

Pharmacist knowledge and management of LASA medicines in preventing medication error in Semarang Regency Pharmacies

Ranita Rahmaniar^{1*}, Aditya Arya Dewantara¹, Nala Khodlil Mubarak², Bella Citra Islami¹, Eka Putri Maharani¹, Nada Amatullahi Kamilah¹

¹ Pharmacy Study Program, Faculty of Medicine Universitas Negeri Semarang, Indonesia

² Medical Study Program, Faculty of Medicine Universitas Negeri Semarang, Indonesia

*Corresponding author's email: ranitarahmaniar@mail.unnes.ac.id

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Abstract

Background: The development of the pharmaceutical industry has produced drugs with similar names and physical forms, known as LASA. The similarity of LASA drugs is a serious concern because it can cause confusion among pharmacist and increases the possibility of errors at dispensing, such as taking the wrong drug. LASA drug management is pharmacist's responsibilities in pharmaceutical services. This study aims to evaluate the knowledge of pharmacist and the management of LASA drugs in Semarang Regency Pharmacies.

Method: This study is a non-experimental study. Questionnaires were given to pharmacists in Semarang Regency Pharmacies. The results were tested using Chi Square to determine the relationship between knowledge and management, knowledge and errors in taking LASA drugs and management and errors in taking LASA drugs.

Results: The results of the study showed that the knowledge of pharmacists >70% was in the good category. LASA drug management has been carried out in >70% of pharmacies. There are still 32.47% medication errors in taking LASA drugs. Analysis showed that there was no significant relationship between knowledge, LASA drug management, and errors in taking LASA drugs.

Conclusion: From this study it can be concluded that LASA drug management in Semarang Regency Pharmacies is in the good category.

Keywords: Knowledge, Drug Management, Pharmacist, Pharmacy Technician, Look Alike Sound Alike.

INTRODUCTION

The development of drug production is currently growing rapidly, resulting in many drugs on the market that have similar names and shapes or *Look Alike Sound Alike* (LASA) (1,2). LASA drugs have the potential to confuse pharmacy personnel, which in turn can cause *medication errors*, so the management of LASA drugs needs to be vigilant. *Medication errors* quite often occur in the dispensing phase, which occurs when preparing and delivering drugs based on prescriptions by pharmacy personnel. *Medication errors* have so far been able to cause various impacts for patients ranging from mild to severe risks such as being the cause of death (3,4). LASA drug management is related to pharmaceutical

services at health care facilities. With optimum drug management, it is expected that good quality drugs can be available in the type and quantity according to patient needs (5,6). One of the roles of pharmacy personnel in pharmaceutical services is the management of LASA drugs. In managing drugs effectively, knowledge of LASA drug management is required (7). Pharmacy personnel are expected to pay attention to the management of LASA drugs, one of which is storage because there is a possibility of *medication errors*, one of which is due to errors in drug retrieval at the storage place (8–10).

Research on LASA drug management has been conducted in several pharmacies across Indonesia. Study in Medan revealed

that 50% of pharmacies implemented LASA drug storage in accordance with the Minister of Health Regulation Number 58 of 2014 (1). Previous research in Surakarta found that only about 13% of the 117 pharmacies studied stored LASA drugs properly. The poor management of LASA drugs is due to the knowledge of pharmacy personnel that has not been maximized (11). Another research in Tegal City indicated that more than 80% of pharmacy personnel had a good level of knowledge and also the LASA drug management practices were carried out properly (12). Similarly, study in the DIY Province found that less than 42% of pharmacies managed LASA drugs properly, and less than 60% of pharmacist demonstrated good knowledge related to LASA drugs. Moreover, more than 50 pharmacists reported making mistakes when handling LASA drugs (13).

Currently, similar research is primarily focused on pharmacists and has not yet included pharmacy technicians. Like pharmacists, pharmacy technicians also need to understand LASA drugs. Additionally, studies on the management of LASA drugs in pharmacies are still limited. This study aims to assess the knowledge of pharmacy personnel, including both pharmacists and pharmacy technicians, as well as to evaluate the management of LASA drugs and the incidence of LASA drug errors in pharmacies in Semarang Regency.

METHOD

Study Design

This was a descriptive non experimental (observational) using a cross sectional study. This study was conducted in Community Pharmacists in Semarang Regency Pharmacies.

