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RESEARCH ARTICLE

Knowledge and practice of unused medicines disposal among patients and pharmacists in a teaching hospital in Southeast Nigeria

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ABSTRACT

Background: Recent developments in the drug industry, together with improved access of many populations to orthodox medications, have contributed to the increase in global medication consumption. Inadequate disposal of unused medication is a cause of concern to public health. **Objectives:** This study assessed the knowledge and practice of disposal of unused medicine among pharmacists and patients in Nnamdi Azikiwe University Teaching Hospital (NAUTH), Anambra State, Nigeria. **Methods:** The study was a cross-sectional retrospective study. A self-administered questionnaire was used to collect data from respondents. The study protocol was approved by the Ethics Committee of NAUTH. Seventy practicing pharmacists and 300 patients undergoing treatment in the tertiary health-care facility participated in the study. Descriptive statistics were used in the overall analysis. Results were summarized as frequencies and percentages. **Results:** About 189 (51.1%) of the respondents indicated that disposal of unused medicine in thrash was one of the most common means of medicine disposal while 222 (60%) respondents indicated that self-discontinuation was the cause of availability of drugs in most homes. About 284 (76.8%) respondents indicated that improper disposal of medicines increased the risk of environmental hazard. About 189 (51.1%) respondents stated that most drug consumers disposed their unused medicine in the trash bin while 196 (53.0%) respondents stated that they were not educated on medication disposal methods. **Conclusion:** The pharmacists and patients in NAUTH, Nigeria, had no form of education on safe disposal of unused medication. Adequate awareness should be created, and guidelines put in place to ensure proper disposal of unused medicines.

Keywords: Medicine, Disease prevention, Toxicity, Safety, Medicine disposal, Public health

INTRODUCTION

There has been an increase in the daily use of medicine with most customers being left with unused medicines. Recent developments in the drug industry, together with the improved access of populations to orthodox medications, have contributed to the increase in global medication consumption.[1] There are different methods of disposing unused medication such as discarding the medicines in the garbage, toilet, or sink.[2] Large quantities of expired and unused medications both prescription-only and over-the-counter (OTC) medications are encountered daily in households, and most are expired or unused medications that are sometimes disposed of in the garbage or flushed down the sink or the toilets. Pharmaceutical active ingredients pollute both food and the environment, but the public health risk which occurs as a result of low-level exposure to pharmaceuticals in the environment is currently unknown.[3] Globally,

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there is high concern regarding the unsafe disposal of expired and unused medication by consumers. There are programs in place in many developed countries that are aimed at ensuring the safe disposal of unused medicines. Different medication disposal methods have been recommended by the World Health Organization (WHO): Incineration, waste encapsulation, landfill, sewer, fast-flowing watercourse, burning in open containers, return to donor or manufacturer, and transfrontier transfer for disposal.[4]

Harmful consequences of inappropriate disposal of medications include drug abuse, accidental overdose of drugs, overstocking of drugs, undesirable effects of drugs, and even death. With the increase in the incidence and prevalence of diseases, health-care professionals tend to prescribe and dispense different medications but most times, patients fail to use all the dispensed medications.[5] According to Food and Drug Administration, more than half of all medications are prescribed and sold inappropriately, resulting in the unnecessary storage of medicines and a threat to the environment.[6] Other factors that contribute to the storage of unused medicines include non-adherence and non-compliance to medication.

Medical wastes are wastes emanating from hospitals, commercial laboratories, and the medical industry.[7] It is often generated in greater quantities relative to other forms of solid waste. The impact of long-term exposure to the hazardous effects of pharmaceuticals is experienced more by vulnerable populations such as pregnant women, newborns, and children.[5] Evidence has shown that antibiotics resistance can be linked to their presence in the environment.[8] Furthermore, storing unused drugs in the home creates an avenue for such drugs to be misused and abused especially when someone accidentally takes them.[5] Medical wastes from health-care facilities should be separated accordingly and treated adequately.[9] Disposal of unused medications is one of the worldwide challenges that have captured the interest of policymakers, health professionals, pharmaceutical companies, and the community in general.

