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The Effect of Poster Education on Public Knowledge of BEYOND-USE DATES in Bekasi Regency

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Abstract
There are two terms related to the time of use of drugs, namely the expiration date (ED) which is determined by the manufacturer, and beyond use date (BUD) which refers to the period of time after the drug is prepared or the primary packaging is opened. Indonesian people tend to store drugs based on ED. Ensuring the safe use of medicines is the role of pharmaceutical personnel, including providing information related to BUD. This research aims to determine the influence of poster media on the level of public knowledge and determine the role of pharmaceutical staff in providing information related to BUD. The research method used was an experimental survey of 600 respondents, using validated questionnaires and poster, which was carried out in hospital pharmacies, clinics, primary health care centers and pharmacies in Kabupaten Bekasi. The research results showed a significant difference in the pre-test and post-test scores with the Asymp.Sig scores. 0.000, which means that there was an increase in the level of knowledge of respondents after conveying BUD information through poster media, and as many as 80.3% of respondents stated that they had never received information related to BUD from pharmacy personnel. The poster has proven effective in increasing public knowledge regarding BUD. The active role of pharmaceutical personnel needs to be increased to ensure the safety and effectiveness of drug use in the community.
Keywords: BUD; Knowledge; Poster;

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Introduction

Drug storage at home is a global public health concern, primarily due to inappropriate drug use and/or non-adherence to prescribed therapies, which consequently affect health, the environment, and healthcare services. The prevalence of drug storage ranges from 35.1% to nearly 100%. Tablets are the most dosage form (more than 60%), followed by syrups/suspensions and capsules, ranking second and third, respectively (Jafarzadeh, Mahboub-Ahari, Najafi, Yousefi, & Dalal, 2021)

The Indonesian population has a habit of storing medicines at home either for first aid purposes and/or keeping leftover drugs from previous treatments, even after the illness has resolved (Noviani, 2023). According to the 2023 Indonesian Health Survey (SKI), 47.1% of 616,110 respondents obtained medicines without a prescription, and 72.0% of them purchased from licensed pharmacies or drug stores. This indicates widespread self-medication to manage symptoms or treat illnesses. Additionally, 45.6% of 266,027 respondents reported receiving or inquiring about drug-related information; among them, 46.8% obtained information about expiration dates, while only 23.0% received information regarding drug storage (Badan Kebijakan Pembangunan Kesehatan, 2023).

Improper drug storage may affect drug stability and efficacy. Storing unnecessary, expired, and/or damaged drugs poses health risks because chemical degradation may alter drug effectiveness or cause adverse effects (Badan Pengawas Obat dan Makanan, 2019). One essential parameter for drug storage is the storage time limit, which consists of the expiration date (ED) and the beyond use date (BUD) (Noviani, Rachmawati, & Sciences, 2023). ED refers to the expiration date determined by the pharmaceutical industry, indicating that the product can be used until the stated date as long as it remains unopened in its original packaging. BUD refers to the date after which a compounded or repackaged preparation should not be used, determined based on the date of preparation (Engel & Lazar, 2016)

Several studies reveal limited public knowledge about BUD. A study in Menteng District, Central Jakarta, reported that 56.36% of 110 respondents had insufficient knowledge (Kurniawan, Hasbi, & Arafah, 2023). Another study assessing patients' knowledge at Kimia Farma Pahlawan Pharmacy in Sidoarjo showed that 53.8% of 171 respondents had a moderate level of knowledge (Puspadina & Chresna, 2023). A study in North Jakarta revealed that 97% of 60 respondents were unaware of BUD, and 100% had never received BUD information from pharmacists.

The public has the right to obtain comprehensive drug information, including dosage, dosage form, special formulations, route and method of administration, pharmacokinetics, pharmacology, therapeutic and alternative options, efficacy, safety during pregnancy and lactation, side effects, interactions, stability, availability, price, and physicochemical properties, whether drugs are obtained through prescriptions or self-medication in any pharmacy service facility. Drug information provision can be carried out through patient counseling and education, as well as via bulletins, brochures, or leaflets. This study aimed to determine the role of pharmacy personnel in educating the public about BUD and to analyze the effect of poster-based education on public knowledge levels.

