (65.9%) decided to return UMs to the source, compared to just 14.5% in the current study [12]. According

to a Nigerian survey, 18(23.4%) of people followed the drug disposal guidelines completely, 17(22.1%) partially, and 42.0 (54.5%) did not [18].

The current findings, along with previous literature, strongly encourage the implementation of drug take-back system. However, before an efficient and effective drug take-back program can be implemented in Libya, several barriers must be overcome, including a lack of information on the amounts and types of UMs returned by the patients. The general public, healthcare providers, and government leaders all need to be more informed of the scope of the issues. To introduce an effective drug take-back program, collaboration from different industries, such as law enforcement agencies, will be needed.

CONCLUSION

This study identified low compliance of pharmacists to WHO standard in the disposal of unused medicines. To enhance the positive attitudes of pharmacists toward the environment and their readiness to be the collection point for UMs collection, guidelines and plans to manage the collection of returning UMs from pharmacies, as well as their discarding and destruction in an ecologically friendly way, must be developed. There is a need for improvement in the discarding and management of expired and unused pharmaceuticals in Libya.

Limitation of the study.

This study conducted only in Tripoli city, so we cannot generalize these results to all Libyan pharmacists

List of abbreviations. UMs; Unused Medicines, WHO; World Health Organization, FDA; Food and Drug Administration.

Declaration

Ethics approval and consent to participate. The Research Committee on Faculty of Medical Technology, University of Tripoli, Libya, reviewed and ethically approved this study. An informed consent form, explaining the research methodology, attached to each questionnaire was read and signed by the pharmacist, who participated in the survey.

Consent for publication. I approve the publication of this manuscript.

Availability of data and material. All data available upon request.

Competing interests. There is no competing of interest regarding this study

Funding. Nil

Authors' contributions. I am the only author of this study

Acknowledgements. I acknowledge the pharmacists who participated in this survey study

REFERENCES

1. Kumar mp, S., and R. Rahman. "Knowledge, awareness, and practices regarding biomedical waste management among undergraduate dental students". *Asian Journal of Pharmaceutical and Clinical Research*, Vol. 10, no. 8, Aug. 2017, pp. 341-5, doi:10.22159/ajpcr.2017.v10i8.19101.
2. Marwa KJ, Mcharo G, Mwita S, Katabalo D, Ruganuza D, Kapesa A. Disposal practices of expired and unused medications among households in Mwanza, Tanzania. *PLoS One*. 2021;16:e0246418. Published 2021 Feb 4. doi:10.1371/journal.pone.0246418.
3. Sharma S, Bhattacharya A. Drinking water contamination and treatment techniques. *Appl Water Sci*. 2017;7:1043–1067. <https://doi.org/10.1007/s13201-016-0455-7>
4. WHO, 1999a. Guidelines for safe disposal of unwanted pharmaceuticals in and after emergencies. World Health Organization. Available: <http://apps.who.int/medicinedocs/en/d/Jwhozip51e/> (accessed April 18, 2021).
5. Peake BM, Braund R, Tong A, Tremblay LA. *The Life-cycle of Pharmaceuticals in the Environment*. Elsevier. 2015;1:187–251.
6. Insani WN, Qonita NA, Jannah SS, Nuraliyah NM, Supadmi W, Gatera VA, Alfian SD, Abdulah R. Improper disposal practice of unused and expired pharmaceutical products in Indonesian households. *Heliyon*. 2020;29;6:e04551. doi: 10.1016/j.heliyon.2020.e04551.
7. Paut Kusturica M, Tomas A, Sabo A. Disposal of Unused Drugs: Knowledge and Behavior Among People Around the World. *Rev Environ Contam Toxicol*. 2017;240:71-104. doi: 10.1007/398_2016_3.
8. A, U., G. S. Mv, P. V. S, and G. R. "assessment of knowledge and practice toward disposal of expired drugs among medical professionals in chennai - a cross-sectional prospective study". *Asian Journal of Pharmaceutical and Clinical Research*, Vol. 10, no. 12, Dec. 2017, pp. 324-7, doi:10.22159/ajpcr.2017.v10i12.21529.
9. Tong AY, Peake BM, Braund R. Disposal practices for unused medications around the world. *Environ Int*. 2011;37:292-8. doi: 10.1016/j.envint.2010.10.002. PMID: 20970194.
10. World Health Organization. International Pharmaceutical Association. International Solid Waste Association. UNICEF. *Guidelines for Safe Disposal of Unwanted Pharmaceuticals in and after Emergencies*. World Health Organization; Geneva, Switzerland: 1999.
11. Food Drug and Administration Where and How to Dispose of Unused Medicines. 2017 09/10/2018. Available online: https://www.fda.gov/drugs/safe-disposal-medicines/disposal-unused-medicines-what-you-should-know#Medicines_recommended. [accessed on April 18 2021].
12. Albaroodi KAI. Pharmacists' Knowledge Regarding Drug Disposal in Karbala. *Pharmacy (Basel)*. 2019;7:57. doi:10.3390/pharmacy7020057.
13. Abahussain E, Waheedi M, Koshy S. Practice, awareness and opinion of pharmacists toward disposal of unwanted medications in Kuwait. *Saudi Pharm J*. 2012;20:195-201. doi: 10.1016/j.jsps.2012.04.001.
14. Sasu S, Kümmerer K, Kramer M. Assessment of pharmaceutical waste management at selected hospitals and homes in Ghana. *Waste Manag Res*.2012;30(6):625–30.
15. Tong A, Peake B, Braund R. Disposal practices for unused medications around the world. *Environ. Int*. 2011;7:292–298.

16. Prescott J, Estler, K. Waste not, want not: drug disposal and role of pharmacist. *Pharmacy Times*. Available: <<https://secure.pharmacytimes.com/lessons/201002-01.asp>> (accessed April 20, 2021).
17. Bekker CL, Gardarsdottir H, Egberts ACG, Bouvy ML, van den Bemt BJJ. Pharmacists' activities to reduce medication waste: an international survey. *Pharm (Basel, Switzerland)* 2018;6:94.
18. Michael I, Ogbonna B, Sunday N, Anetoh M, Matthew O. Assessment of disposal practices of expired and unused medications among community pharmacies in Anambra State southeast Nigeria: a mixed study design. *J Pharm Policy Pract.* 2019;12:12.