Global warming, which is one of the factors that contend with today's environment, can be linked to the poor management of biodegradable and non-biodegradable solid waste. The generation of medical waste has increased in Nigeria to an estimated rate of about 0.5–0.7% per annum.[7] In recent times, the management and disposal of medical waste have become a major challenge. The WHO estimated that there are about 8–16 million new cases of hepatitis B virus; 2.3–4.7 million cases of hepatitis C virus; and 80,000–160,000 cases of human immunodeficiency virus each year due to unsafe injections disposal as a result of poor waste management systems.[10] Contaminated injection equipment may be scavenged from waste areas and dumpsite either to be reused or sold again.

There is the absence of a national guideline in place to adhere to in the correct disposal of wastes in health-care facilities in Nigeria.[9] Lack of awareness of policies and legislation on handling medical waste has led to the increase in the improper handling of waste in health-care facilities.[9] A recent study proposed that practicing prudent disposal of unused medications will be an obvious starting point of reducing the introduction of pharmaceutical residues into the environment.[11] Studies have shown that there is no significant difference in the manner of medical waste management in state and private hospitals in Nigeria and other African countries.[9,12] This suggests that some health care workers and waste officials are not aware of the policies in handling waste and the final waste disposal methods.[9,12] This study, therefore, assessed the knowledge, attitude, and practice of disposal of unused medications among patients and pharmacists in a teaching hospital in Nigeria.

METHODS

Study site

The study was a cross-sectional study conducted at Nnamdi Azikiwe University Teaching Hospital (NAUTH), a tertiary hospital located at Nnewi in Anambra State, Nigeria. The study protocol was approved by the Ethics Committee of NAUTH, Nnewi.

Sampling/sample size

The study involved practicing pharmacists and patients undergoing treatment in the tertiary health-care facility. The sample size was calculated using the formula by Yamane (1967).[13]

$$N = \frac{N}{1 + N\,(e)^2}$$

Using the formula, 286 patients and 56 pharmacists were estimated for an adequate survey. To account for possible attrition, an additional 14 patients and pharmacists were added to get a sample size of 300 patients and 70 pharmacists. The respondents were randomly selected.

Study instrument and data collection

A structured questionnaire adapted from a previous study[14] was developed as the study instrument. The questionnaire consisted of 21 items in two sections. Section one consisted of information on the respondents' demographic data such as gender, age, marital status, level of education, and religion. Section two of the questionnaire comprised 16 questions that assess the respondents' knowledge, attitude, and practice to dispose of unused medication. The first six questions had multiple-choice answers while the last 10-item questions elicited "Yes" or "No" answers. The instrument was subjected to face and content validation by three pharmacists and a statistician.

A pilot study was implemented to determine the feasibility of the research instrument. This was carried out by administering the questionnaires to 10 patients and 10 pharmacists who were excluded from the main study. At the end of the pre-test, the questions were modified and administered to the respondents that met the inclusion criteria.

The questionnaire was self-administered by the researcher and collected by face-to-face contact with the respondents. The purpose of the study was communicated to all the respondents and informed consent obtained before commencement of the study. Participation was purely voluntary and the confidentiality of the participants was maintained throughout the study. The inclusion criteria were pharmacists that gave their informed consent to participate in the study, patients admitted at the different units in the hospital, outpatients that handle their prescribed drugs, and patients' caregivers in the hospital. Pediatric and geriatrics that cannot manage their prescriptions were excluded from the study. The study lasted from June to November 2019.

Data analysis

Data collected were analyzed using Statistical Package for the Social Sciences, (version. 20.0 for Windows, Inc., Chicago, IL, USA). Descriptive statistics were used in the overall analysis. Results were summarized as frequencies and percentages.

RESULTS

Demographics of the respondents

Out of the 400 questionnaire distributed, 370 were filled giving a response rate of 92.5%. A good number of the respondents that participated in this study were patients 300 (81.1%). The ratio of male-to-female pharmacists that participated in this study was 1:1. A good number of the pharmacists were students 144 (38.9%) with a mean age of 40.1 ± 13.9 years and a modal age of 20–40 years. Detailed summary of the demographic characteristics of the pharmacist respondents is shown in Table 1.

