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# Proper practice of unused medicine: opinions of patients at Puskesmas 1 Umbulharjo Yogyakarta

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## ABSTRACT

Properly managing unused medications is crucial to mitigate potential adverse effects on public health and the environment. This investigation aims to ascertain patients' perceptions and explore potential correlations between demographic variables and attitudes toward disposing of unused medications. The present study employed an analytical observational design utilizing a cross-sectional approach. A sample size of 96 patients was obtained using the Lameshow formula. The study employed a purposive sampling technique. The study population comprised individuals who fulfilled the eligibility criteria and sought medical attention at the Umbulharjo 1 public health center in March-June 2022. The research instrument was a data collection sheet. Data analysis was completed using the chi-square test. According to the respondents' views on new medication disposal practices, most patients (46.9%) returned unused medications to healthcare professionals. Gender and disposal practices are significantly correlated, such as keeping unused medication at home (p=0.002) and providing it to the patient's family (p=0.049). Additionally, there is a strong association (p = 0.000) between educational background and the practice of keeping unused medications at home. According to this study's findings, up to 45 individuals (46.9%) returned unused medications to healthcare providers. There is a correlation between gender, socioeconomic factors, educational background, and attitudes toward discarding unneeded medications.

**Keywords**: Opinions, practice, handling, unused medicine

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## INTRODUCTION

Over 1,000,000 tons of medicine are consumed annually globally, and this number is increasing. It is estimated that 4.5 trillion medicine dosages were used up in 2020 for over-the-counter and doctor-prescribed drugs (Bungau et al., 2018). According to the World Health Organization (WHO), half of the patients do not properly ingest medication, and more than half of prescriptions are given, given, and sold incorrectly (Kementrian Kesehatan Republik Indonesia, 2011).

Incorrect medicine disposal poses a direct impact on individual health as the drugs which should be thrown away are consumed by people. In addition, disposing of drugs can turn into environmental pollutants (Amster, 2016). The most typical method of coping with unused medications is tossing them in the trash or flushing them down the toilet (Tong et al., 2011). *Riset kesehatan dasar'*s (Riskesdas') fundamental health study shows 35.2% of Indonesian households store drugs, including potent, over-the-counter, traditional, and unidentified medicines. Of these drugs, 47% are residual medications (Riskesdas, 2013). According to a study by (Kristina et al., 2018), over 70% of Yogyakarta residents discard unused medications and household waste in the same location without first receiving appropriate treatment.

Different behaviors towards unused medicines are affected by one's knowledge, opinion, or attitude. By following the right and safe process when disposing of unused medications, higher quality in those areas can increase responsibility towards health and the environment (Gifford & Nilsson, 2014). In light of the aforementioned fact, a study was conducted to determine how patients at Puskesmas Umbulharjo 1 in Yogyakarta dispose of unused medications and the relationship between patient demographics and disposal methods.

## MATERIALS AND METHODS

### Materials

This study utilized a questionnaire to collect the data. The questionnaire was adopted from (Bashaar et al., 2017) in research entitled "Disposal Practices of Unused and Expired Pharmaceuticals among the General Public in Kabu" and from Insani et al. (2020) research entitled "Improper disposal practice of unused and expired pharmaceutical products in Indonesian households". The questionnaire was validated in Insani's study with an alpha Cronbach's value of 0.854 (> 0.7), so the questions in the questionnaire were deemed valid and reliable (Riwidikdo, 2008).

There were two parts to the questionnaire. The first one dealt with the demographic information of the respondents, including their age, gender, educational background, and employment situation. The second section sought information on managing medications by asking people a variety of questions, such as whether they had any unused medications at home, what types of medications they had, why they were not using them, what they were, what they did with them when they were no longer effective, whether they had ever received information on proper drug disposal techniques, and whether they were aware of the effects of improper disposal techniques on the environment.

### Methods

This research took place in March-June 2022 at Puskesmas Umbulharjo 1 Yogyakarta. Primary data were obtained from the aforementioned questionnaire. Before collecting the data, a proposal was designed and followed by the completion of permission letters. The first agenda was proposing a permit for research and ethical clearance to the Dean of the Faculty of Pharmacy, Ahmad Dahlan University. After that, a permit for research was proposed to Puskesmas Umbulharjo 1 Yogyakarta. The next stage involved fulfilling the administrative requirement, gathering data in accordance with the characteristics of the research that was included, and researchers outlining the purpose, methodology, and approach of the study. The questionnaire-filling procedure was then outlined. Informed consent was sent to the respondent candidates. The questionnaire that the respondents had completed was then gathered and double-checked by the researchers.

