

Patient View on Look-Alike, Sound-Alike (LASA) Medication Errors in a Saudi General Hospital: Responding, Experience and Contributing Factors

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Abstract

Background: The use of look-alike, sound-alike (LASA) medication in the outpatient and in-home-care areas is an important patient-safety hazard.

Aims: Determine the level of patient's awareness, experience, and contributing factors of the issue of LASA medication errors in one of the general hospitals in Saudi Arabia.

Methods: A descriptive cross-sectional survey comprised 148 outpatients in medical, dermatology, cardiology, and neurology clinics took place for a period of 3 months from May, to July 2024. Demographics, awareness, and experiences of LASA were evaluated with a structured questionnaire. The statistics were performed with chi-square test and Fisher exact test.

Results: The overall number of patients (n=148) included 64.2% women. The cohort included 50% participants with university education and or even higher. Twenty-four-point three percent (24.3%) indicated that they had been given the incorrect LASA medication at a time, most commonly as a result of either look-alike tablet/capsules (43.2 %) or

packaging (40.5 %). Education level, type of clinic, and keeping every option of medication in one place were markedly linked to LASA experience (P was .048, .047, and .049, respectively).

Conclusions: Patients awareness about the risks of LASA medication was moderate. Errors might be prevented by clear labeling; education and the way things are stored. Adoption of pre-packaged multi-dose dispensing in combination with the targeted patient counseling also can contribute to an increased safety.

1. Introduction

Prevention potential and actual medication error is one of the most important issue in Essential Safety Requirements. Many factors may contribute in medication error. One factor is called Look Alike Sound Alike (LASA). Determination the patients' Experience on LASA medication may be significant in improving patient safety and could avoid complications [1,2]. These errors may include administration of the right medication but the wrong dose, wrong route, or wrong time, all of which can cause diminished therapeutic effect or adverse effects. These types of mistakes may occur more frequently in cases when diagnoses are based on presentation or where patients find it difficult to distinguish names of similar-sounding medications, again pointing to the necessity of adequate labeling, patient education, and medication storage techniques to avoid such errors.

1.1. Review of Literature

The safety of patients is one of the pillars for healthcare systems all over the world. The threat of medication errors is a significant obstacle on the road to accomplishing this achievement because they may arise at any point throughout the process of medication use [3]. Look-Alike Sound-Alike (LASA) medications constitute one of these reasons. They bring confusion to patients, health care providers, and pharmacists. The risk of LASA-related errors is immense, especially in outpatient and home-care facilities, where no supervision is given [1,4]. A “Look Alike and Sound Alike” (LASA) refers to medications that are similar in appearance, such as in shape, spelling, phonetics, and packaging. Therefore, sharing prominent similarities may cause confusion to prescribers, pharmacists, nurses, and patients.

LASA medications are reported to cause harm in the United Kingdom's patients. For example, around 10.7% of incidences were reported, which makes 206,485 out of 1,936,812 medication incidents, and 63 deaths were noted [5]. A high proportion of LASA errors are reported among all medication errors; LASA errors range from 6.23% to 14.7% [6]. The risk of improper medication, like LASA, is a considerable concern in the treatment of patients with mild as well as chronic symptoms. It has been previously shown that 19% of errors in 200 prescribed medications were caused by LASA medication [7]. Healthcare professionals reported that 37.3% of error incidences occurred in LASA medications [8]. Researchers have also reported that three cases of insidious medication errors were caused by LASA (FDA, 2019). Another study reported that 35 out of 400 incidences were caused by LASA medications [9]. The Food and Drug Administration (FDA) has reported various accrued events in terms of LASA medication

(FDA, 2019).

