



Assessment of Knowledge, Attitude and Practice towards Disposal of in-Home Medication among Community in Eastern Province, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. Author MDA conceptualized the study and developed the results and discussion section. Author MDA conceptualized and designed the study. Author AA conducted the literature review and developed the discussion section. Data collection was done by authors ZSAS, FDA and ZAAA. Author MDA analyzed the data. Manuscript is written by authors LSK and SL. Authors MDA and AA revised the manuscript for intellectual and scientific content. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Current study conducted with aims to assess general public knowledge, attitude and practice towards disposal of in-home medication among community in Eastern province, Saudi Arabia.

Methods: A cross-sectional survey-based study was conducted from 1st September 2019 to 31st October 2019 among the community in Eastern province, Saudi Arabia. A validated self-administered questionnaire was distributed to easily approachable 1400 participants through social media in which 916 respondents were completely filled the survey form. Chi square test were used

for the calculation of variance among the group. P-value less than and equal to 0.05 is considered statistically significant.

Results: The response rate of survey was 65.42%. The mean age of the survey respondents was 30.34 ±9.95 years. Among all the respondents 225(24.56%) respondents were male and 691(75.43%) respondents were female from community of Eastern province, Saudi Arabia. The majority of the respondents 709 (77.4%) ($p < 0.05$) purchased the medicines on prescription. The majority of the respondents 763 (84.8%) ($p < 0.05$) answered that improper disposal of unused and expired medicines causes damage of environment and health. The results revealed that the most common Over the counter (OTC) drugs as follows, analgesics with 456 (49.78%) ($p < 0.05$), Vitamins & Minerals 272 (29.69%), Cold and flu Drugs 84 (9.17%), Food Supplements 56 (6.11%) and in the last Digestive drugs with 48 (5.24%).

Conclusion: Gaps persist in practices, hence vigorous, safe and cost-effective pharmaceutical waste management program reinforced campaign is required. Healthcare providers (HCPs) and community pharmacists (CPs) should organize training to educate customers on standard medicine disposal practices.

Keywords: Knowledge Attitude and Practice (KAP); Healthcare Providers (HCPs); Community Pharmacists (CPs); drug disposal; Saudi Arabia.

1. INTRODUCTION

Medical disposal is a worldwide crisis that threatens the health of children, animals and even the soil. Medicine is the complete method of diagnosing and treating and can also be preventing of certain diseases. But if the medication is misused or doesn't properly dispose it, it can cause negative effects. According to WHO, 85% of the wastes aren't hazardous waste, which means it's not a threat to the environment. But the other 15% of improper method of waste disposal danger to the environment because it includes infectious, toxic or radioactive which can cost damage to almost anyone gets reach to it whether it's a human being or an animal .16 billion injections are used worldwide but only little amount is properly disposed according to World Health Organization (WHO) [1]. And the reason of the high number of unmanaged medical waste is that people are uneducated and doesn't know the danger on themselves and the environment [2]. There are certain methods can be used to decrease the amount of wastes and especially the effects can backfire from the unmanaged medical waste [3]. Some of those methods are planning the issues and managing the wastes, recycling the materials for the purpose of using less materials which will cost less eventually and cause less damage on the environment and on the people [4]. Another useful method that can be used is by educating the people about the dangers of hazardous waste and the danger of expired medicines that may be consumed by a child that doesn't know what that is exactly, or it can be dissolve to the earth which may cause damage