The participants in this research who responded met several requirements, including being at least 16 years old, having taken medication, and possessing drugs that had not been used. Respondents who did not complete the required fields were not included in the study. There were 45 respondents who were engaged in the purposive sampling technique used in data collection.

The current study was carried out in April–May 2022. With the letter identification number 012202008, an ethical permission request was sent to Ahmad Dahlan University's research ethics committee before the research was carried out. After receiving approval from the Health Office of *Daerah Istimewa Yogyakarta* and Puskesmas Umbulharjo 1 Yogyakarta, the study was able to begin.

This study used a cross sectional approach along with analytical observation. To select the sample based on inclusive and exclusive parameters, purposeful sampling was used. A questionnaire that had previously undergone reliability testing and validation was used to gather data.

**Data Analysis**

In this research, univariate and bivariate analyses were used for data analysis. A univariate analysis was used to explain the research data. Patients' characteristics, the causes of why drugs were left unutilized, and patients' perspectives on the handling of unused medications were all included in the univariate data at Puskesmas Umbulharjo 1. At Puskesmas Umbulharjo 1 Yogyakarta, bivariate analysis was used to examine the relationship between patients' sociodemographic traits, such as age, educational background, gender, and employment status, and their views on how to dispose of unused medications correctly. Chi-square was used to evaluate the data at a 95% significance level.

## RESULTS AND DISCUSSION

**Patients' characteristics**

The participants in this study were 96 patients from Puskesmas Umbulharjo 1 Yogyakarta who were willing to participate in the study and who met the inclusion criteria. Table 1 presents the patients' characteristics.

Based on Table 1, 48 (50%) out of 96 patients are male and and the other 48 are female. More than half of the respondents (53.3%) are between 18 – 30 years old. This finding agrees with previous research by (Al-Shareef et al., 2016) in Riyadh, Saudi Arabia which identified 44.8% patients from the age group of 18 – 34 years old. The educational background of most respondents (46 patients, 47.9%) is senior high school. Four (0.9%) patients graduated primary school. This result is similar to a study conducted in Riyadh (Al-Shareef et al., 2016) and Serbia (Kusturica et al., 2012). Meanwhile, the working status is dominated by entrepreneur (34 respondents or 35.4%). This is in line with research carried out in Malta where most patients are workers (47.6%) (West, 2015).

The characteristics of respondents seen from the ownership of unused medicines in their houses, 70 patients (72.9%) save or dispose of unused drugs in their places. This fact echoes the finding of the research conducted in Yogyakarta mentioning that out of 324 households surveyed, the majority of respondents (85%) keep unused medicines in their houses (Kristina et al., 2018). Furthermore, 71 patients (74%) admit that they have never received information on how to practice drug disposal properly. This result turns out to be lower than other studies among which are studies done in Riyadh (AlAzmi et al., 2017) for 83% of patients, in Tanzania for 85% of patients (Baltazary, 2013) and in Washington for 80.3% of patients have never received information on proper drug disposal (Seehusen & Edwards, 2006).

**Classification of unused medicines**

This study reveals that some patients owned more than one unused medicine. The classification of those unused medicines they possessed can be seen in Table 2.

Referring to the above table, it can be seen that the most unused medicine classification owned by patients is NSAID (anti-inflammation nonsteroid) with a percentage of 37.5%, followed by vitamin and nutrition complement at 29.2% and antibiotics at 17.7%. This study shares similar findings with some studies showing that analgesia is the most commonly used for self-medication, mainly for treating toothache, headache, joint pain, and dysmenorrhea. Vitamins and supplements are the second highest after NSAID with 29.2%. (Saputra et al., 2021) in their research identify an increase in vitamin and supplement sales before and after the pandemic.