The incidences of LASA are common in treatment at hospitals or home-based treatment [2]. Several factors have been reported that lead to LASA incidents, considering the example of appearance. In this context, a study reported that medication appearance—look-alike tablets were 28%, boxes were 20%, and blister packaging was 13% [10]. Another study reported that confusion due to medication name was 64.62%, packaging confusion accounted for 24.62%, and similar appearance accounted for 10.77% of errors, indicating a considerable health concern associated with LASA [11]. One of the most practiced techniques to prevent LASA error and its associated confusion is to educate and spread awareness among healthcare professionals, pharmacists, and, if possible, patients as well [12].

Hence, hospitals and emergency departments implement policies and procedures to reduce errors associated with LASA medications [13]. Strategies including the use of Tall Man letters or boldface letters in medication names, labeling and identification of color coding, barcoding and computerized physician order entry, appropriate font size and used tool for brand name and safety storage strategies and specific places to keep medicine in order can reduce the possibility of errors in LASA medications [3,12,14-16]. LASA medication errors cause mild to chronic harm in patients worldwide, for example, in the United States, Thailand [11,17]. Therefore, proper education is required to reduce LASA-associated errors in labeling and storage. A number of cases were reported in KSA about LASA errors. However, the current study will emphasize LASA medication and, more specifically, proper labeling and storage in a general hospital in Saudi Arabia.

1.2. Research Question

This research was set out to seek answers for the following questions: What is the patients' experiences, their awareness levels, and contributing factors as regards LASA medication errors in a general hospital in Saudi Arabia?

2. Materials and Methods

2.1. Study Design

A descriptive study based on structured and validated Questionnaire was conducted at General hospital in Saudi Arabia from May 2024 to July 2024.

2.2. Study Setting

The current study was conducted at general hospital in Saudi Arabia from May 2024 to July 2024.

2.3. Sampling

The questionnaire was distributed among the patients (n = 148), who visited for follow-up care in different wards of the hospital, like Medical, Dermatology, Cardiology, and Neurology. A sample size calculator (<http://www.raosoft.com/samplesize.html>) was used to estimate the sample for the current study with total population 238. The calculator estimated the samples for the current study with a Confidence Interval of 95% with margin of error 5% and response distribution 50% [18].

2.4. Ethical Approval

This study was approved by the local Research and Ethics Committee in the hospital with approval code 04-EP-2024. Every participant was made aware of the object of the study, and obtained written approval before doing so. The process of data collection adhered to the principles of ethics and all the participants were advised of their privacy, willingness to participate as voluntary subjects and the option to withdraw the study any time.

2.5. Data Collection

Developed questionnaire of demographic data and patient's experiences with LASA medication was shared with patients. The data from patients was collected after consent approval of participation. The study protocols were shared with the patients in a face-to-face interview from May to July 2024. The questionnaire clarity, relevance, and internal consistency were tested by way of a pilot study that comprised 12 participants before the actual data collection [19]. At their conclusion, they did not form part of the

final study population. The pilot feedback assisted in revising the language of certain questions, appearance and flow better and be more culturally acceptable and understandable. The pilot study was used to confirm the instruments that were used in the main study.

2.6. Statistical Analysis

Statistical Package for Social Sciences version 26 (SPSS, Ver: 26) was used to analyze the data for the current study. The relationship between patients' knowledge and experience with LASA medication using Pearson Chi-Square test and exact probability test for small frequency distribution data were used. All statistical methods used were two-tailed with an alpha level of 0.05, considering significance if P-value was less than or equal to 0.05. This study was carried out at General hospital in Saudi Arabia hospital at Al Ahsa.

2.7. Virtual Clinics Definitions

Whether the terminology of a telemedicine service is a virtual clinic, in the context of this paper, it could be evaluated as the program that provides video or audio consultation by means of the application Sahehty (voice), where the patient is given an opportunity to renew a prescription, report his/her symptoms and identify medication based on an image posted by the patient [11].

3. Results

A total of 148 eligible persons of varying ages, education levels, and job types have participated, as detailed in Table 1.