Knowledge and practice of unused medicine disposal among pharmacists and patients at NAUTH

This study recorded that accumulation of expired and unused drugs was as a result of self-discontinuation of medicine 222 (60.0%), irrational prescriptions 31 (8.4%), OTC drugs 54 (14.6%), and to prevent adverse drug reactions 20 (5.4%). A good number of the respondents 270 (73.0%) indicated that they stopped using their drugs before the time recommended by the physicians. About 253 (68.45%) of the respondents indicated that they have drugs at home they do not use while more than half of the patients indicated that they have never been educated about unused medicine

disposal methods. About 222 (60%) respondents from our study dispose of their unused medicines in the rubbish bin. This is the most common pattern of practice of medicine disposal. Less than half of the respondents 141 (38.1%) indicated that analgesics were the medicines commonly stored and disposed of by consumers. The detailed result on the knowledge, attitude, and practice of medicine disposal among pharmacists and patients in NAUTH is shown in Tables 2 and 3.

DISCUSSION

This study was a cross-sectional questionnaire-based study conducted on 370 pharmacists and patients in a tertiary hospital in Nigeria. The pharmacists and patients knowledge and practice of unused medicine disposal were assessed using a validated questionnaire. The result revealed significant differences in the pharmacists' and patients' knowledge and practice of unused medication disposal.

Table 1: Sociodemographic characteristics of respondents (*n*=370)

Gender	Patients (n)	Pharmacist (n)	N (%)
Gender			
Male	153	32	185 (50)
Female	147	38	185 (50)
Male-female ratio: 1:1			
Age			
20–40	159	52	211 (57.0)
41–60	105	13	118 (31.9)
>60	36	5	41 (11.1)
Mean age=41.0 years (standard deviation=±13.9 years)			
Occupation			
Self-employed	114	17	131 (35.4)
Government employed	45	19	64 (17.3)
Students	111	33	144 (38.9)
Others	30	1	31 (8.4)
Educational level			
No formal education	15	0	15 (4.1)
Elemental school	33	0	33 (8.9)
Secondary school	66	3	69 (18.6)
University	186	67	253 (68.4)
Religion			
Muslim	24	4	28 (7.6)
Christian	258	62	320 (86.5)
Others	18	4	22 (5.9)
Total	300	70	370 (100)

Table 2: Knowledge and practice of unused medicine disposal among the respondents (*n*=370)

Variables	Patient (*n*)	Pharmacist (*n*)	Total, *n* (%)
Why is safe disposal of medicines necessary?			
To prevent illegal/ unintended use	147	20	167 (45.1)
To prevent adverse reactions	51	8	59 (16.0)
To prevent environmental pollution	102	42	144 (38.9)
Various means of disposal of medicines by consumers?			
Disposal in thrash	147	42	189 (51.1)
Flushing in sewers	36	16	52 (14.1)
Throwing in the river	39	3	42 (11.4)
Burning at home	51	7	58 (15.6)
Returning to dispensers/ pharmacy	21	2	23 (6.2)
Others	6	0	6 (1.6)
What will be the nature of drugs beyond the expiry date?			
Toxic	96	11	107 (28.9)
Remain same	15	1	16 (4.3)
Loses its effect	93	16	109 (29.5)
Both A and C	96	42	138 (37.3)
What may be the cause for the availability of expired drugs in the house?			
Self-discontinuation	171	51	222 (60.0)
To prevent illegal/ unintended use	39	4	43 (11.6)
To prevent an adverse reaction	18	2	20 (5.4)
Over-the-counter drugs	51	3	54 (14.6)
Irrational prescription	21	10	31 (8.4)
How could the hazardous effect of unused and expired medicines be minimized or controlled?			
Providing proper guidance to consumers	186	28	214 (57.8)
Prescribing compliance quantity and duration	57	31	88 (23.8)
Lowering the number of prescribed medicines	27	4	31 (8.4)
Donating or sharing the unused medicines	6	2	8 (2.2)
Others	24	5	29 (7.8)
The stakeholder for creating awareness among the community on proper disposal of unused and expired medicines are?			
Electronic media	87	11	98 (26.5)
Physicians	27	5	32 (8.7)
Pharmacist	18	9	27 (7.3)
Newspaper	30	4	34 (9.2)
All sources	138	41	179 (48.3)
Total	300	70	370 (100)

Table 3: Knowledge of unused medicine disposal among the respondents (*n*=370)