Antibiotics are the third highest medicine type owned by patients in their houses. (Wondimu et al., 2015) affirm the phenomenon above and add that the high amount of unused antibiotics may indicate bacterial resistance towards antibiotics. Antibiotics, hypertension medicine, and diabetes medicine are prescription drugs. The fact that there are remaining medicines of these types indicates misunderstanding and low obedience towards medicine consumption. Doctors and pharmacists as health practitioners who play roles in medicine prescription and administration to patients should consider educating patients to properly complete the medication and consume medicines as prescribed. Thus, unused medicines from chronic and infectious diseases can be prevented.

**Table 1. Characteristics of patients at Puskesmas Umbulharjo 1 Yogyakarta**

| Characteristic | Number (n=96) | Percentage (%) |
|---|---|---|
| **Gender** | | |
| Male | 48 | 50 |
| Female | 48 | 50 |
| **Age** | | |
| 18-30 years old | 54 | 56.3 |
| 31-40 years old | 13 | 13.5 |
| 41-49 years old | 17 | 17.7 |
| 50-59 years old | 9 | 9.4 |
| ≥ 60 years old | 3 | 3.1 |
| **Education** | | |
| Primary School | 2 | 2.1 |
| Junior High School | 6 | 6.3 |
| Senior High School | 46 | 47.9 |
| Diploma | 10 | 10.4 |
| S1/S2/S3 | 32 | 33.3 |
| **Working status** | | |
| Employee | 21 | 21.9 |
| Businessman | 11 | 11.5 |
| None | 6 | 6.3 |
| Student | 24 | 25.0 |
| Entrepreneur | 34 | 35.4 |
| **Having unused medicine** | | |
| Yes | 70 | 72.9 |
| No | 26 | 27.1 |
| **Ever receiving information about proper medicine disposal** | | |
| Yes | 25 | 26 |
| No | 71 | 74 |
| **Knowing that incorrect medicine disposal poses a danger to the environment and residents' health.** | | |
| Yes | 76 | 79.2 |
| No | 20 | 20.8 |

**Table 2. Classification of unused medicines owned by patients at Puskesmas Umbulharjo 1 Yogyakarta within the period of April-June 2022**

| Classification of Unused Medicines | Number (n=149) | Percentage (%) |
|---|---|---|
| NSAID (Paracetamol, Ibuprofen) | 36 | 37.5 |
| Vitamin and nutrition supplement | 28 | 29.2 |
| Antibiotics | 17 | 17.7 |
| Cough medicine | 14 | 14.6 |
| Antihistamine | 12 | 12.5 |
| Anti-hypertension medicine | 9 | 9.4 |
| Anti-ulcer medicine | 8 | 8.3 |
| Anti-diabetes medicine | 4 | 4.2 |
| Herbal medicine | 4 | 4.2 |
| Others | 17 | 17.7 |

**Reasons for unused medicines**

Unused medicines can be caused by patients' low obedience, irrational medicine excess or prescription, or lack of monitoring towards potent drug purchase with no doctor's prescription. Among those factors causing medicines to not be consumed anymore are medication change, patients' death, patients' recovery, or medicine expiration. This study discloses that some patients have more than one reason why they stop consuming drugs. Those reasons are written in the following Table 3.

**Table 3. Reasons for unused medicines of patients at Puskesmas Umbulharjo 1 Yogyakarta**

| Reasons for Unused Medicines | Number (n=133) | Percentage (%) |
|---|---|---|
| Improved health condition | 49 | 51 |
| Expiration | 26 | 27.1 |
| Medication change | 19 | 19.8 |
| Excessive medicine amount | 15 | 15.8 |
| Side effects or allergy | 7 | 7.3 |
| Damaged or unclear medicine label | 4 | 4.2 |
| Not knowing the medicine function | 2 | 2.1 |
| Difficulty in understanding the drug use instruction | 0 | 0 |
| Others | 11 | 11.5 |

The primary reasons for those unused medicines are improved health conditions 51% and drug expiration 27.1%. Another study carried out in Thailand derived a similar finding in which the majority of patients (73.5%) experience betterment and recovery so that they do not feel the need to continue the medication (Wongpoowarak et al., 2010). In addition, an empirical investigation in Barcelona shows that better health condition is the second highest reason after drug expiration for 24.91% (Coma et al., 2008). Socialization towards patients regarding their medications and diseases during communication, information, and education about the drug- help to increase patients' obedience to consuming their medicines. Besides, rational drug prescription (adequate for patients' needs) reduces residual drugs.