Personal characteristics	No	%
Age in years		
18-39	75	50.7%
40-49	32	21.6%
50-59	41	27.7%
Gender		
Male	53	35.8%
Female	95	64.2%
Medical filed work		
Yes	17	11.5%
No	131	88.5%
Field of work		
Not working	35	36.8%
Student	15	15.8%
Government Employee	6	6.3%
Private Employee	4	4.2%
HCW	15	15.8%
Others	12	12.6%
Retired	8	8.4%
Educational level		
Below secondary	35	23.6%
Secondary education	39	26.4%

University / above	74	50.0%
The patient clinic		
Medical Clinic	85	57.4%
Dermatology Clinic	29	19.6%
Neurology Clinic	25	16.9%
Cardiology Clinic	9	6.1%

Table 1: Personal Characteristics of Study Patients (n=148)

Participants' ages ranged from 18 to ≥ 50 years (mean 35.4 ± 11.9). Females comprised 64.2% (n = 95), and healthcare workers represented 11.5% (n = 17). Employment status was categorized as not working (36.8%), students (15.8%), healthcare workers (15.8%), other jobs (12.6%), and retired (8.4%). Regarding

education, 23.6% had a below secondary level form, 26.4% secondary, and 50% university levels or higher. Clinic attendance was distributed as follows: medicine clinic (57.4%), dermatology (19.6%), neurology (16.9%), and cardiology (6.1%). Table 2 summarizes medication history and dispensing.

Drug dispensing and medication history	No	%
Who dispensary and received patient medication?		
Patient himself	132	89.2%
Care giver	16	10.8%
Is there communication with you through a virtual clinic regarding drug consultation?		
Yes	58	39.2%
No	90	60.8%
Total years of received the same medication		
1-4 years	96	64.9%
5-10 years	18	12.2%
> 10 years	34	23.0%
Number of different medications taken daily?		
2-4 medications	122	82.4%
> 4 medications	26	17.6%
Is your storage medication in one place?		
Yes	139	93.9%
No	9	6.1%

Table 2: Medication History and Drug Dispensing Among Study Patients (n = 148)

Most patients (89.2%) practiced self-medication. Virtual clinics provided consultations for 39.2%. The majority (64.9%) had received the same medication for 1–4 years; 23% for over 10 years. Most patients (82.4%) took 2–4 medications daily, while

17.6% took more than four. Nearly all (93.9%) stored medications in one location. Table 3 presents patients' experiences with LASA medication errors.

LASA experience	No	%
Did you receive wrong look-alike and sound-alike medication?		
Yes	36	24.3%
No	99	66.9%
I cannot remember	13	8.8%
If yes, how many times?		
1-5 times	29	80.6%
> 5 times	7	19.4%

How discovered that medication is an error		
Look-alike tablets or caps	16	43.2%
Packaging look-alike	15	40.5%
Sound alike names	4	10.8%
Strips look-alike	2	5.4%
Time that you discover look alike and sound alike medication		
During dispensary from pharmacy	4	10.8%
At home	11	29.7%
During take medication	17	45.9%
After take medication and side effect occurred	5	13.5%

Table 3: Study Patients Experience with Look Alike Sound Alike Medication (n = 148)

About 24.3% reported receiving incorrect LASA medications 1–5 times. Errors were most commonly identified by tablet or capsule similarity (43.2%), packaging resemblance (40.5%), alike names (10.8%), and look-alike medications (5.4%). Errors were

discovered after medication intake (45.9%), at home (29.7%), during pharmacy dispensing (10.8%), or after experiencing side effects (13.5%). Table 4, highlights factors associated with LASA experiences.