to the plants which will return to humans. And some people tend to give their medicine for other people just because they saw similarities between themselves and that person consume medication without doctor's prescription can cause serious damage to that person or it may make his case more dangerous than what he was [1]. Reasons that may cause medical disposal is like we mentioned before people not having enough knowledge of the danger of medical waste, and in some way when a person is healed and no longer in need of using that certain medicine they simply look for the easiest way to get rid of it not realizing that it can damage someone or an animal in a way [2]. And some people can't keep up with their medical records so they tend to ignore or not use their medicine in the proper way which will make the medicine expire throughout time and amount of people get back to the track and not realize that the medicine is actually expired and they start consuming the same medicine again without doctor reference which may damage their body in a way. Some reasons are due to the doctor, like prescribe some medication patient doesn't need or change the medicine to other medicine [5]. There are certain proper ways for medical disposal in the household which means safer ways of getting rid of the medicine without costing a damage to anyone around you. First is simply reading the Drug information leaflet so if the person finds any hazard materials it can be wasted in a proper way. After reading the leaflet and figuring there is no danger it can be sealed in a plastic bag so that it keeps humidity and liquid materials away. Then mixing unwanted wastes with it so it can be seen as trash, then

seal all of them together and throw it in the dust bin. That is the best way of getting rid of the un-hazardous waste but when it comes to the hazardous waste it's always better to consult a doctor or a pharmacist on the proper way of getting rid of that certain medicine [6]. Most of the medicine that people tend to get rid of are the Over the counter OTC medicines, because these medications can be purchased without a medical prescription for example, we have Paracetamol, vitamins and minerals, Antihistamines and eye or nose or ear medicines and of course we don't forget the Analgesics [7]. Doctors, pharmacist and nurses are the first people that should explain to the patient the use of the medicine and they should always keep contact with the patient and his/her use of the medicines and to know what he/she did with the medicines after he/she was done with it. The government should prepare a list of essential drug used by the people and explain every quantity that can be used by the person and how to properly waste it and spread it to the hospitals and every medical centre and pharmacy around the country especially places where people have limited reach to modern technology [8]. Placing the wastes in the toilets or water drain can cause chemical reactions may cause damage to the nature and modern countries uses water purification as a method to provide water to the people but medical and chemical wastes can mix with the water particles which makes it very difficult to separate and those water when they use for the agriculture, the plants cause genetic damage to the community [9].

Throwing pills on the streets can look like a candy for a 5-year-old kid and it may lead to the kid consuming that medicine while thinking its sweet, even older people that can't understand what the medicine is for can consume it without doctor prescription and can cause some serious health problems which may cause absolute death. So, the best way to get rid of the unwanted or unused or expired medicines is by simply getting a reach to the nearest hospital or medical centre and handing it over. Those medicine can be reused if it's still clean and not expired by giving it to people with the same disease or illness or it can be disposed by professional people who can make sure that those medicines will cause no damage to any kid, adult or even the environment [7]. "take-back" programs is another way or method to get rid of unwanted or unused or expired medicine by returning drugs to federal organizations, the Drug Enforcement Administration (DEA) and the

Environmental Protection Agency (EPA), there is two set categories of take-back programs: periodic events in specific dates and permanently collection sites, but this program is not usually available in all the places like here in the kingdom of Saudi Arabia, which leave people with few options for disposal of drugs [6,10].

So, it's always good to use medicine as described from a doctor or a pharmacist, and never give their personal medicines to anyone else without medical prescription and they should always seek healthiest and safest methods on disposing medicines. We therefore conducted this study with aims to Assessment of knowledge, attitude and practice towards disposal of in-home medication among community in Eastern province, Saudi Arabia.

2. MATERIALS AND METHODS

2.1 Study Plan

This research was a descriptive cross-sectional study to assess the Public Knowledge, attitude and practice (KAP) of in-home medication disposal in Eastern province, Saudi Arabia, and used a self-administered questionnaire to gather data over a period of 2 months from 1stSeptember 2019 to 31stOctober 2019.

2.2 Study Instrument

A self-administered, validated 24-items questionnaire was used to record respondent's Knowledge, attitude, and practice (KAP) of in-home medication disposal in Eastern province, province, Saudi Arabia. First part consists of seven items, mainly information related to the demographics data. The second part questionnaire consists six questions to measure general public knowledge toward in-home medication disposal. The third part of the questionnaire consist comprises seven questions designed to measure general public practice toward in-home medication disposal in Eastern province, Saudi Arabia.