Method

This research employed a descriptive-comparative design with a quantitative experimental survey approach. The study was conducted in 12 locations—three hospital pharmacies, three clinics, three public health centers, and three community pharmacies—in Bekasi District between May and June 2024.

The research instruments included a Beyond Use Date (BUD) educational poster registered with the Directorate General of Intellectual Property, Ministry of Law and Human Rights, with registration number 000594794, and a validated questionnaire.

The study population comprised individuals receiving pharmacy services at the researchsites. Quota sampling was used, with 50 respondents at each location, totaling 600 participants. Ethical clearance was obtained (No. 334/EC/KEPK/STIKES-PI/IV/2024). Respondents meeting inclusion criteria were asked to participate, provided with a pre-test, educated using the poster, and then given a post-test. Knowledge levels were measured using a questionnaire consisting of 10 Guttman-scale statements, calculated using the formula:

$$\% \text{ actual score} = \frac{actual\ score}{ideal\ score} \text{ x } 100\%$$

The actual score represents the total correct answers, and the ideal score is the maximum possible score. Knowledge levels were categorized as “good” (>75%), “moderate” (60–75%), and “poor” (<60%). Sociodemographic data and the role of pharmacy personnel were analyzed using univariate analysis. The effect of poster-based BUD education was analyzed using the Wilcoxon test due to non-normal data distribution, processed with SPSS version 25.

Result and Discussion

Tabel 1
Sociodemographic Characteristics of Respondents

Sociodemographic Variables	Category	Frequency (%) n=600
Age (years)	17–25	130 (21.7)
	26–35	224 (37.3)
	36–45	150 (25.0)
	46–55	78 (13.0)
	56–65*	18 (3.0)
Gender	Male	153 (25.5)
	Female	447 (74.5)
Education Level	Primary School	46 (7.7)
	Junior High School	64 (10.7)
	Senior High School	323 (53.8)
	Bachelor’s Degree	122 (20.3)
	Others	45 (7.5)
Occupation	Housewife	285 (47.5)
	Private Employee	187 (31.2)
	Civil Servant	15 (2.5)
	Others	113 (18.8)

The sociodemographic characteristics of respondents are presented in Table 1. Age was categorized into five groups (Sonang, Purba, & Pardede, 2019). The age group of 19–59 years was classified as adults, representing a productive age range characterized by the ability to perform daily activities effectively and efficiently. Most of respondents were female (74.5%), which aligns with the predominant occupation being housewives (47.5%). This proportion may be attributed to data collection conducted during working hours, making women, particularly housewives, the dominant respondents. More than half of the respondents had completed high school (53.8%), consistent with the demographic profile of Bekasi District, where high school graduates comprise the highest proportion of the population, totaling 1.319.442 individuals.

Table 2
Role of Pharmacy Personnel in Providing BUD Education (n = 600)

"Have you ever received information about Beyond Use Date (BUD) from pharmacy personnel?"	**Frequency (%) n=600**
Yes	116 (19.3)
No	484 (80.7)

A total of 80.7% of the 600 respondents reported never receiving education about the Beyond Use Date (BUD) from pharmacy personnel (Table 2). This condition may result from time constraints during medication dispensing due to the high number of patients or the limited availability of pharmacy personnel. Pharmacists often write BUD information on drug labels but fail to communicate it effectively to patients (Cokro, Arrang, Chiara, & Hendra, 2022). One of the essential clinical pharmacy activities mandated by pharmaceutical service standards is Drug Information Service (PIO), in which pharmacy personnel, especially pharmacists, are required to provide education on drug-related information, including dosage, side effects, drug interactions, storage, and other relevant aspects to ensure safe and effective drug use

Table 3
Respondents' Knowledge Level Before and After BUD Education (n = 600)

Knowledge Level Category	**Frequency (%) n=600**	
	Pre-test	Post-test
Good	232 (38.7)	494 (82.3)
Moderate	172 (28.7)	57 (9.5)
Poor	196 (32.6)	49 (8.2)