Factors	Did you take or received from pharmacy wrong look-alike and sound-alike				p-value
	Yes		No		
	No	%	No	%	
Age in years					.210
18-39	22	29.3%	53	70.7%	
40-49	8	25.0%	24	75.0%	
50-59	--	--	--	--	
60-69	--	--	--	--	.450
70+	--	--	--	--	
Gender					
Male	11	20.8%	42	79.2%	.495^
Female	25	26.3%	70	73.7%	
Medical field work					
Yes	3	17.6%	14	82.4%	.048*
No	33	25.2%	98	74.8%	
Educational level					
Below secondary	10	28.6%	25	71.4%	
Secondary education	13	33.3%	26	66.7%	.047*
University / above	13	17.6%	61	82.4%	
The patient clinic					
Cardiology Clinic	4	44.4%	5	55.6%	
Dermatology Clinic	3	10.3%	26	89.7%	
Medical Clinic	21	24.7%	64	75.3%	.582^
Neurology Clinic	8	32.0%	17	68.0%	
Who dispensed and received patient medication?					
Patient himself	33	25.0%	99	75.0%	.127
Care giver	3	18.8%	13	81.3%	
Is there communication with you through a virtual clinic regarding drug consultation?					

Yes	18	31.0%	40	69.0%	.797
No	18	20.0%	72	80.0%	
Total years of receiving the same medication					.734
1-4 years	25	26.0%	71	74.0%	
5-10 years	4	22.2%	14	77.8%	
>10 years	7	20.6%	27	79.4%	.049*^
Number of different medications taken daily					
2-4 medications	29	23.8%	93	76.2%	
>4 medications	7	26.9%	19	73.1%	
Is your storage medication in one place?					

P: Pearson χ^2 test ^ Exact probability test * $P < 0.05$ (significant)

Table 4: Factors Associated with Patients' Experience with Look Alike Sound Alike Medication

LASA errors were reported by 33.3% of patients with secondary education versus 17.6% with university education ($P = 0.047$). Clinic-wise, cardiology patients reported the highest LASA errors (44.4%), followed by neurology (32%) and dermatology (10.3%) ($P = 0.047$). Patients who stored medications in one place experienced more LASA errors (25.2%) compared to those who did not (11.1%) ($P = 0.049$). Table 5 shows the relationship between patient knowledge and LASA experiences.

Knowledge	Did you receive wrong look-alike and sound-alike medication?				p-value
	Yes		No		
	No	%	No	%	
Able to segregation between Look Alike-Sound Alike					.448
Yes	24	22.6%	82	77.4%	
No	12	28.6%	30	71.4%	.012*
Are there any explanations regarding look-alike and sound-alike medications, how to deal with them?					
Yes	15	17.0%	73	83.0%	
No	21	35.0%	39	65.0%	.264^
Are the look-alike and sound-alike medications labeling with clear text when you received?					
Yes	22	20.8%	84	79.2%	
No	4	36.4%	7	63.6%	
I didn't check	10	32.3%	21	67.7%	

P: Pearson χ^2 test ^ Exact probability test * $P < 0.05$ (significant)

Table 5: Relation Between Patients' Knowledge and Experience with Look Alike Sound Alike Medication

Patients lacking explanations about LASA were more likely to experience errors (35% vs. 17%, $P = 0.012$). Similarly, those receiving LASA medications without clear labeling reported higher error rates (36.4% vs. 20.8%, $P = .049$). Figure 1 indicates patient awareness: 71.6% recognized LASA differentiation and labeling, and 59.5% received explanations about LASA.