Variables	The proportion of respondents (*n*)		Total, n (%)
	Patient (*n*)	Pharmacist (*n*)	
Do improper disposal cause environmental hazards?			
Yes	219	65	284 (76.8)
No	81	5	86 (23.2)
Have you ever been educated about disposal methods?			
Yes	126	48	174 (47.0)
No	174	22	196 (53.0)
Have ever stopped using your drugs before the time recommended by the physician?			
Yes	210	60	270 (73.0)
No	90	10	100 (27.0)
Do you have any drugs at home that you do not use?			
Yes	195	58	253 (68.4)
No	105	12	117 (31.6)
Do you look at the expiry date of drugs before you use them?			
Yes	219	65	284 (76.8)
No	81	5	86 (23.2)
Do you know about medication waste?			
Yes	117	52	169 (45.7)
No	183	18	201 (54.3)
Do you ever read medication disposal instructions?			
Yes	120	35	155 (41.9)
No	180	35	215 (58.1)
Do you know about the drug take back system?			
Yes	54	28	82 (22.2)
No	246	42	288 (77.8)
Do you know that misused/repeated change or failing to complete antibiotics may cause drug resistance?			
Yes	222	61	283 (76.5)
No	78	9	87 (23.5)
Improper disposal of unused and expired medicines can affect the environment and health?			
Yes	246	67	313 (84.6)
No	54	3	57 (15.4)
Total	300	70	370 (100)

This study recorded poor knowledge of unused medicine disposal among pharmacists and patients in NAUTH. This is consistent with the studies by Abah and Ohimain, Anozie *et al.*, Okoro and Peter, Paut Kusturica *et al*., Gidey *et al*., and Kampamba *et al*.[15-20] that reported poor knowledge of disposal of unused medication. A good number of the respondents stated that they have not been educated on unused or expired drugs disposal methods. This is consistent with a study[18] where lack of adequate information and clear instruction on adequate means of disposal of unused medication was reported in the USA, New Zealand, Bangladesh, Malta, and Ireland. Another study[20] also recorded lack of education and information on safe disposal of unused medication. This study revealed that the most common method of disposal of unused medicine by the pharmacists and patients were by throwing them in the dustbin. This is consistent with a study.[19] Another study[18] revealed that the most common method of disposal of unused medication in countries such as the United Kingdom, Qatar, Ghana, Malta, Serbia, Saudi Arabia, Bangladesh, and Lithuania was by throwing them in the garbage. This study also recorded that only very little percentage of the respondents had knowledge of the drug take back program. This is consistent with the studies[2,20-23] that recorded that only few percentage of the respondents had knowledge of the drug take back program. This may be due to the low level of awareness of the drug take back program in Nigeria. This study revealed that a good number of the respondents had knowledge of the adverse effects of improper disposal of unused medication in the environment. This is consistent with the studies by Okoro and Peter, Kampamba *et al*.[17,20] which recorded that a good number of the respondents were aware of the adverse effect of improper disposal of unused medication in the environment.

This study had some possible limitations. First is the self-assessment nature of the questionnaire. Second, the cross-sectional nature of the study made it difficult to observe the cause-and-effect relationship. Third, the single institution, the study was carried out limited data collected.

CONCLUSION

A good number of the pharmacists and patients in NAUTH, Nigeria, did not receive any form of training on safe disposal of unused or expired medication and so dispose their unused medication in the dustbin. Educational interventions should be developed in this regard. There is also an urgent need for policymakers to develop protocol for disposing unused and expired drugs in Nigeria.

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CONFLICTS OF INTEREST

The authors have none to declare.