Setting and Sampling

The data were collected during the period from June 1, 2024 to September 2024 among pharmacists and pharmacy technicians in Semarang Regency Pharmacies.

Instrument

Data collection was carried out using a questionnaire in Indonesian language containing informed consent and a list of questions related to LASA drugs. The questionnaire contained 6 questions related to knowledge of LASA drugs, 10 questions related to storage of LASA drugs and 1 question related to errors in administering LASA drugs in Semarang Regency Pharmacies. The validity and reliability of the questionnaire was tested on 30 preliminary results of questionnaires that had been distributed previously to non-sample respondents and analyzed using SPSS.

Data Collection

The flow in this study begins with preparation by preparing a proposal submitted to the Faculty of Medicine, Universitas Negeri Semarang and licensing at Semarang Regency Health Office (Indonesian: Dinas Kesehatan), the Semarang Regency Indonesian Pharmacists Association (Indonesian: Ikatan Apoteker Indonesia, officially abbreviated as IAI) and the Semarang Regency Indonesian Pharmacists Association (Indonesian: Persatuan Ahli Farmasi Indonesia, officially abbreviated as PAFI). The research team directly collected data by conducting random visits to various pharmacies. The data obtained were recorded immediately after the visit and each questionnaire was rechecked to ensure completeness of the answers.

Data Analysis

Data analysis was carried out analytically using Software Statistical Package for Social Sciences (SPSS) version 25. Quantitative analyses of respondent characteristics are presented in tables and graphs. The knowledge of pharmacy personnel was evaluated using questionnaires with questions 1 to 6, categorized as good (total score >average) or poor (total score <average). LASA medication management was assessed through questionnaires with questions 1 to 10, also divided into the same categories. The Chi-Square test was used to determine the relationship between knowledge, LASA

medication management, and medication errors in Semarang Regency pharmacies. A significance value of <0.05 indicated a significant relationship, while a value of >0.05 indicated no significant relationship. The results were analyzed and presented narratively, concluding with a discussion and a research report, which was subsequently developed into a scientific article for publication.

RESULTS

Respondent Characteristics

According to data from the Badan Pusat Statistik, there were 123 pharmacies in Semarang Regency in 2023, distributed across 19 sub-districts (14). characteristics data of respondents in this study such as types of pharmacy personnel, age, gender, education level, length of work, and pharmacy location. These characteristics are presented in Table 1.

Characteristics	n	%
Pharmacy Personnel		
Pharmacist	28	36.36
Pharmacy Technician	49	63.64
Age		
< 25 years	7	9.09
25-30 years	19	24.68
30-35 years	27	35.06
35-40 years	9	11.69
40-45 years	12	15.58
45-50 years	1	1.30
> 50 years	2	2.00
Gender		
Male	10	12.99
Female	67	87.01
Education Level		
Diploma of Pharmacy	37	48.05
Bachelor of Pharmacy	12	15.58
Bachelor of Pharmacy - Pharmacist	19	24.68
Magister of Pharmacy - Pharmacist	9	11.69
Length of Work		
< 5 years	27	35.06
> 5 years	50	64.94

Characteristics	n	%
Location of The Pharmacy		
Getasan	6	7.79
Tengaran	3	3.90
Susukan	1	1.30
Kaliwungu	5	5.49
Suruh	1	1.30
Pabelan	1	1.30
Tuntang	3	3.90
Banyubiru	2	2.60
Jambu	2	2.60
Sumowono	6	7.79
Ambarawa	9	11.69
Bandungan	4	5.19
Bawen	1	1.30
Bringin	1	1.30
Bancak	5	6.49
Pringapus	4	5.19
Bergas	7	9.09
Ungaran Barat	8	10.39
Ungaran Timur	8	10.39

Table 1 shows that most of the respondents were Pharmacy Technicians, accounting for 63.64%. This corresponds with their highest education level, where the majority held a D3 in Pharmacy, representing 48.05%. The age group of respondents was predominantly 30-35 years, comprising 35.06%, and the majority identified as female, at 87.01%. Additionally, 64.94% of respondents had more than 5 years of work experience.