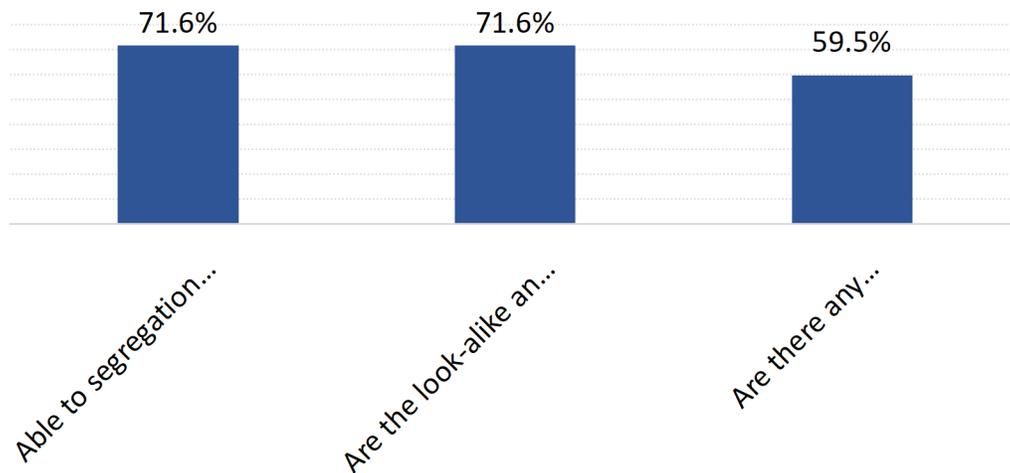


Figure 1: Patients' Awareness about Look Alike Sound Alike Medication (n=148)

Figure 2 details patient responses to adverse effects from LASA errors: 43.2% sought hospital care, 27.7% used the Sehhaty app for remote consultation, 14.2% visited pharmacies, and 14.9% monitored symptoms themselves. Virtual clinics, such as Sehhaty,

facilitate remote consultations through video or audio, medication renewals, and symptom reporting. However, challenges remain in verifying LASA medications remotely, which may necessitate physical clinic or pharmacy visits for proper evaluation.

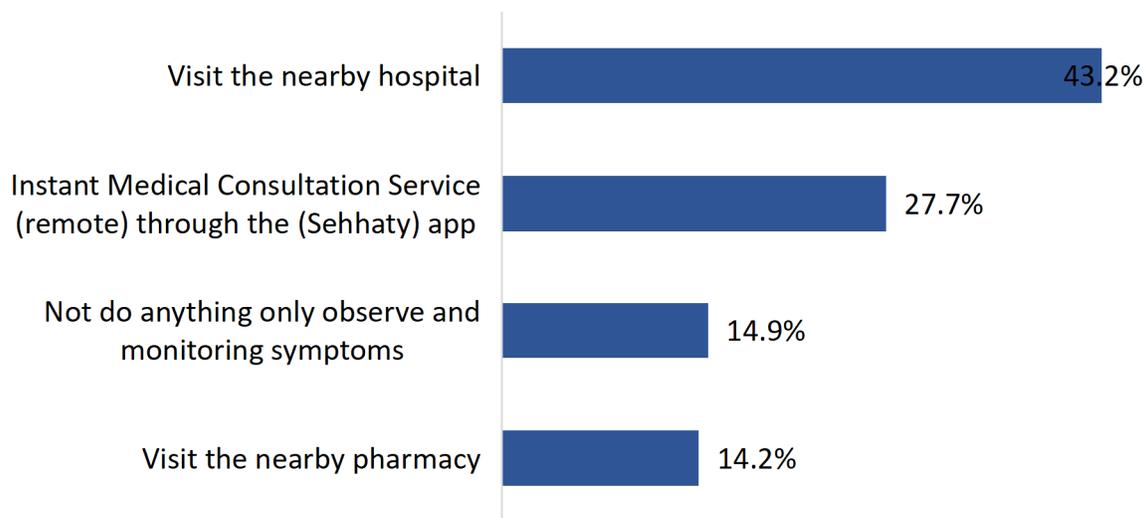


Figure 2: Patients' Reported Practice when they Notice any of the Side Effect or Adverse from LASA error (n=148)

4. Discussion

The study revealed that most patients were young, well-educated, and mainly attended medical clinics. A high proportion practiced self-medication and received long-term medication regimens. About one-quarter reported experiencing LASA medication errors, primarily due to tablet or capsule similarity and packaging resemblance. Notably, dermatology patients, who were generally better educated, reported fewer LASA errors. Lack of clear labeling was strongly associated with increased errors. The current study findings align with previous literature reporting LASA error rates ranging from 6.2% to 37.3% globally, with variability depending on setting and population [1,6,8,11]. LASA errors are

a well-established source of medication errors and patient harm, sometimes with severe consequences [9,17]. Confusion arises from orthographic (look-alike) and phonetic (sound-alike) similarities affecting prescribing, dispensing, and administration stages [6-8].