REFERENCES

1. Barnett-Itzhaki Z, Berman T, Grotto I, Schwartzberg E. Household medical waste disposal policy in Israel. Israel J Health Policy Res 2016;5:21.
2. Sonowal S, Desai C, Kapadia JD, Desai MK. A survey of knowledge, attitude, and practice of consumers at a tertiary care hospital regarding the disposal of unused medicines. J Basic Clin Pharm 2016;8:4.
3. Quijano D. Patient's Knowledge, Attitudes, and Practices about Remaining Drugs Disposal. Bogotá: An Ecopharmacovigilance Approach Bogotá; 2015.
4. Arunachalam U, Mv GS, Vivekkumar P, Geetha R. Assessment of knowledge and practice toward disposal of expired drugs among medical professionals in Chennai-a cross-sectional prospective study. Asian J Pharm Clin Res 2017;10:324.
5. Bashaar M, Thawani V, Hassali MA, Saleem F. Disposal practices of unused and expired pharmaceuticals among the general public in Kabul. BMC Public Health 2017;17:45.
6. U.S Food and Drug Administration. Consumer Updates-Where and How to Dispose of Unused Medicines. Where and How to Dispose of Unused Medicines. United States: U.S Food and Drug Administration; 2017.
7. Ola-Adisa EO, Mangden YP, Sati YC, Adisa JO. Knowledge, attitudes/beliefs and practices in medical waste management-an appraisal of Jos North LGA, Plateau state, Nigeria. Int J Res Hum Soc Stud 2015;2:43-56.
8. Goycochea-Valdivia WA, Moreno-Ramos F, Paño-Pardo JR, Aracil-Santos FJ, Baquero-Artigao F, del Rosal-RabesT, *et al*. Identifying priorities to improve paediatric in-hospital antimicrobial use by cross-sectional evaluation of prevalence and appropriateness of prescription. Enfermed Infecciosas Microbiol Clin 2017;35:556-62.
9. Chisholm JM, Zamani R, Negm AM, Said N, Abdel Daiem MM, Dibaj M, *et al*. Sustainable waste management of medical waste in African developing countries: A narrative review. Waste Manag Res 2021;39:1149-63.
10. Awodele O, Adewoye AA, Oparah AC. Assessment of medical waste management in seven hospitals in Lagos, Nigeria. BMC Public Health 2016;16:269.
11. Yu X, Hu X, Li S, Zhang M, Wang J. Attitudes and practice regarding disposal for unwanted medications among young adults and elderly people in China from an ecopharmacovigilance perspective. Int J Environ Res Public Health 2019;16:1463.
12. Oli AN, Ekejindu CC, Adje DU, Ezeobi I, Ejiofor OS, Ibeh CC, *et al*. Healthcare waste management in selected government and private hospitals in Southeast Nigeria. Asian Pac J Trop Biomed 2016;6:84-9.
13. Yamane T. Statistics: An Introductory Analysis. 2nd ed. New York: Harper and Row; 1967.
14. Ayele Y, Mamu M. Assessment of knowledge, attitude and practice towards disposal of unused and expired pharmaceuticals among the community in Harar city, Eastern Ethiopia. J Pharm Policy Pract 2018;11:27.
15. Abah SO, Ohimain EI. Healthcare waste management in Nigeria: A case study. J Public Health Epidemiol 2011;3:99-110.
16. Anozie OB, Lawani LO, Eze JN, Mamah EJ, Onoh RC, Ogah EO, *et al*. Knowledge, attitude, and practice of healthcare managers to medical waste management and occupational safety practices: Findings from southeast Nigeria. J Clin Diagn Res 2017;11:IC01-4.
17. Okoro RN, Peter E. Household medicines disposal practices in Maiduguri, North-Eastern Nigeria. Int J Health Life Sci 2019;6;e97085.
18. Paut Kusturica M, Tomas A, Sabo A. Disposal of unused drugs: Knowledge and behavior among people around the world. In: de Voogt P, editor. Reviews of Environmental Contamination and Toxicology.(Continuation of Residue Reviews). Vol. 240. Cham: Springer; 2016.
19. Gidey MT, Birhanu AH, Tsadik AG, Welie AG, Assefa BT. Knowledge, attitude, and practice of unused and expired medication disposal among patients visiting ayder comprehensive specialized hospital. Biomed Res Int 2020;2020:9538127.
20. Kampamba M, Cheela T, Hikaambo CN, Mudenda S, Saini K, Chabalenge B. Knowledge, attitude, and practices on disposal methods of expired and unused medicines among students in public academic institutions in Lusaka, Zambia. Int J Basic Clin Pharmacol 2021;10:774-80.
21. Labu KK, Mamun A, Abdullah M, Harun M, Sikder K. Knowledge, awareness and disposal practice for unused medications among the students of the Private University of Bangladesh. J Biomed Pharm Res 2013;2:26-33.
22. 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;38:822-8.
23. Kampamba M, Nyirenda M, Hatwiko H, Kampamba D, Hikaambo CN. Assessment of household knowledge, attitude and practices on disposal methods of expired and unused medicines among residents of Lusaka City, Zambia. Afr J Pharmacy Pharmacol 2020;14:221-8.