**Distribution of opinions related to unused medicine disposal practice of patients at Puskesmas Umbulharjo 1 Yogyakarta**

The following table presents information on patients' opinions at Puskesmas Umbulharjo 1 Yogyakarta regarding the practice of medicine disposal.

**Table 4. Opinions of patients at Puskesmas Umbulharjo 1 Yogyakarta regarding unused medicine disposal practice**

| Opinions Regarding Unused Medicine Disposal Practice | Response | Number (n= 96) | Percentage (%) |
|---|---|---|---|
| Returning to the health workers | Yes | 45 | 46.9 |
| | No | 51 | 53.1 |
| Returning to the pharmacy | Yes | 42 | 43.8 |
| | No | 54 | 56.3 |
| Flushing in the sink | Yes | 36 | 37.5 |
| | No | 60 | 62.5 |
| Storing at home | Yes | 30 | 31.3 |
| | No | 66 | 68.8 |
| Flushing in the toilet | Yes | 27 | 28.1 |
| | No | 69 | 71.9 |
| Giving to patients' relatives or family | Yes | 15 | 15.6 |
| | No | 81 | 84.4 |

Based on the above Table 4, regarding patients' behaviors on unused medicine disposal, 46.9% of total patients perceive that returning the drugs to the health officials is the proper practice. 43.8% of patients confirm that the correct procedure is returning the pharmaceuticals to the pharmacy. Those facts are in line with the research finding conducted in Kuwait (Abahussain et al., 2006) stating that 54% of patients consider safe medicine disposal by returning it to the pharmacy.

Giving unused medicines back to pharmacies or health workers is the most proper procedure of medicine disposal, or in some countries, it is called a take-back program (Bashaar et al., 2017). The pharmacy will collect and perform drug disposal according to the legal system and law.

Drug disposal can be done by referring to the guide from WHO, health office, and campaigns such as *Gema Cermat*- a movement of intelligent drug disposal- or *Dagusibu* – get, use, store, and dispose of drugs- by destroying solid drugs first before throwing it away to the trash bin, and for liquid medicine, by dispensing and diluting it first before throwing the bottles to the container (Bashaar et al., 2017; Depkes RI, 2008).

**Reasons of patients' at Puskesmas Umbulharjo 1 Yogyakarta in selecting unused medicine disposal methods**

The respondents' reasons for choosing the medicine disposal method are presented in Table 5.

When given question of the reason in choosing the safe drug disposal, 76 patients (79.2%) mention to avoid drug misuse, 41 patients (42.7%) respond to prevent environmental pollution, and 23 patients (24%) state to preclude undesired side effects. This result difference from a study carried out in India by (Jamison et al., 2013) who report that more than half of their respondents (55%) believe that medicine is used to cure patients, so that it does not generate negative impact for the surrounding environment.

**Table 5. Reasons in choosing unused medicine disposal methods of patients at Puskesmas Umbulharjo 1 Yogyakarta**

| Reason in Choosing Unused Medicine Disposal Method | Number (n= 140) | Percentage (%) |
|---|---|---|
| Preventing drug abuse | 76 | 79.2 |
| Preventing environmental pollution | 41 | 42.7 |
| Preventing side effect | 23 | 24 |

How to dispose of unused medicines properly can be a part of socialization materials to improve the community's understanding of the related matter. With this effort, the citizens are aware that incorrect medicine disposal poses undesired effects for individuals and the public. By doing so, the citizens will need to know how to properly dispose of their unused remaining drugs. This goes along with what (Angi'enda & Bukachi, 2016) mention that a systematic and coordinated movement is necessary to campaign the existing risks, negative impacts, and management of unused medicines. The training can be done by the government and related institutions responsible for drug management, such as the pharmacy community or pharmacy industry.

**Correlation between patients' characteristics and proper unused medicine disposal at Puskesmas 1 Umbulharjo Yogyakarta**

The data which had been analyzed using univariate analysis with descriptive method at Puskesmas Umbulharjo 1 Yogyakarta were analyzed using chi square method with SPSS software to figure out the correlation between respondents' characteristics with the existing variables. The analysis result showed that there was a significant correlation between gender and handling unused medicine by storing it at home (p=0.002) and returning it to the patients' family or relative (p=0.049) with a confidence level of 95% or $\alpha = 0.05$. In addition, a relationship was found between education background with unused medicine disposal practice.

