

DISPOSAL PRACTICES OF UNUSED MEDICATIONS BY IN-PATIENTS IN LAGOS UNIVERSITY TEACHING HOSPITAL

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Abstract

Background: Large quantities of prescribed medications remain unused. Several studies have investigated the generation of unused drugs in households. One such study had 58.0% of participants with unused medications in their possession. However, there is a paucity of data on knowledge of and adherence to guidelines on 'unused medications disposal' by in-patients.

Objectives: This study was conducted to assess medication disposal knowledge and practice among hospitalised patients in Lagos University Teaching Hospital.

Methods: A descriptive cross-sectional study was conducted among 278 in-patients in Lagos University Teaching Hospital between April and May 2017. Convenience sampling was used to recruit the participants, and data was collected through a face-to-face interview using a structured questionnaire. The data were analysed with SPSS, version 21.0. The variable of interest was described in the form of statements and tables.

Results: Close to half of the patients (45.3%) had unused medications. The most common reasons were excess supply (36.6%), improved medical condition (33%) and change in medication prescription (23.2%). Of the 247 respondents, 107 (43.3%) disposed of their unused medications in the garbage, and only 54.1% identified incineration as the most appropriate method. Environmental pollution (90.3%) was the most common consequence reported by the respondents.

Conclusion: Knowledge and practice of unused medications disposal by in-patients in LUTH was inadequate. Most disposal practices indicated by the participants were against recommended guidelines on safe and appropriate pharmaceutical waste disposal. Awareness about appropriate guidelines for disposing of unused medicines should be created among the public.

Keywords: disposal, knowledge, practice, unused medications, guidelines, hospitalised-patients

Introduction

Unused medications include expired, spilt, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and must be disposed of appropriately ⁽¹⁾. Healthcare facilities have contributed immensely to the generation of unused medications in the environment ⁽²⁾. Other reasons could be adverse drug reactions, unclear instructions on medicine labels, non-adherence and self-medication ^(3;4).

A recent study in Jordan reported that around 58.0% of the study participants had unused, leftover, or expired medications in their homes ⁽⁵⁾. The World Health Organization (WHO) recommends that unwanted medications should never be used and should always be considered pharmaceutical waste ⁽⁶⁾. However, these unused medications are often wrongly disposed of, as many studies have confirmed the presence of trace amounts of medicines in groundwater, surface bodies of water, and drinking water ⁽⁷⁾. For example, in Indonesia, 82.1% of the respondents in a survey discarded their unused medications in household garbage ⁽⁸⁾. In a similar study in Kabul, 77.7% of the respondents discarded expired medicines in household trash ⁽⁹⁾. The US revealed that approximately 11% of unused Medication was disposed of via drug take-back programs, whereas the majority was kept in a cabinet (55%), thrown in the trash (14%), or flushed down the toilet (9%) ⁽¹⁰⁾. Flushing unused medications in the sink or toilet was the second most common among participants in a survey carried out in Kuwait, where 11.2% of the population cited it as a drug disposal method ⁽¹¹⁾.

The consequences of the improper disposal of unused medications have created several public health concerns in society⁽¹²⁾. Several cases of death and accidental poisoning have been associated with wrong disposal methods, and many drugs, such as acetaminophen, verapamil, and estradiol, are found in waterways^(13;14). The existence of pharmaceuticals and their metabolites in water has been recognised as potentially dangerous⁽¹²⁾. For example, the trace levels of ethynyl estradiol, the active component of common oral contraceptives, impair the sexual development of fish⁽¹⁵⁾. In addition, evidence shows that antibiotics in water may lead to antibiotic resistance⁽¹⁶⁾. Careful attention should be paid towards the disposal of these potentially dangerous chemicals⁽⁷⁾. The disposal method determines the concentration of the pharmaceuticals discharged into the environment. Therefore, patients need clear guidance on how to dispose of these medications. Consumer education materials are available with recommendations for disposing of unwanted medications^(14;17).