2.3 Study Sample Size and Data Collection

The sample size was calculated by Raosoft® online sample calculator with the margin of error 5%, and confidence level of (CI) 95% and so, the recommended sample size was calculated to be 385. Questionnaire survey link were distributed among a total of convenient sample of 1400

general public of Eastern province, Saudi Arabia through social media and e-mail, of which 916 completely answered the questionnaire.

2.4 Data Analysis

Data analysis was performed using the Statistical Package for Social Science Version 23 (SPSS V.23) (Institute Inc: Cary, NC, USA). Demographic characteristics were applied to calculate the numbers (frequencies) and percentages; mean \pm standard deviation). Associated factors within group were calculated using the chi-square (χ^2) test. A p-value \leq 0.05 was considered statistically significant.

3. RESULTS

The total response rate of survey was 65.42%. The mean age of the survey respondents were 30.34 \pm 9.95 years. Among all the respondents 225 (24.56%) were male and 691 (75.43%) were female. Of all the respondents answered questionnaire, 19 (2.07%) were illiterate, 20 (2.08%) were primary, 244 (26.63%) were High School, 56 (6.11%) were Intermediate and 577 (62.99%) were University. Out of 916, 159 (17.35%) respondents are working in healthcare, 326 (35.58%) respondents are working in non-health care related, 230 (25.10%) respondents are unemployed and 201 (21.94%) respondents were students. Among all the study participants 454 (49.56%) have health insurance while 462 (50.43%) are without health insurance. Detailed information about the demographics are shown in Table 1.

3.1 Knowledge of Safe Disposal of Medications among Households in Dammam, Saudi Arabia

As shown in Table 2, the majority of the respondents 709 (77.4%) ($p < 0.05$) purchased the medicines on prescription, 123 (13.4%) purchased over the counter, 44 (4.8%) received for friend/colleague and 43 (4.7%) purchase based upon the advice of a relative or friend. The majority of the respondents 763 (84.8%) ($p < 0.05$) answered that they knew the improper disposal of unused and expired medicines causes damage of environment and health. But surprisingly, 544 (59.4%) ($p < 0.05$) of the respondents mentioned that they have unwanted or unused medication at home. And most of them 600 (65.5%) ($p < 0.05$) answered that they did not

receive information regarding the correct disposal of medication. About the question that Patient is responsible for disposal of unused medicines, 714 (77.94%) ($p < 0.05$) of the respondents' answer was yes, 152 (16.59%) ($p < 0.05$) answer no, 50 (5.45%) answer they don't know.

3.2 Drug Disposal Practice of Unused and Expired Pharmaceuticals among Households in Dammam, Saudi Arabia

As shown at Table 3, 246 (26.85%) ($p < 0.05$) of the respondents have expired medication at home, 413 (45.85%) did not have and 257 (28.05%) responded they don't know if they have expired medication or not. Most of the respondents did not change their habit regarding unused or unwanted drug handling in the last 2 years with 603 (65.82%) ($p < 0.05$). Over the counter (OTC) drug people buy most often from the pharmacy, analgesics with 456 (49.78%) ($p < 0.05$), Vitamins & Minerals 272 (29.69%), Cold and flu Drugs 84 (9.17%), Food Supplements 56 (6.11%) and in the last Digestive drugs with 48 (5.24%).

As shown in Fig.-1. The most used disposal method of unwanted medications reported was throwing away with household garbage, sink, toilet, etc. with 610 (67%), followed by returning to health facility with 191 (21%) and the least method is to Bring to company's drug-box with 115 (12%).

Fig. 2 show common reasons selected by the participants for having unused or expired medicines in their homes. The most common reasons for having unused medication that their symptoms improved and they felt better with 681 (74.3%) followed with doctor changed the medication and asked to stop earlier medication with 341 (37.2%), did not feel it was helping the condition with 253 (27.6%), experienced side effect with 235 (25.7%), changed to herbal remedies with 127 (13.9%).

