

DISPOSAL OF UNUSED MEDICINES RESULTING FROM HOME TREATMENT IN ROMANIA

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Abstract. Unused pharmaceutical compounds and their degradation products that are inappropriate disposed of are a source of pollution of the environment with negative impact on human health, as well as on solid and aquatic environment. The present study is an assessment of compliance with the law standards concerning the final disposal of pharmaceutical wastes resulting from home treatment among the population from western part of Romania, namely Bihor County. A total of 739 people were interviewed by using a questionnaire in order to evaluate their health status, the way of using and storing medicines and the disposal methods of the expired, unwanted or unused medication. The results revealed the level of public awareness regarding the legal disposal methods and destruction of the pharmaceutical wastes and the urgent need of public information campaigns (including educational campaigns for implementation of cost-effective and optimum unused pharmaceutical disposal strategies) that are nowadays totally insufficient and could be performed, for example, by the specific staff from the pharmacies and as well by the presence of informative advertisements in pharmacies. Proper management of pharmaceutical wastes will mitigate the potential of the disposal problems and will have a positive impact on the environmental and human health.

Keywords: expired drugs, medicines disposal, pharmaceutical waste, education.

AIMS AND BACKGROUND

Pharmaceuticals acquired by people, by using a prescription or not, are potentially not totally used due to several reasons: the improved patient condition, adverse effects, and changes in dosage of the medicines, death, leading to expired, unwanted or unused medication¹. Expired medicines belong to the 'chemical and pharmaceutical wastes' category² and these must be properly managed so that the risks to human health and the environmental impact are minimised^{3,4}. The pharmaceutical waste resulting from home treatment is usually improperly disposed of around the world, which are more likely thrown away in the garbage bin, rinse down in the sink or in the toilet^{1,5–10} and then can enter into the aquatic environment¹¹.

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In two European countries, namely Malta and Republic of Ireland, were conducted surveys in 2012 to monitor the disposal of pharmaceutical wastes and excess medication and less than 10% of respondents returned them to pharmacies¹².

The current legislation in Romania provided by the Law No 211/2011 on the waste regime¹³ and the Order of the Minister of Health no. 1226/2012 established the technical rules on the management of wastes from medical activities and designated by the National Public Health Institute (a public institution with legal status, subordinated to the Ministry of Health) as the authority responsible for managing the national database regarding wastes from medical activities and approving on-site collection by separation on established categories of wastes from medical activities.

These regulations concerned only the specialised units ('pharmacies, drug stores, approved establishments for sale or distribution of medicines and pharmaceutical products; production units, warehousing and storage of medicines and biological products, pharmaceutical research institutes, preclinical units of universities and colleges of pharmacy, the National Agency for Medicines and Medical Devices') which are the main producers of pharmaceutical wastes.

Expired, unwanted or unused medicines resulting from home treatment represent a modest component of pharmaceutical wastes. Their elimination is regulated by the Order No 119/2014, which established the following: 'Expired medicines derived from the population will be submitted to the nearest pharmacy or pharmaceutical point in order to be disposed of and further destroyed by incineration'¹⁴. When they are managed improperly, unused or expired medicines reach the environment through water, soil and air, becoming a source of pollution to the environment and therefore a risk factor for the public health^{15,16}. Thus, monitoring the way of management of them is particularly important¹⁰. This study is an assessment of compliance with the law standards concerning the final disposal of expired, unused, unwanted drugs resulting from treatment at home in Romania. The main objective consists in assessing the management of these types of wastes, but also focuses on the health of the population and on the education in this field, providing an overview of pharmaceutical waste management in Romania.

EXPERIMENTAL

The objective of this study was to ascertain information regarding the use, method of acquired and disposal of unused, expired or unwanted medicines in western part of Romania.

This study was conducted over a period of 12 months and was based on a completion of a questionnaire that assessed personal data, socio-economic indicators, health status, the use of medicines and final disposal of the pharmaceutical wastes resulted from home care. The questionnaires were distributed to 850 people, over 18

years of age, in five pharmacies (three urban and two rural pharmacies), located in Bihor county, during 2014/2015. 79 questionnaires were eliminated due to refusal/ omitting of the patients to answer to all questions and these were excluded from the analysis. 771 questionnaires were completed and remained to be analysed in this study. The personnel from these pharmacies informed their clients that they may return the unused, expired or unwanted medicines in pharmacies, where they will be collected and sent for incineration. All personal data were confidential. An outline of the questionnaire and the probably answers are presented in Table 1.