Knowledge of Pharmacy Personnel in Semarang Regency Pharmacies Regarding LASA Drugs

This questionnaire on the knowledge of pharmacy personnel related to LASA preparations aims to determine the level of knowledge of pharmacy personnel, both pharmacists and pharmacy technicians related to LASA preparations in Semarang Regency Pharmacies. Respondents received 6 statements related to knowledge of LASA drugs. The questionnaire contained 6 questions with 5 true statements and 1 question with a false statement. The answer options that have been determined based on the Guttman scale with the answer score on the knowledge level questionnaire, if the answer "True" is given a score of 1, the

answer "False" is given a score of 0. The questions and results of pharmacy personnel's knowledge of LASA drugs are in Table 2.

Tabel 2. Statement Regarding the Knowledge of Pharmacy Personnel Practicing in Semarang Regency Pharmacies on LASA Drugs

No	Statement	Average
1	In the classification of drugs, there are drugs with the <i>Look-Alike Sound-Alike</i> (LASA) group	1.00
2	There are drugs whose names are often confused with other drug names due to their similarities	1.00
3	There are drugs that, when pronounced, sound like other drug names due to their similar sounds	1.00
4	LASA drugs are stored on drug shelves according to specific guidelines	0.99
5	LASA drug names are written with the <i>Tall Man Lettering</i> method	0.97
6	LASA drugs should be checked in stages before being dispensed to the patient	0.74

The results shown in table 2 indicate that some pharmacy personnel have limited knowledge on several questions. The table displaying the percentage of knowledge among pharmacy personnel on LASA drugs is presented in Table 3.

Table 3. Pharmacy Personnel Knowledge of LASA Drugs

Pharmacy Personnel	n	%
Good Criteria	56	72.73
Pharmacist	18	23.38
Pharmacy Technician	38	49.35
Poor Criteria	21	27.27
Pharmacist	10	12.99
Pharmacy Technician	11	14.29

The data presented in Table 3 show the lowest knowledge score for pharmacists is 5, while the highest score is 6. For pharmacy technicians, the lowest knowledge score is 3, and the highest score is also 6. The level of knowledge of pharmacists and pharmacy technicians

regarding LASA drugs had an average score of 5.70 out of a maximum of 6.

Management of LASA Drugs in Semarang Regency Pharmacies

The questionnaire on the management of LASA drugs aims to assess the level of management practices among Pharmacy Personnel working in Semarang Regency Pharmacies. Respondents were presented with a questionnaire consisting of 10 statements related to LASA drug management. The answer options were predetermined and categorized into 'ever done' and 'never done.' The questions concerning the management of LASA drug preparations are detailed in Table 4.

Table 4. Questions of LASA Drug Management in Semarang Regency Pharmacies

No	Questions	Average
1	Do you put "LASA" stickers on the shelves or storage containers of LASA category drugs in the pharmacy?	0.86
2	Do you organize LASA medicines in the pharmacy in a way that they are interspersed with other medicines?	0.92
3	Do you store LASA medications in the pharmacy on separate shelves, or are they stacked with other medications?	0.75
4	Do you store LASA medications in a pharmacy where the Tall Man Lettering method is used to highlight different letters in similar drug names for differentiation?	0.79
5	Do you store LASA medicine according to the temperature indicated on the medicine package?	0.96
6	Do you store LASA drugs using the FEFO and/or FIFO system?	0.99
7	Do you get LASA drugs from an official distributor (PBF)?	0.95
8	Do you have a list of LASA drugs at the pharmacy?	0.73
9	Do you record the mutation of LASA drugs on the stock card either manually or electronically?	0.83
10	Do you document any instances of LASA medication mismanagement that could result in medication errors?	0.82

Table 4 shows that the average management of LASA preparations in Semarang Regency pharmacies is 8.60 out of a maximum of 9 points. The level of management of LASA preparations in Semarang Regency pharmacies shows that of the 77 respondents practicing in pharmacies, those who have carried out drug management properly are 54 pharmaceutical workers or 70.13%. Based on observations and interviews, several LASA drugs were found in Semarang Regency pharmacies. LASA drugs found in Semarang Regency pharmacies are shown in table 5.