The recommended method of disposal of most pharmaceuticals is incineration⁽¹⁸⁾. Most Konongo-Odumasi in Ghana were reported to have disposed of their unwanted medications by deep burial⁽¹⁹⁾. Wherever practical, the possibility of returning unusable drugs for safe disposal by the manufacturer should be explored, particularly drugs that present disposal problems, such as antineoplastics⁽¹⁸⁾. Safely packaged but outdated drugs and drugs no longer needed should be returned to the supplier. This is currently the preferred option for countries that lack incineration facilities.⁽²⁰⁾ Unused prescription medications taken back to the pharmacy cannot be re-dispensed because the integrity of returned medications cannot be guaranteed⁽⁶⁾. Most studies on medication disposal reported that less than a quarter of respondents returned unused medications to the pharmacies for proper disposal.^(21;25)

A Nigerian study estimated the average waste generated as 49.8 kg/day and 0.58kg/bed/day comprising 16% hazardous and 84% non-hazardous⁽²⁶⁾. However, there is still a paucity of data on evaluating unused drugs by in-patients in hospital wards, making this study relevant. Therefore, this study aims to assess patients' medication disposal knowledge and practice on admission in Lagos University Teaching Hospital.

Methods

Study Setting

The study was conducted at Lagos University Teaching Hospital (LUTH) in South-western Nigeria. LUTH has a 761-bed facility and records over 9,000 patients (in and out-patients) attendances in a month⁽²⁷⁾. This hospital also serves as a referral centre for primary and secondary health care centres in Lagos state and its environs.

Study Design

A descriptive cross-sectional survey was conducted through face-to-face interviews using pre-validated structured questionnaires.

Study Population

The study population comprised all patients on admission during the data collection period and fulfilled the eligibility criteria. Eligibility criteria included all patients above 18 years old that were on admission between April and May 2017 and willing to participate in the study. Patients with cognitive and communication problems were excluded from the study.

Sampling procedure

The sample size was determined using the following single population proportion formula

$$N = \frac{z^2 p (q)}{d^2} \quad (28)$$

$$d^2$$

Where N = sample size

Z = standard normal deviation (a constant), which at 95% confidence interval = 1.96

p = level of significance = 0.5

q = 1-p

d = Error margin allowable = 5%

Hence,

$$N = 1.96 \times 0.5(1-0.5) / 0.05^2 = 0.9604 / 0.0025 = 384.16$$

For a finite population, using the correction formula,

$$\text{New sample size} = \frac{N}{1 + (N-1)/\text{population}} \quad (28)$$

Where population = 1020, i.e. estimated number of patients admitted in two months.

$$\text{New sample size} = \frac{384.16}{1 + (384.16-1)/1020}$$

New sample size = 278 patients

A convenience sampling method was employed to recruit them.

Data collection procedure

The data collection tools used for this study included a researcher-completed pre-validated structured questionnaire adapted from previous studies⁽⁹⁾. The questionnaire was subjected to psychometric analysis by validating the contents using a pilot test on five patients to determine a need for adjustment prior to the commencement of the actual study. The outcomes of the pilot testing were further used to edit the questionnaire to enhance clarity and flow.

The questionnaire consisted of two sections. Section one was about the respondent's personal information, including gender, age, marital status, and level of education. Section two of the questionnaire included open and closed-ended questions that assessed respondents' practices and knowledge concerning unused medication disposal, their sources, and their awareness of the consequences of improper disposal.

Finally, the questionnaire was distributed to 278 in-patients from fifteen wards at LUTH. The data collector approached the patients on admission after explaining the purpose of the study and getting their consent.

Ethical Considerations

Ethical approval to conduct the study was obtained from the ethics review board of Lagos University Teaching Hospital with correspondence number ADM/DCST/HREC/APP/14909. Written informed consent was also obtained from each respondent. Furthermore, participants' confidentiality was respected by ensuring that the patient's identification was coded and no unauthorised use of the information was made.

Data Analysis

The collected data were checked and cleaned for completeness and then analysed using Statistical Package for Social Science (SPSS) software (version 21.0). Descriptive analysis was reported as a mean (\pm standard deviation [SD]). Categorical variables were reported as frequency (percentage). The Chi-square test was used to assess the difference in practices regarding the disposal of medications between different demographic groups. Binary logistic regression was used to identify predictors of medication disposal practices.

Results

Socio-demographic Characteristics of the Respondents

The total population of the study was 278, with 88% responses. Of the 247 respondents, 105 (42.5%) were males, and 142 (57.5%) were females. The most frequent age bracket was between 31 to 45 years (42.1%), and almost half of the study participants (113 (45.7%)) had tertiary education (Table 1).