Table 1. Content of the questionnaire: questions and possible answers given to participants

Question	Possible answers
How often do you use medicines?	1. Daily; 2. Several times/week; 3. Once/ week; 4. Once/month
For what type of disease do you use to take medicines?	1. Chronic; 2. Acute; 3. Seasonal
How do you buy the medicines?	1. As indicated by a specialist (doctor/pharmacist); 2. Self-medication
What do you do with the medication if the treatment has changed, the medicine expired or you do not want to use it anymore?	1. Throw it away in the garbage bin; 2. I give it to acquaintances/relatives; 3. I return it to the pharmacy
What do you do with used sanitary waste (needles, syringes, swabs, vials, etc.)?	1. Throw it away in garbage bin; 2. Throw it anywhere
Do you consider that unused, expired or unwanted medicines and medical waste should be disposed of in special containers?	1. Yes; 2. No
Gender	1. Male; 2. Female
Area of origin	1. Urban; 2. Rural
Age (in completed years)	Numerical answer given
Educational level	1. Primary education; 2. Secondary education; 3. Higher education

For statistical processing of the data SPSS 19 program was used.

RESULTS AND DISCUSSION

In this study were analysed 771 questionnaires received from 47.2% male and 52.8% female given in five pharmacies in Bihor County. Informed consent was obtained from all individual participants included in the study. Most of the re-

spondents were in the age group 35–60 years (58.2%), 24.8% were over 60 years and 17.00% were in the age group 18–35 years.

We emphasised that the group of participants interviewed is representative for the population of Bihor County, in terms of demographic data. The participants lived in cities (61.3%) and in rural areas (38.7%). Educational levels are medium, 44.2% respondents have secondary school attended, 38.7% have elementary school followed, and 17.1% respondents have higher education. The frequency of use of pharmaceutical products is shown in Table 2.

Table 2. Frequency of use of the medicinal products

Frequency	No	%
Daily	371	48.1
Several times/week	112	14.5
Once/week	11	1.4
Once/month	6	0.8
Several times/year	43	5.6
Once/year	52	6.7
I do not use drugs	176	22.8

We noted that 48.1% of respondents are using medicines daily and nearly 22.8% do not use any medicine.

During the interview period, from 595 respondents who reported to take medicines, 77.5% had medication for chronic diseases, 5.4% referred to medicines taken for acute diseases, and 17.1% of participants are taken medicines for seasonal diseases (Table 3).

Table 3. Distribution of cases according to the diseases for which medicines are used by participants, in this study

Disease	No	%
Chronic	461	77.5
Acute	32	5.4
Seasonal	102	17.1

Self-medication was reported to be employed by 19.0% of respondents (Table 4), most of them reported to use medication for acute or seasonal diseases. When they were asked ‘how the expired, unused, or unwanted medicines are disposed’ of 95.3% of respondents thrown the medicines in the garbage, 4.0% gave the medicines to other people and only 0.7% returned to the pharmacy, as is shown in Table 5.

Table 4. Share of self-medication

How do you buy the medicines?	No	%
Self-medication	157	20.4
Prescription on medication	614	79.6

Table 5. Methods used to dispose the medicines

Expired, unused or unwanted medicines	No	%
Throw away in the garbage bin	567	95.3
Throw away to other places	24	4.0
Return to a pharmacy	4	0.7

The information which may educate the public and the legal regulations should be welcomed as civic behaviour and as well have to be implemented to avoid many accidents that occur due to actually disposal of pharmaceutical waste anywhere.

Regarding the need for special containers for disposing of unused/expired pharmaceuticals or waste facilities in public places, such as pharmacies, and malls, more than 80% of respondents agreed with this (Table 6).

Table 6. Need for special containers for disposing of unused/expired pharmaceuticals

Pharmaceutical products need special containers	No	%
Yes	623	80.8
No	148	19.2

In the last months, in Bihor and Arad counties were interviewed the pharmacists in ten, respectively in five different pharmacies, about their program of 'taking back' the expired/unused medicines from patients. All of them confirmed the availability and the active implementation of it, as it is an unequivocal obligation of the pharmacies in Romania to accept medicinal wastes for disposal. Just in one pharmacy in Oradea, Bihor County, was exposed a written information and also the pharmacists presented to patients the possibility that the pharmacists can take back medicinal wastes to be appropriate disposed of.