The effect of BUD poster education is shown by changes in pre-test and post-test results across knowledge categories (Table 3). The percentage of respondents with good knowledge increased from 38.7% to 82.3%, accompanied by a decrease in moderate knowledge from 28.7% to 9.5% and poor knowledge from 32% to 8.2%. Limited knowledge may result from insufficient information received through direct education or media, such as posters, bulletins, or leaflets. Direct education through counseling or PIO can improve respondents' knowledge of BUD. Posters serve as an effective educational medium when strategically placed in pharmacy waiting areas, assisting pharmacy personnel in providing PIO. Other studies have also reported improvements in knowledge following educational interventions (Kartika, Aryani, Dahnis, & Normaidah, 2023); (Saputri et al., 2023).

Table 4
Correct Responses to Questions on BUD Before and After Education

Question	Frequency (%) n=600	
	Pre-test (%)	Post-test (%)
Beyond Use Date (BUD) is the time limit for drug use after the primary packaging is opened or damaged, such as compounded, mixed, or dissolved preparations.	59.5%	87%
Expired Date (ED) is the expiration date stated on the drug product packaging, determined by the pharmaceutical manufacturer, before the primary packaging is opened.	85.3%	97.5%
Tablets/capsules stored in plastic clip packaging should be used within 2 months after opening.	57.3%	87.7%
Compounded powdered drugs (puyer) and capsules should be used within 2 months after compounding.	47.3%	83.2%
Liquid syrup preparations should be used within 30 days after the bottle is opened.	67.3%	89.3%
Reconstituted dry syrup (e.g., antibiotic suspensions) should be used within 7–14 days.	74.8%	94.3%
Ointments/creams in tubes should not be used for more than 6 months after opening.	66.5%	90.2%
Compounded ointments/creams in jars should be used within 3 months after opening.	60.2%	87.3%
Ear/nasal drops should be used within 3 months after the seal is opened.	54.3%	85.8%
Eye drops should be used within 1 month after the seal is opened.	64.8%	89.7%

A total of 59.5% of respondents correctly answered questions regarding the definition of BUD before the intervention, which increased to 87% after education (Table 4).

Table 5
Correlation Between Education Level and Knowledge Level

	Pre-test– Post-test
Z	-14.270[b]
Asymp. Sig. (2-tailed)	.000

The correlation test using Spearman's rho (Table 5) showed no significant relationship between education level and knowledge ($p = 0.671 > 0.05$). This finding aligns with previous research, which reported no significant association between education and public knowledge regarding the management of leftover, damaged, and expired drugs (Pramestutie, Hariadini, Ebtavanny, & Aprilia, 2021). Knowledge or cognition is a crucial domain influencing an individual's actions. Factors affecting knowledge include memory, observation, curiosity, reasoning, logic, language, and human needs (Chusniah Rachmawati, 2019). Besides education, information and mass

media significantly influence knowledge, emphasizing the role of pharmacy personnel in providing information about BUD using mass media such as posters.

Table 6
Statistical Analysis of Pre-test and Post-test Differences Using the Wilcoxon Test

Education	Education Level			**Total** n=600	***P value*** (Spearman rho)
	Good	Moderate	Poor		
	Frequency (%)				
PS	23	9	14	46	0.671
JHS	26	18	20	64	
SHS	114	92	117	323	
Bachelor's Degree	50	39	33	122	
Other	19	14	12	45	

The Wilcoxon test analysis showed a statistically significant difference ($p = 0.000 < 0.05$), indicating a significant improvement in respondents' knowledge after receiving BUD education through posters (Table 6). Educational media such as posters, leaflets, and bulletins are effective in improving knowledge (Karim, Adam, & Idris, 2024). Posters convey written messages using both text and images designed to attract attention, emphasizing message strength, visuals, and colors to influence behavior and attitudes (Sumartono & Astuti, 2018).

Conclusion

Pharmacy personnel, particularly pharmacists, play a crucial role in providing information as one of the key factors influencing knowledge. Pharmacists need to strengthen their role in BUD education to ensure the safe and effective use of medicines. Poster-based education significantly improves public knowledge of BUD and should be strategically placed in pharmacy service waiting areas to optimize educational outreach.

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