Table 1: Socio-demographic Characteristics of the Respondents (n=247)

Variable	Frequency (percentage%)
Gender	
Male	105 (42.5%)
Female	142 (57.5%)
Age (years)	
18-30	85 (34.4%)
31-45	104 (42.1%)
46-50	58 (23.5%)
Educational level	
Primary	23 (9.3)
Secondary	98 (39.7)
Tertiary	113 (45.7)
No formal education	13 (5.3)

**Multiple responses per cent might exceed 100*

Reasons for the generation of unused Medication

A large proportion of respondents (76.9%) obtained their medications from pharmacies within the hospital, while 45.3% had leftover/unused medications, the most common reason being excess quantity supplied (36.6%). Only 17% of respondents admitted to possessing un-prescribed medications, out of which 31.0% said they had those drugs because they had been using them before they were admitted (Table 2). There was no statistically significant relationship between the demographic data of respondents and the possession of unused medications.

Table 2: Reasons for generation of unused Medication (n=247)

Variable	Frequency (percentage %)
Source of Medication	
Pharmacy within LUTH	190 (76.9%)
Pharmacy outside LUTH	16 (6.5%)
Patent Medicine store	41 (16.6%)
Any unused/ leftover medication	
Yes	112 (45.3%)
No	135 (54.7%)
Reason for unused Medication (n=112)	
Change in Medication Prescription	26 (23.2%)
Excess supply	41(36.6%)
Non-Compliance	4(3.6%)
Side Effects	4(3.6%)
Improved Medical Condition	37 (33.0%)
Possess any un-prescribed medication	
Yes	42 (17.0%)
No	205 (83.0%)
Reason for possession of un-prescribed Medication (n=42)	
Have been using it	13 (31.0%)
For Faster cure	7 (16.7%)
Recommended by relatives	8 (19.0%)
Others	14 (33.3%)

**Multiple responses per cent might exceed 100*

Knowledge of Unused Medication Disposal methods

More than three-quarters of respondents (85%) had never been told or educated on proper disposal methods, as seen in Table 3. Out of the 15% that knew of proper disposal methods, more than half identified incineration as a known disposal method. Almost half of the respondents (48.9%) were ignorant of the consequences of improper medication disposal (Table 3).

Table 3: Knowledge about Unused Medication Disposal methods (n=247)

Variable	Frequency (percentage %)
Have you ever been advised on unused medication disposal methods?	
Yes	37 (15.0%)
No	210 (85.0%)
If yes, which type? (n=37)	
Incineration	20 (54.1%)
Deep burial	7 (18.9%)
Secure land tilling	3 (8.1%)
Encapsulation	2 (5.4%)
Return to the original supplier	5 (13.5%)
If yes, would you like a brief education on unused medication disposal practices? (n=210)	
Yes	186 (88.6%)
No	24 (11.4%)
Are there consequences for improper medication disposal?	
Yes	93 (37.7%)
No	33 (13.4%)
I do not know	121 (48.9%)
If yes, which ones do you know? (n=93)	
Environmental pollution	84 (90.3%)
Aquatic life pollution	17 (18.3%)
Drinking water pollution	21 (22.6%)
Effects on animals	25 (26.9%)

**Multiple responses per cent might exceed 100*

Disposal Practice of Unused Medications

Table 4 shows the disposal practice of unused medications, where 91.9% of respondents indicated that no one buys their unused drugs there on the ward, and 65.6% were willing to drop them off at convenient locations within the hospital. The most commonly used disposal practice for unused medicines among in-patients was throwing

them in the garbage, as reported by 107 (43.3%), followed by taking the medications back home and either keeping them for future use or sharing them with friends or neighbours, 87 (35.2%).

Table 4: Disposal Practice of Unused Medications (n=247)

Variable	Frequency (percentage %)
Do other people buy unused Medication from patients?	
Yes	20 (8.1%)
No	227 (91.9%)
If yes, who are the buyers? (n=20)	
Patients	19 (95.0%)
Pharmacy	1 (5.0%)
Willingness to drop off unused Medication at a convenient place in the hospital.	
Yes	162 (65.6%)
No	85 (34.4%)
If no, why? (n=85)	
Not Convenient	24 (28.2%)
Availability of time	1 (1.2%)
Issues of trust	4 (4.7%)
I may not be refunded	48 (56.5%)
Willingness to return unused Medication if to be refunded.	
Yes	199 (80.6%)
No	48(19.4%)
If no, why? (n=48)	
Potential re-use by others	8 (16.7%)
Can't be bothered	35 (72.9%)
How do you intend to dispose of unused Medication?	
Take back home	87 (35.2%)
Throw it away in the garbage	107 (43.3%)
Pour the liquid down the sink	11 (4.5%)
Flush down the toilet	22 (8.9%)
Give to other patients	7 (2.8%)
If taken home, what do you do with unused Medication? (n=87)	
Keep for future use	54 (62.1%)
Share with family members/ neighbours	30 (34.5%)
Others	6 (6.9%)