As shown in Fig. 3. Type of pharmaceuticals remained unused at home among respondents. Oral antibiotic with 693 (75.7%), analgesics 368 (40.2%), topical antibiotics 327 (35.7%), vitamins 276 (30.1%), anti-hypertensive 154 (16.8%), anti-diabetic 146 (15.9%).

Table 1. Socio-demographic characteristics of study participants (n=916)

Parameter	Frequency (n=916)	Percentage (%)
Age in Years [Mean \pm SD =30.34 \pm 9.95]		
<30 years	415	45.30
\geq 30 years	501	54.69
Gender		
Male	225	24.56
Female	691	75.43
Marital Status		
Single	283	30.89
Married	633	69.10
Household members		
<4 people	248	27.07
\geq 4 people	668	72.92
Educational level		
Illiterate	19	2.07
Primary	20	2.18
High School	244	26.63
Intermediate	56	6.11
University	577	62.99
Occupation		
Unemployed	230	25.10
Student	201	21.94
Non-Healthcare related	326	35.58
Healthcare related	159	17.35
Do you have health insurance?		
Yes	454	49.56
No	462	50.43

Table 2. Knowledge of safe disposal of medications among households in Dammam, Saudi Arabia

Parameter	Frequency (n=916)	Percentage (%)	P-Value
Ways of Procuring Medicines			
Purchased on prescription			
Purchase based upon the advice of a relative or friend	706	77.07	<0.05
Purchased over the counter	43	4.69	
Received from friend/ colleague	123	13.42	
44	4.80		
Do you have unused or unwanted drugs at home?			
Yes	544	59.38	<0.05
No	274	29.91	
Don't Know	98	10.69	
Did you check expiry date of your medication?			
703	76.74		
Yes	150	16.37	<0.05
No	63	6.87	
Don't Know			
Did you receive information concerning the correct disposal of medication?			
Yes	216	23.58	<0.05
No	600	65.50	
Don't Know	100	10.91	
Improper disposal of unused and			

Parameter	Frequency (n=916)	Percentage (%)	P-Value
expired medicines causes damage of environment and health?			
Yes	763	83.29	
No	137	4.95	
Don't Know	16	1.74	<0.05
Patient is responsible for disposal of unused medicines?			
Yes	714	77.94	
No	152	16.59	
Don't Know	50	5.45	<0.05

Table 3. Drug Disposal practice of unused and expired pharmaceuticals among households in Dammam, Saudi Arabia

Parameter	Frequency (n=916)	Percentage (%)	P-Value
Do you have expired drugs at home?			
Yes	246	26.85	
No	413	45.08	
Don't Know	257	28.05	<0.05
Have you changed your unused or unwanted drug handling habits in last 2 years?			
Yes	313	34.17	
No	603	65.82	<0.05
Have you changed your habit regarding drug storage per label in last 2 years?			
Yes	375	40.93	
No	361	34.41	
Don't Know	180	19.65	<0.05
Ways of Procuring Medicines			
Purchased on prescription	706	77.07	
Purchased over the counter	123	13.42	
Purchase based upon the advice of a relative or friend	43	4.69	
Received from friend/ colleague	44	4.80	<0.05
Which OTC do you buy most often in the pharmacy?			
Analgesics	456	49.78	
Cold and flu Drugs	84	9.17	
Digestive drugs	48	5.24	
Food Supplements	56	6.11	
Vitamins & Minerals	272	29.69	<0.05
How did you change your way of unused or unwanted drug handling?			
Gave up bringing to company's drug-box	15	1.63	
Gave up returning to a health facility	13	1.41	
Gave up throwing into garbage, sink, or toilet, etc.	71	7.75	
I did not change my way in handling the drug	511	55.78	
Started to bring to company's drug-box	77	8.40	
Started to return to a health facility	132	14.41	
Started to throw into garbage, sink, or toilet, etc.	97	10.58	<0.05

