

Disposal Practices of Unused and Expired Household Medicines

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Abstract: Expansion of pharmaceutical industries and improved availability of pharmaceuticals across the world have contributed to an increase in drug usage and accumulation in homes. Improper disposal of expired and unused medications has several consequences such as environmental pollution, and childhood poisoning. The study revealed insufficient knowledge as well as inappropriate disposal practices of unused and expired medicines among residents of Murud - Janjira. There is need to organize a public enlightenment programme on safe, appropriate use, as well as disposal of unused and expired medicines.

Keywords: Pharmaceutical preparations, Medical waste disposal, Knowledge

I. INTRODUCTION

The growth of the pharmaceutical industry and better access to medications all contribute to a rise in drug use and accumulation in households throughout the world. As a result, many studies have been conducted on the various types of unwanted medications, their quantities held in households, and their disposal habits. In Murud, there are existing guidelines focused on the proper disposal of outdated pharmaceuticals in community pharmacies but there are no guidelines to govern the disposal practices of expired and unused prescriptions among community inhabitants. Non-prescription or over-the-counter (OTC) medications are not often only available in pharmacies, but also in supermarkets and other places in various countries. Self-medication might involve taking left over pharmaceuticals from past treatment courses, drugs obtained from relatives or friends which often leads to improper storage of unused drugs, expired drugs and potential dumping of the drugs in households. Due to an increase in disease incidence and prevalence, healthcare practitioners tend to prescribe and dispense various kinds of medicines to end-users. However, factors such as poor adherence to medication, discontinuation of medication, adverse effects, inappropriate prescription, feeling healthy, dose changes, non-adherence, and medicines reaching expiration date have contributed to potential build-up of expired and unused medicines in some households.

Improper disposal of expired and unused medications has several consequences such as environmental pollution, childhood poisoning, negative impact on wildlife, and development of drug-resistant micro-organisms. Throwing household expired medicines into the garbage cans or the sewage system can cause environmental hazards that may have implications on public health since some of the medicines consist of potentially harmful ingredients that may accumulate in the environment. When unused medicines are dumped in the environment with municipal rubbish, the active chemicals in the medicines pose harm to the environment and human health because they may be released into the air when the waste is burned or seep into the ground in the presence of water. Proper disposal of pharmaceuticals should be well known among end-users. However, environmentally unsafe medication disposal practices are common in several regions of the world. For example, in Indonesia, it was found that >50% of the patients flushed their medicines down the toilet and <1% returned unused medication to the pharmacy. These challenges and practice of improper pharmaceutical waste disposal has been well documented in a systematic review carried out despite the fact that there are measures for disposal in these countries. The accumulation of unused and expired medicines in households and their disposal practices are serious global challenges that need to be investigated. There has been no study regarding the disposal practices of unwanted pharmaceutical products conducted in Liberia. The results of these studies are necessary for developing effective measures to increase public awareness of medication disposal and the harms associated with its improper practices.

II. MATERIALS AND METHODS

2.1. Study area

The study was conducted in Murud City

2.2. Study design

This study was carried out from December to February 2024 using a descriptive cross-sectional design.

2.3. Sample size

The sample size was calculated using the SPSS with the estimated population size of 300.

2.4. Sampling technique

Convenient sampling was used to sample the permanent residents of the Murud City while simple random sampling was used to select the willing participants. A list of all permanent residents was made and a number allocated to each. A total of 300 random numbers from the total number of residents were generated via computer generated codes. Each generated number associated with each household was visited and the study objectives were explained.

2.5. Data analysis

Descriptive statistics was used to analyse all data and presented using descriptive statistics using Statistical Package for Social Sciences (SPSS) version 25.