The patients' education background was categorized into lower and higher education. Lower education categories included non-school-graduates, primary school graduates, and high school graduates, while the higher education category covers diploma, undergraduate, and graduate school. This study revealed a significant correlation between education background and drug disposal practice of storing it at home with a value of p=0.000 with a confidence level of 95% or $\alpha = 0.05$). In contrast, no significant relationship was found between age, working status, and unused medicine disposal practice.

The correlation between patients' characteristics and unused medicine disposal practice can be seen on the following Table 6.

Age, gender, and socioeconomic level have a role in determining individual attitudes and behavior. Age determines the maturity of thinking, Education is one of the things that affect the mindset, so personal characteristics indeed have a significant influence on behavior, in this case, is the behavior of handling unused drugs. This aligns with Notoatmojo's opinion (2010) that maintenance behavior depends entirely on knowledge, education, understanding, awareness, and willingness in decision-making. Increasing age also affects behavior change (Notoatmodjo, 2010). Adult education is generally more varied, because adults already have knowledge, attitudes, and skills that have been possessed for years.

This condition requires the role of pharmacists as agents of change in providing education to the public about how to manage well. This effort can also be carried out as a suggestion for more in-depth research on the impact and role of pharmacists in increasing public awareness related to the management of unused medicine.

**Table 6. Correlation between patients' characteristics and opinions on safe disposal practice of unused medicine at Puskesmas Umbulharjo 1 Yogyakarta**

| Characteristic | Opinions on Safe Disposal Practice of Unused Medicine (*p-value*) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flushing to the sink | | | Storing at home | | | Returning to the pharmacy | | | Flushing to the toilet | | | Giving to relatives | | | Returning to health workers | | |
| | Yes | No | *p* | Yes | No | *p* | Yes | No | *p* | Yes | No | *P* | Yes | No | *p* | Yes | No | *p* |
| **Gender** | | | | | | | | | | | | | | | | | | |
| Male | 16 | 32 | 0.399 | 22 | 26 | 0.002 | 24 | 24 | 0.217 | 11 | 37 | 0.256 | 11 | 37 | 0.049 | 27 | 21 | 0.066 |
| Female | 20 | 28 | | 8 | 40 | | 18 | 30 | | 16 | 32 | | 4 | 44 | | 18 | 30 | |
| **Age** | | | | | | | | | | | | | | | | | | |
| <45 | 25 | 51 | 0.069 | 25 | 51 | 0.498 | 34 | 42 | 0.704 | 20 | 56 | 0.442 | 10 | 66 | 0.194 | 35 | 41 | 0.753 |
| >45 | 11 | 9 | | 5 | 15 | | 8 | 12 | | 7 | 13 | | 5 | 15 | | 10 | 10 | |
| **Education Background** | | | | | | | | | | | | | | | | | | |
| (Lower Education) | 23 | 31 | 0.243 | 26 | 28 | 0.000 | 25 | 29 | 0.569 | 16 | 38 | 0.710 | 11 | 43 | 0.147 | 27 | 27 | 0.487 |
| (Higher Education) | 13 | 29 | | 4 | 38 | | 17 | 25 | | 11 | 31 | | 4 | 38 | | 18 | 24 | |
| **Working Status** | | | | | | | | | | | | | | | | | | |
| Employed | 9 | 23 | 0.180 | 10 | 22 | 1.000 | 11 | 21 | 0.190 | 6 | 26 | 0.149 | 10 | 27 | 1.000 | 13 | 19 | 0.386 |
| Unemployed | 27 | 37 | | 20 | 44 | | 31 | 33 | | 21 | 43 | | 5 | 54 | | 32 | 32 | |

## CONCLUSION

Opinions on patients' practice of unused medicine reveal that the majority of patients return unused medicine to health workers for as many as 45 patients (46.9%). There is a correlation between gender and opinion on drug disposal practice of storing the drug at home with a value of $p$=0.002 and returning the drug to patients' relatives with a value of $p$=0.049. In addition, there is a significant relationship between patients' education background and medicine disposal practice of storing it at home with a value of $p$=0.000 with a confidence level of 95% or $\alpha = 0.05$.

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