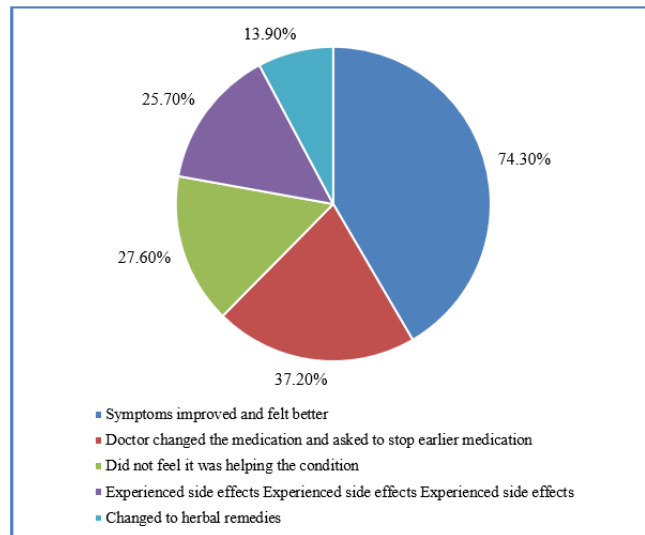


Fig. 1. Drug Disposal method among Eastern province, Dammam community

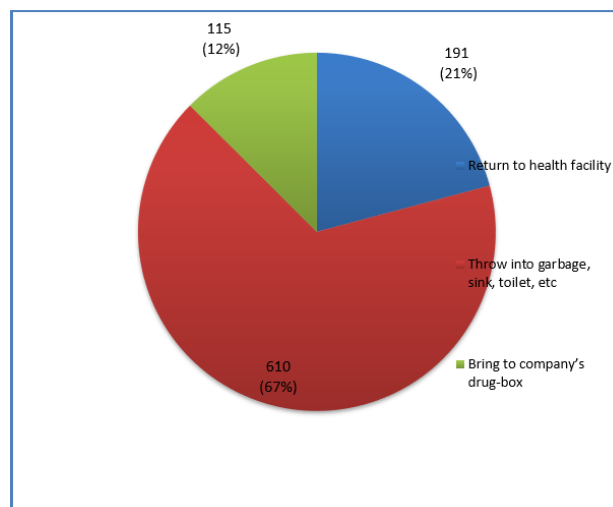


Fig. 2. Respondents reason for purchased medicine remaining unused at home

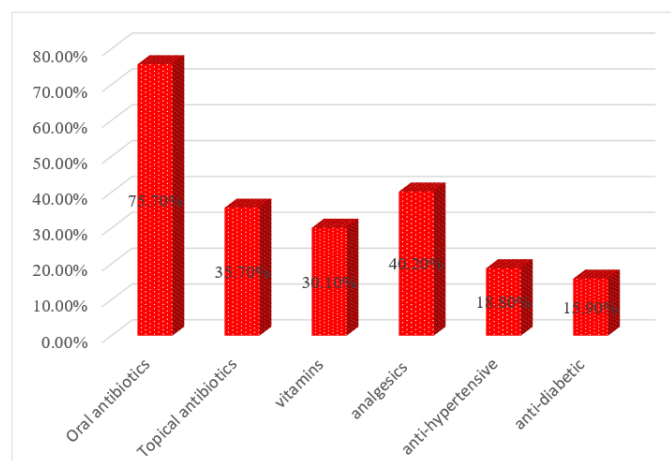


Fig. 3. Type of pharmaceuticals remained unused at home among respondents

4. DISCUSSION

Our study purposes to measure the prevalence of wrong disposal of medication practice among the community in Eastern province, Saudi Arabia, reasons for wrong disposal medication, type of medication that are most disposal and people's knowledge, attitude and practice about in-home medication disposal. In KSA there is no certain system or program that collect unused or expired medicines or show to the people what to do with these drugs like some other countries, and based on that we ran our study in the Eastern Province, Saudi Arabia. Several studies conducted and reported that population in Saudi Arabia practice in home medication disposal with wrong way, some studies chosen a specific population different city in Saudi Arabia, and different countries, with other aim for their study [13].