Strategies to mitigate LASA errors include separate storage of LASA medications, clear labeling, and patient education—practices endorsed by the World Health Organization (WHO, 2022) and European agencies [13]. Visual distinctions such as color contrast and “Tall Man” lettering, along with verbal confirmation of drug names, can enhance accuracy [14]. The heavy reliance on digital health tools like Sehhaty underscores the need to improve

virtual verification methods to prevent LASA errors.

5. Conclusions and Recommendations

The current study concluded that 24.3% patients had medication error due to LASA. Look-alike tablets or capsules and packaging look-alike were the most common factors behind the error. Where the current highlighted the significant findings and discovered that LASA errors in patients lead to cause side effects, which is harmful in certain situations. It also, suggests that education and explanation regarding LASA medication reduces the risk of error where emphasizing that storing medication in one place is a core reason for errors in LASA medications. Additionally, the current suggests that labelling and separation of medications in dispensary needs to be improved to avoid errors in poorly educated patients. Overall, reducing errors linked to LASA medications highlights the need for pharmacists to educate and guide patients who are prescribed these drugs. Nevertheless, clinical pharmacists should introduce LASA medication policies and guidelines to patients in healthcare settings [20,21].

Limitations

Despite valuable insights, several limitations exist. Data were self-reported, introducing potential recall and social desirability biases. Literacy and health knowledge variability may have caused misinterpretation during questionnaire pilot-testing. The study was conducted at a single general hospital, limiting generalizability. Additionally, non-response bias could not be assessed as response rates were not recorded. Future research should employ more structured observational methods and broader sampling to address these issues.

Future Research

Future studies should utilize mixed methods, combining quantitative surveys and qualitative interviews to explore patient perceptions and contexts of LASA errors in depth. Research should evaluate the effectiveness of interventions such as Tall Man lettering, barcoding, and separate storage in outpatient and home settings. Additionally, investigating the impact of digital tools, virtual clinics, and pharmacist-led education on reducing LASA errors would be valuable, particularly in low-resource or high-risk populations.

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Appendix 1 (Survey)

1. Gender Male Female
2. Age, in years 18-39 40-49 50-59
3. Nationality
4. Medical filed work Yes No
5. Field of work Medical Nursing Pharmacy Housewife Government Employee Teacher Retired Handicap Chef Student Sales man Engineer Epidemiology Technician
6. Education Level Illiterate Primary school Middle school Secondary school Under-graduate Postgraduate
7. Clinic Medical Neurology Dermatology Cardiology
8. Who dispensary and received your medication? Yourself Care giver
9. Is there communication with you through a virtual clinic regarding medication consultation? Yes No
10. Total years of received the same medication. 1- 4 years 5-10 years

>10
11. Number of different medications taken daily? 2-4 >4
12. Is your storage medication in one place? Yes No
13. Able to segregation between Look Alike-Sound Alike Yes No
14. Are there any explanations regarding look-alike and sound-alike medications, how to deal with them? Yes No
15. Are the look-alike and sound-alike medications labeling with clear text when you received? Yes No I didn't check
16. Did you received wrong look-alike and sound-alike medication? Yes No Can't remember
17. Did you take or received from pharmacy wrong look-alike and sound-alike how many times? 1- 5 > 5
18. How discovered that medication is an error 1. Look-alike tablets or caps 2. Packaging look-alike 3. Strips look-alike
19. Time that you discover look alike and sound alike medication. 1. During dispensary from pharmacy 2. At home 3. During take medication 4. After take medication and side effect occurred
20. What will you do if you notice any of the side effect or adverse from LASA error? 1. Not do anything only observe and monitoring symptoms. 2. Instant Medical Consultation Service (remote) through the (Sehhaty) app. 3. Visit the nearby hospital. 4. Visit the nearby pharmacy.

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