III. RESULTS

Participants that consented to participate in this study were 162 out of which 90 (55.56%) were females making a response rate of 54%. The reason for the low response rate was that participants were not available in their places of residence during the visit by the researchers. Also, some of the participants did not give consent to participate in the study. Other than 5.6% of them, they had at least primary education. Majority of the respondents (82.1%, 133) were aware of the environmental and human health effects arising from improper disposal of unused and expired medicines, while 64.2% (104) usually did not read medicine disposal instruction on the package. >3% (5) of the respondents were aware of the expired medication take-back system but mentioned that such practice is not being enforced. Sixty (37%) respondents were aware that unused and expired medicines need to be disposed of safely and properly while >70% (119) of the respondents felt that unused and expired drugs are waste and should be disposed of like ordinary waste. <67% (108) were cognizant of the expiration date of drugs and stressed the importance of reading the expiration date before buying while 33.3% (54) of the respondents knew nothing about medication expiration date. More than three quarters of the respondents (75.3%, 122) believed that it is the responsibility of the pharmacists to inform the public about the proper disposal of unused or expired medication while 22.2% of the respondents believed that any matter concerning unused or expired medication should be reported by doctors. The rest opted for nurses. Regarding the knowledge about the right method required to dispose of unused or expired medication, <50% of the participants agreed that flushing the unwanted drugs down the toilet is the correct and safe practice while 32.7% of the respondents believed that disposing of the unwanted medication along with municipal solid waste is the preferred and safe method (Fig. 1). Ninety-nine respondents (61.1%) reported that they mix unwanted or unused drugs with household waste for disposal, while 25.5% of the respondents flushed the unwanted drugs down a toilet. <4% reported that they donate the drugs to friends while 9.9% stated that they return the drugs to the pharmacy stores. Regarding the reasons why expired drugs are found in homes, >28% (46) of the respondents indicated that they discontinued taking the drugs after feeling well while 25.9% (42) stated that they discontinued taking the medicine due to its side effect. <25% (40) reported that the taste of the medicine prevented them from taking it while the rest (21%, 34) reported that they stopped taking the medications after another medication was prescribed to them.

IV. EXPIRED DRUGS DISPOSAL PRACTICES OF PARTICIPANTS

A large proportion of this study participants reported that they mix unwanted or unused drugs with household waste for disposal. These results are in agreement with the results of a study conducted in Murud City where 74% of the participants

specified that they usually dispose of their unused and expired medicines along with household solid waste. Additionally in Brazil, 47% of the participants stated that the disposal of unused and expired medicines is done along with domestic waste. It is interesting to note that 9.9% of the participants returned the unused or expired medicines to the pharmacy while 3.7% of the participants donated the expired or unused medicines to friends and relatives. This was similar to respondents' actions toward unwanted medicine in studies carried out in Zambia where >60% and 30.4% of the participants indicated that they mainly disposed of expired unused medicines in household garbage and flushed into toilets/sinks respectively.⁴ Also, in Eastern Ethiopia, 53.2% of the participants threw expired or unused medicines in household garbage bin, 23.9% flushed into toilets/sinks, 1.9% donated to friends or relatives and 1.0% returned to the pharmacy.²² Improper disposal of medicines in the United States had led to detection of various medications such as acetaminophen, verapamil, and estradiol in rivers due to incorrect disposal of unused and expired medication.²³ This practice is dangerous and has been reported to hamper fish sexual development and feminization, lead to antibiotics resistance,²⁵ and also genetically impact human life on the long term basis.²⁶ This highlights the need of proper medicines disposal guidelines among community dwellers in Asian countries. More than half of the participants indicated the presence of unwanted medicines in homes. This result is similar to the results obtained from studies conducted in Indonesia,⁷ and Ethiopia,²² where 95.5%, 58.3%, 100%, and 66.2% participants confirmed having unused and expired medicines at home respectively. The variability found in the response rates in these studies can be linked with the level of awareness in the study areas.

V. LIMITATIONS OF STUDY

This research assessed the knowledge on disposal as well as disposal practices of unused and expired household medicines among residents in one Community in Liberia which could imply that the findings are not generalizable to other communities in Murud. There was also a response rate of 54% showing a relatively small sample size. However, the findings have provided valuable insight that could be built upon in further studies. This study was carried out among a relatively young population and the findings might be different from an older population. Future studies might also explore the area. Also, inferential statistics exploring the influence of participant demographics on knowledge of disposal practices was not assessed in this study. This could be explored in future studies.

VI. CONCLUSION

The study revealed poor knowledge and awareness of unwanted/ expired medicines disposal among majority of participants. The medication disposal practices found in the study were disposing along with household waste and flushing the unwanted medicines in toilets and sinks. It is therefore expedient that government-driven public awareness campaigns on the safe disposal practices of unused medicines be carried out.

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