*Multiple responses per cent might exceed 100

Discussion

This study examined the knowledge and practice of disposal methods of unused medications in 247 hospitalised patients of Lagos University Teaching Hospital. It also assessed respondents' knowledge of the consequences of improper disposal of unused medications. Many studies reported the reasons for having large amounts of unused medications as a change in therapy due to ineffectiveness or adverse effects of prescribed drugs ^(2; 13). However, in this study, it was found that the most common reason for unused medications was due to excess supply being made to the patients. This was followed by improved medical conditions and changes in medication prescriptions (Table.2). This highlights an underlying problem in dispensing medications for in-patients in LUTH. These findings are like those found in the research carried out in Malaysia, where more than half of the respondents gave excess supply as the most common reason and identified improved medical conditions and change in prescriptions as some of the other reasons for having unused medications ⁽¹³⁾. In Bangladesh, however, difficulty following instructions was the most common reason for unused medications ⁽³⁾.

In addition, a significant proportion (6.5%) procured their medications from pharmacies outside LUTH. This suggests poor supply chain management of medicines by the LUTH department of pharmacy. The finding highlights the need for prescribers to choose medicines judiciously and minimally with the first prescription to

allow for changes required after the necessary tests may have been carried out. This will counter the problem of excess stock of medicines with patients. Almost two-thirds of our respondents (65.6%) were willing to return unused medications to the Pharmacy (Table 4). This rate was higher than some studies in the US, Malaysia, and Kuwait, which reported that below a quarter of the study population returned unused medicines to the pharmacies (3; 11; 22; 24; 25). Specifically, 15% of respondents in Bangladesh admitted to returning unused medications to the pharmacy⁽¹³⁾, while 27% of the respondents surveyed by Malaysia returned unused medicines under the "Medicine Return Programme (MRP)"⁽²³⁾. Meanwhile, none of the respondents in Ethiopia practised returning unused medications to the pharmacy⁽²¹⁾.

This study revealed that more than three-quarters of respondents never had prior education or information on the safe disposal of medications. Furthermore, only 37 (15.0%) respondents were informed about unused medication disposal practices. This is similar to the study carried out in Ghana, where 80% of respondents never received information on proper medication disposal⁽¹⁹⁾. Likewise, in Tanzania, 85% reported never having been informed or educated about safe disposal practices⁽²⁹⁾. In this study, only one-third of the participants, 93 (37.7%), correctly understood the consequences of improper medication disposal as environmental, aquatic life, drinking water and wildlife pollution. This is similar to a study in Indonesia where more than half of 497 respondents (53.1%) were unaware that improper medication disposal could harm the environment and population health⁽³⁰⁾. On the contrary, more than 80% of respondents in India showed their concern that improper disposal of medications can affect the environment⁽³¹⁾. Many patients, 107 (43.3%), threw unused medications in the garbage (Table 4).

This finding was similar to that found in a study carried out in 2020, where more than half of the respondents threw unused medications in the trash⁽³²⁾. This could be because there was no existing appropriate drug disposal facility/program as typical of most developing countries. A similar study conducted in 2014 observed that medical waste management currently receives very little attention in most developing countries, including Ethiopia⁽³³⁾. Therefore, creating public awareness to return unused medications to healthcare facilities or designated collection sites is vital to enhance safe and appropriate pharmaceutical waste disposal.

Limitations to the study

The exact number of patients that had unused medications could not be accurately determined during data collection because some were still on Medication at that time. Secondly, the specific types of medications that were unused were not identified.

Conclusion

Knowledge of unused medication disposal methods by in-patients was inadequate. Most disposal practices indicated by the participants were against recommended World Health Organization guidelines on safe and appropriate pharmaceutical waste disposal. Awareness about the proper disposal of unused medicines should be created. National guidelines on safe disposal are required, and an organised method of collecting unused pharmaceuticals needs to be introduced. The Unit dose dispensing system (UDDS) should be employed to manage medicines in hospitals properly.

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