The pharmaceutical wastes management is an important feature regarding the human health and has a direct impact on environmental protection^{6,15,17,18} especially following the increasing use of medicines by people around the world in the last decades. The methods used by respondents for the disposal of pharmaceutical wastes were evaluated by employing different survey instruments around the world (telephone questioning, written or mailed questionnaires, online surveys, interviews with patients)^{5,9}. Usually, the most common method to dispose of the unused medicines is into the garbage, as it was reported in United Kingdom¹⁹, Kuwait²⁰, Ghana²¹, New Zealand⁵, Serbia⁸, Brasil²², Mexico²³, toilet or sink in United States of America²⁴ and stored at homes²⁵ and/or returned to pharmacies in Sweden²⁶. In the last years aroused the high concern about the proposals and

implementation of strategies for a proper management of pharmaceutical wastes in Europe and in several publications have been reported about these methods and about the public impact regarding this issue²⁷. For example, in Croatia the pharmacists are obliged to collect unused pharmaceuticals from patients and to pay for their disposal²⁸. A conclusion of the study was that the amount of collected of unused pharmaceuticals in Zagreb was below the European average annually. Therefore the authors suggested that more advertisement about the methodology of collection has to be performed to increase the public awareness in order to proper dispose of medicinal wastes and perhaps to eliminate the financial obligations of the pharmacies to pay for the disposal service²⁸.

The present study was performed to evaluate the Romanian citizens about their health status, the use of medicines and the methodologies of disposal of unused, unwanted or expired pharmaceuticals. Majority of respondents, more than 95%, thrown the medicines in the garbage, as is shown in Table 3. Majority of the respondents, regardless of gender, age or education, during the interview, were not aware about a different management of this type of waste, compared to other household wastes that is well established and used both in urban and in rural areas. Therefore, most of the respondents have thrown the medicinal wastes into the garbage bin. This result has a consequence on environmental safety risk to human health as in the last years the yearly sales of medicines increased around the world²⁹. The information which may educate the public and the legal regulations should be welcomed as civic behaviour³⁰ and as well have to be implemented to avoid many accidents that occur due to actually disposal of pharmaceutical waste anywhere.

Following the analysis of data obtained, there is a modest interest of the population and also a low level of information about how the pharmaceutical wastes should be disposed of/used later. Therefore, it is mandatory to perform more information campaigns to educate the population about a secure storage and as well about safe and proper medication waste disposal, mainly in order to reduce the risk of accidental medication exposure and toxicity especially for children and pets. One alternative to attain the excess³¹ of medication at patient homes is to reduce the prescription of quantity of medicines prescribed especially for as-needed orders^{32,33}.

A recent study conducted after a public education campaign in Bihor County, showed a significant increase to 87.3% in 6 months of the number of patients who have returned the expired and/or unused drugs to pharmacies³⁴. This showed that the pharmacists have a wide audience and they can actively be involved in the education of patients regarding the use and disposal of expired/unwanted medicines.

Our opinion is that a permanent program of public awareness has to be implemented for the safe and secure disposal of the pharmaceutical wastes, and one simple and cheap example is to present in each pharmacy a written advertisement about the possibility to return the medicinal waste in the pharmacies.

Therefore, the implementation of special purpose containers for the assembly of the pharmaceutical residues, their location in pharmacy buildings is useful and necessary, especially given by the high increase in the consumption of medication in recent years, in Romania.

CONCLUSIONS

It is necessarily required a proper management program of disposal of pharmaceutical wastes from home treatment in Romania. This can be achieved primarily through proper information of population for a suitable safe and secure disposal of medicinal wastes and by increasing the interest of public on the protection of the environment. It was noticed that if the optimum information about the proper method of disposal of unused/unwanted medicines is performed, especially by pharmacists who are in near contact with the patients, the population is open to accept and to use this disposal practices of pharmaceutical wastes. Also, in order to facilitate the recovery of the sanitary wastes it would be very useful to implement their collection in proper containers in pharmacies and in shopping malls, considering that in all of these commercial centres exists a pharmacy, and the number of clients is continuously growing.

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