Our study showed that (67%) of the participants throw away unused and unwanted medications with household garbage, sink, toilet, etc., and (21%) returned to health facility. Similar results found in other studies, like this study conducted on outpatient pharmacy at King Abdul-Aziz medical city in Jeddah their study showed that (73%) of the respondents throw the medications in the household garbage, and only (14%) of respondents return the drug to the pharmacy [13]. Other study conducted in King Khalid University Hospital, and King Saud University in Riyadh (79%) of the respondents disposed their medication in the garbage, (1.7%) return it to pharmacy [12]. Other study conducted in Turkey (33.9%) of the respondents dispose drug to garbage, sink, toilet, etc., (34%) Return the medication to health facility [11]. A study conducted in the USA showed that (54%) of respondents disposed of unwanted medications via household waste, and (1.4%) returned them to a pharmacy [14]. Other study in UK and found out that (60%) of the participants throw the expired or unused medicines in the garbage and only (22%) returned it to the pharmacy [15]. therefore, the disposal method in our study is similar to the previous studies.

In our study (59.38%) respondents they have unused or unwanted drug in their house. (75.7%) are oral antibiotic remains unused in their house and topical antibiotics (35.7%), in Pakistan (54%) of the participants responded to have unused or expired medicines in their homes. Around (61.6%) are antibiotic [16]. Also, In Riyadh they found that (51.9%) of respondents stored

unwanted antibiotics in their home [12]. This may indicate likely antibiotic abuse.

Other drugs remain unused in our study are analgesics with (40.2%), vitamins with (30.1%), anti-hypertensive with (16.8%), anti-diabetic with (15.9%). Compared with Pakistan (57.82%) of the respondents had analgesics, (47.39%) had antihypertensive.

In our study (65.5%) of respondents answer that they did not receive information regarding the correct way for disposal medication. In Jeddah more than (80%) of the respondents said they never received any instruction or information from healthcare workers regard safe and proper disposal of medications [13]. In Riyadh (90.1%) responds they did not receive any information about disposal of medicines [12]. In Pakistan most respondents did not ever receive information about medicine disposal [16]. Therefore, healthcare workers especially the pharmacist should be involved in educational programs and give the patient the right information about the correct and safe disposal method of medicines when they come to see them.

Most of the participants agree that inappropriate disposal of medicines may harm children, animals, the environment include the planet and the water. Public health education is the key to this existing problem. In addition, providing information in a special paper for each drug on the proper disposal of this medicine can play an important role in solving this problem.

About Limitation. There were some limitations our study. First, since the survey was conducted online and used self-administered questionnaire by the respondents it may subject to some bias. Second, the period of the survey was short, and the number of the participants was not much enough. Additionally, respondents recall some of the information from their memory and this depends on their memory capacity. However, this provides a chance for future studies to study disposal practices in eastern province. And more expansively, countrywide.

5. CONCLUSION

Our study showed that many Saudi population stored some unused or expired medicines in their houses and most of them dispose the leftover of medicines unsafely via throw it into garbage, sink or toilet. This can harm the environment and a

low percentage of respondents have ever received information about correct and proper medication disposal. Results of our study also reflect that the knowledge of safe and proper drug disposal among the Saudi population is very low making it a significance of concerned authorities to implement educational and take-back programs. Therefore, healthcare providers mainly pharmacists are literally better prepared and play a greater role in education of the public and create adequate awareness for proper storage and safe disposal of unwanted or unused and expired medicine.