Tabel 5. List of LASA Drugs in Semarang Regency Pharmacies

Look Alike	Sound Alike
• Amlodipine 5 mg - Amlodipine 10 mg	• Asam MEFENamat - Asam TRANEXamat
• Furosemide tab - Ramipril 5 mg tab	• MetroNIDAZOLE - metoCHLORPAMIDE
• ISDN tab - Nifedipine tab	• DexTAMIN - DexTEEM PLUS
• Histapan - Heptasan	• GliBENCLAMID - GliMEPIRIDE
• Glimepiride 1 mg - 4 mg	• DiPHENHYDRAMIN - diMENHYDRINAT
• Salbutamol 2 mg - Simvastatin 10mg	• CIPROfloxacin - LEVOfloxacin
	• PredniSON - Methyl predniSOLON
	• LANSOprazol - OMEprazol
	• FARizol – FARgetix
	• MELOxicam - PIROxicam
	• RenaDINAC - RenaBETIC
	• ePERison – eSPERison
	• EPERISON - ELSIRON
	• VoITADEX - VoITAREN
	• HiStapan - HEptasan
	• OMEroxol - OMEdrinat

Errors in Administering LASA Drugs in Semarang Regency Pharmacies

This section examines the error rate in administering LASA drugs among pharmacy personnel, aiming to determine whether mistakes have occurred during the

handling of these medications. Respondents were asked the question, “Have you ever experienced an error when taking or preparing LASA drugs?” The response options were categorized as “yes” or “no.” According to the study results, 25 pharmacy personnel, representing 32.47%, reported having made mistakes in administering LASA drugs. A detailed breakdown of errors reveals that 7 pharmacists (25%) and 17 pharmacy technicians (34.69%) have encountered errors in handling LASA medications.

Relationship Between Knowledge, Management, and Errors in Taking the LASA Drugs in Semarang Regency Pharmacies

In this study, statistical analyses were conducted using the Chi-Square test with a significance level set at 0.05. A significance value ≥ 0.05 indicates no significant relationship, while a significance value ≤ 0.05 suggests a significant relationship. The relationship between the knowledge of pharmacy personnel, the management of LASA drugs, and errors in taking LASA drugs in pharmacies in Semarang Regency is presented in Table 6.

Table 6. The Relation between Knowledge, Management, and Errors in Taking LASA Drugs in Semarang Regency Pharmacies

Test Variable	p-value	Interpretation (Sign ≤ 0.05)
Knowledge and Management of LASA Drugs	0.988	No significant relationship
Knowledge and Errors in Taking of LASA Drugs	0.403	No significant relationship
Management and Errors in Taking of LASA Drugs	0.189	No significant relationship

Table 6 shows that all significance values are ≥ 0.05 , indicating that there is no significant relationship between the knowledge of pharmacy personnel and the management of LASA drugs, between the knowledge of pharmacy personnel and errors in taking LASA drugs, and between the management of LASA drugs and errors

in taking LASA drugs at Semarang Regency pharmacies.

DISCUSSION

LASA errors are a major cause of medication errors, which are a serious problem in healthcare. Based on research, this type of error contributes to 6 to 14% of total medication errors. This is very risky for patient safety because it can result in the administration of the wrong medication, either in terms of type, dose, or frequency of administration. As a result, patients can experience an overdose, subdose, or even receive medication that is not appropriate for their medical condition. These errors can occur when the medication is prescribed, prepared, or given to the patient. Common confusion is between generic name - generic name, brand name - brand name or generic brand name - brand name (15,16).

Lack of knowledge possessed by pharmacists can worsen the health condition of patients. Drug grouping is an important factor in determining the appropriate drug to be given to patients. In order to prevent errors in drug administration, pharmacists need to continuously improve their knowledge of drugs and always prioritize patient safety in every pharmaceutical action (13). If the knowledge of pharmacists about LASA drugs is improved, then their attitudes and actions in handling drugs with similar names and forms will change for the better. This change in attitude will encourage them to improve the way they store and handle LASA drugs, so as to minimize the occurrence of drug administration errors. To achieve this, ongoing training and support from all health workers are needed, with the main goal of ensuring patient safety (17).

Based on this study, the knowledge levels of both pharmacists and pharmacy technicians regarding LASA drugs and management of LASA drugs fall within the 'good' criteria with Nearly one-third of pharmacy personnel have made errors in taking LASA drugs pharmacy personnel. Based on this study, not all pharmacy personnel have the knowledge that LASA

drugs should be stored on drug shelves according to special guidelines, written using the Tall Man Lettering method and must be checked in stages before being given to patients.

LASA drugs should be stored in separate cabinets or separated on different or spaced shelves. This is done to prevent drugs taking errors. In this study, Some pharmacists do not have the knowledge that LASA drugs should be separated from each other. This is similar to other studies that found that LASA drug storage in Tegal City and Medan City's Pharmacies was not placed on different shelves, not placed close together and LASA drugs must be given special marks to prevent drug taking errors (1,5). Pharmacies do not separate storage based on dose or dosage form, one of the reasons is because the number of pharmacists is limited so they do not have enough time to store LASA drugs based on their place. Pharmacists only put the drugs on the same drug shelf. Drug administration errors that can occur at this stage can occur, one of which is in the prescribing process (prescribing), transcribing (prescription translation), dispensing (preparation), and administration because the drug names are very similar so that they can result in inappropriate drug services and can endanger patients. Marking using stickers is also still not widely used in pharmacies in Semarang Regency. The provision of LASA stickers can facilitate the taking of drugs and minimize errors in drug services to patients (1,18).

Some pharmacists in Semarang district pharmacies have also not used the Tall Man Lettering system in writing LASA drugs. This is similar to similar studies conducted in Yogyakarta City, Pontianak City and Bandung which found that there are still pharmacies that do not apply the Tall Man Lettering (13,18,19). To reduce the risk of medication errors due to similar names, ISMP has created a list of potentially confusing drugs and recommends using the Tall Man Lettering case for different parts of the name to highlight the differences. This list includes

not only generic drugs, but also branded drugs. This idea has received support from the US Food and Drug Administration through its Name Differentiation Project. By highlighting the differences in letters in different parts of the name, drugs that at first glance appear the same become easier to distinguish. A list of Tall Man Lettering is usually available in hospitals and is used on drug labels and storage areas. However, the use of Tall Man Lettering alone is not enough. It needs to be supported by training for health workers, the use of barcode scanning, and more thorough checks to ensure patient safety (20,21).

In this study, some pharmacists do not have the knowledge that LASA drugs should be checked in stages before being dispensed to the patient. LASA drugs are high-alert drugs. Double check must be done before dispensing LASA drugs. Pharmacists must screen prescriptions when receiving prescriptions from patients, and double check the conformity between the prescription and the patient's identity when preparing the drug according to the prescription. In addition to the patient's identity, the form and dosage of the drug, the amount, and the rules of use are also checked to prevent errors (18–20,22).

In terms of drug management, in addition to LASA drugs not being stored in special containers and not following the Tall Man Lettering rules, pharmacies in Semarang Regency also do not have a list of LASA DRUGS in the pharmacy. This is similar to research in Pontianak City and Situbondo Regency where some pharmacies do not yet have a list of LASA drugs. In fact, a list of LASA drugs should always be available in the drug room as a reference in identifying and handling drugs that have the potential to cause errors (18,22,23).

The LASA drug storage system can be done by placing the drug at a certain distance from other drugs, storing it in a separate drug box, storing it separately in rows and groups that have a LASA list, using LASA stickers, and using Tall Man lettering. This method can support the

accuracy of pharmacists in preparing patient drugs and reduce the possibility of taking the wrong drugs that can cause medication error (22). There is no relationship between the knowledge of pharmacists and the management of LASA drugs in pharmacies, between the knowledge of pharmacists and errors in taking LASA drugs and between the management of LASA drugs and errors in taking LASA drugs in pharmacies. This is similar to previous studies which stated that there is no relationship between knowledge of management and errors in taking LASA drugs in pharmacies (13).

CONCLUSIONS

The majority of respondents were pharmacy technicians (63.64%), with most having a D3 in Pharmacy as their highest level of education (48.05%), were aged in the group was 30-35 years (35.06%), and a significant majority identified as female (87.01%). Furthermore, 64.94% had more than 5 years of work experience. The knowledge of pharmacists and pharmacy technicians regarding LASA drugs fell within the 'good' criteria, with an average score of 5.70 out of 6. The management of LASA preparations in pharmacies also met the 'good' criteria, scoring an average of 8.60 out of a maximum of 9 points. However, it was noted that 32.47% of respondents had made mistakes in taking LASA drugs. Additionally, there was no significant relationship found between the knowledge of pharmacy personnel, the management of LASA drugs, and errors in taking LASA drugs in Pharmacies in Semarang Regency.

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