6. LIMITATIONS

One of the inadequacies of this study may have been selection bias, since only those with access to smartphones and computer devices could participate in this study. This could also be a threat to the external validity of this study. However the selection of study participants from the one province only, to make more strength of the results study can conducted throughout country for better results and to assess the overall knowledge and practice towards disposal of self-medicine.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

Study protocol has been approved from Scientific Research Unit of Mohammed Al-Mana College for Medical Sciences with reference number: SR/RP/11. Moreover, online consent was also requested from the study participants who wished to participate in the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. World Health Organization. Health-care waste; 2018.

Available: <https://www.who.int/news-room/fact-sheets/detail/health-care-waste> [Last Access on 10th December 2019].

2. Haughey CW, Lawson D, Roberts K, Santos M, Spinosa S. Safe Medication Disposal. 2019;37(2):106-110.
3. Us Bio-Clean. 9 Ways to Reduce Your Medical Waste. Available: <https://usbioclean.com/ways-reduce-medical-waste/> [Last Access on 10th December 2019].
4. Global Recycling. Australia: PVC Recycling in Hospitals; 2017. Available: <https://global-recycling.info/archives/1438> [Last Access on 10th December 2019].
5. Lucca JM, Alshayban D, Alsulaiman D. Storage and disposal practice of unused medication among the Saudi families: An endorsement for best practice. *Imam J Appl Sci.* 2019;4:1-6.
6. U.S Food and Drug Administration. Disposal of Unused Medicines: What You Should Know; 2019. Available: <https://www.sfda.gov.sa/ar/drug/news/pages/h21-4-2018a1.aspx> [Last Access on 10th December 2019].
7. Millar, Abi. "Defining OTC Drugs". *Pharma Technology Focus* (67); 2018. Available: <https://www.pharmaceutical-technology.com/features/pharmaceutical-technology-focus-issue-67/>. [Last Access on 10th December 2019].
8. Aeshah Al Azmi, Hani AlHamdan, Rayf Abualezz, Faiz Bahadig, Noha Abonofal, Mohamed Osman. Patients' Knowledge and Attitude toward the Disposal of Medications. *J Pharm (Cairo).* 2017; 2017: 8516741.
9. Vorvick LJ. How and when to get rid of unused medicines: MedlinePlus Medical Encyclopedia. MedlinePlus. U.S. National Library of Medicine; 2018. Available: <https://medlineplus.gov/ency/patientinstructions/000943.htm> [Last Access on 10th December 2019].
10. Stephen Barlas. Pharmacy Take-Back Programs. *P T.* 2009;34(8): 404.
11. Akici A, Aydin V, Kiroglu A. Assessment of the association between drug disposal practices and drug use and storage behaviors. *Saudi Pharm J.* 2018;26(1):7-13.
12. Al-Shareef F, El-Asrar SA, Al-Bakr L, Al-Amro M, Alqahtani F, Aleanizy F, et al.

- Investigating the disposal of expired and unused medication in Riyadh, Saudi Arabia: a cross-sectional study. *Int J Clin Pharm.* 2016;38(4):822-8.
13. Aeshah Al Azmi, Hani Al Hamdan, Rayf Abualezz, Faiz Bahadig, Noha Abonofal, and Mohamed Osman. Patients' Knowledge and Attitude toward the Disposal of Medications. *J Pharm (Cairo).* 2017; 2017: 8516741.
 14. Tong AY, Peake BM, Braund R. Disposal practices for unused medications around the world. *Environ Int.* 2011;37(1):292-8.
 15. Law AV, Sakharkar P, Zargarzadeh A, Tai BW, Hess K, Hata M, Mireles R, Ha C, Park TJ. Taking stock of medication wastage: Unused medications in US households. *Res Social Adm Pharm.* 2015;11(4): 571-8.
 16. Husain T, Farooqi S, Khan M, Humayoon R, Jabeen S. Medication Disposal; Household Practices in Karachi, Pakistan. Need for a Medication Take-Back Program. *Professional Medical Journal.* 2017; 24(9):1380–6.

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