

A Cross-sectional Study to Assess the Knowledge, Attitude, and Practice of Look-alike, Sound-alike Drugs among Healthcare Providers at a Tertiary Care Hospital



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Received: 08 November 2025; Accepted: 30 April 2026

ABSTRACT

Background: Sometimes, drug names or their appearances create confusion among healthcare providers. These look-alike or sound-alike (LASA) drugs have the potential to cause medication errors leading to patient harm. Such errors can occur during prescribing, dispensing, and administration of drugs. Therefore, this study was conducted to assess the knowledge, attitudes, and practice of LASA drugs among healthcare providers at a tertiary care hospital in India.

Materials and methods: This cross-sectional, observational, single-center, questionnaire-based study was conducted among healthcare providers at a tertiary care hospital in India. The study was conducted over a duration of 2 months between November and December 2024.

Results: Out of the 400 participants, 81% were doctors, followed by 12.75% nurses, 3.25% pharmacists, and 3% interns. The majority of them were aware of the term LASA drugs. The majority of them were slightly concerned about the risks of LASA drugs. Whereas, only 10% of them had ever reported LASA errors, as the majority of them were unaware about medication error reporting form.

Conclusion: This study suggests that lack of awareness about LASA drugs among healthcare providers contributes to medication errors. To address this, solutions can be implemented at different levels via a multidisciplinary approach.

Journal of The Association of Physicians of India (2026): 10.59556/japi.74.1593

INTRODUCTION

Look-alike, sound-alike (LASA) drugs are drugs that have orthographic (look-alike) and phonetic (sound-alike) similarities. Look-alike drugs appear the same in terms of packaging, shape, color, and size, while sound-alike drugs are similar in terms of names, doses, and strengths.^{1,2} Confusion due to LASA drugs can occur between brand-brand, brand-generic, or generic-generic names of drugs.³ The appearance of drugs can be confusing either because different drugs look the same or same drugs look different.¹ Thus, LASA drugs can lead to a specific type of medication error known as LASA errors.⁴

Look-alike, sound-alike errors can occur during the prescribing, dispensing, and administration of drugs.⁵ While prescribing, illegibility in prescriptions on which the diagnosis is not mentioned makes it difficult to identify the drug. Also, errors may occur during dispensing if the pharmacists are not aware of LASA drugs and during administering if the nursing staff does not cross-check LASA drugs. Thus, LASA errors can lead to overdosing, underdosing, or inappropriate dosing of drugs.⁶ LASA errors have more detrimental effects in children, elderly patients, and those with organ

failures.⁷ They may culminate in serious adverse events, including death.

Regulators are accountable for the naming and packaging of new drugs to avoid LASA errors.⁸ The Central Drugs Standard Control Organization (CDSCO) is the regulatory authority in India. Naming bodies such as the World Health Organization International Nonproprietary Names program (WHO INN program) can prevent the designation of highly confusing names.^{2,9}

In India, very few studies have been conducted on awareness of LASA drugs, one of which concluded that only 34% of doctors and 17% of pharmacists were aware of LASA drugs.¹⁰ As tertiary care hospitals provide highly specialized care, awareness of LASA drugs is critically important to reduce medication errors and for better patient outcomes. Therefore, this study aimed to assess the knowledge, attitude, and practice of LASA drugs among healthcare providers at a tertiary care hospital in India.

MATERIALS AND METHODS

Study Design

This study was a cross-sectional, observational, single-center, questionnaire-based study conducted among healthcare providers at a

tertiary care hospital in an urban metropolitan city of India. The study was conducted over a 2-month duration between November and December 2024.

Sample Size

The sampling method used for this study was consecutive sampling, where all eligible participants available during the study period were approached. Approximately 500 healthcare providers were approached during the study period, out of whom 400 responded to the questionnaire, yielding a response rate of approximately 80%. Respondents included postgraduate residents, nurses, and pharmacists working at a tertiary care hospital, selected using a convenience sampling approach.

Study Procedure

Before starting this study, Institutional Ethics Committee approval was taken (IEC Number: IEC/Pharm/RP/335/Oct/2024). Informed consent was taken over the "Google Form" platform before data collection. Participants were informed that their participation was voluntary and that they could choose not to answer any question. Participants' confidentiality was maintained as no information related to identity was collected.

The questionnaire was validated by six doctors, two nurses, and two pharmacists. The questionnaire had four parts. The first part consisted of demographic details such as age, gender, profession, and years of

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How to cite this article: Bansal N, Kumar Khobragade AA, Bawne AR, et al. A Cross-sectional Study to Assess the Knowledge, Attitude, and Practice of Look-alike Sound-alike (LASA) Drugs among Healthcare Providers at a Tertiary Care Hospital. *J Assoc Physicians India* 2026;74(7):20–23.

experience. In the second part, questions were based on knowledge about awareness of LASA drugs. In the third and fourth parts, questions based on attitude and practice, respectively, were put forth to the participants. The questionnaire used in the study is provided as an appendix.

Statistical Analysis

Cronbach's alpha value was calculated to validate the questionnaire, which was 0.9. The data obtained were analyzed in Microsoft Excel (Version 2502). Data were analyzed using descriptive statistics.

RESULTS

Out of the total 400 participants who participated in the study, most of the participants ($n = 305$, 76.25%) were between 20 and 30 years of age, followed by those between 31 and 40 years ($n = 56$, 14%). The number of male participants ($n = 222$, 55.5%) was greater than that of female participants ($n = 178$, 44.5%). The majority of participants in the study were doctors ($n = 324$, 81%), followed by nurses ($n = 51$, 12.75%), pharmacists ($n = 13$, 3.25%), and interns ($n = 12$, 3%). Most of the participants had less than 5 years of work experience ($n = 281$, 70.25%), followed by those with 11–15 years of experience ($n = 39$, 9.75%) and those with 16–20 years of experience ($n = 29$, 7.25%). A majority of the participants were aware of LASA drugs ($n = 243$, 60.75%), with most of them believing that they were drugs with similar names ($n = 315$, 78.75%), with similar appearances ($n = 227$, 56.75%), or with similar packaging ($n = 153$, 38.25%) (Fig. 1). Most of them ($n = 268$, 67%) were able to identify at least one LASA drug pair (Fig. 2), while almost all of them ($n = 375$, 93.75%) were aware of at least one potential risk which could arise from prescribing LASA drugs (Fig. 3).

Most of them were aware ($n = 355$, 88.75%) that a thorough understanding of LASA drugs was necessary to prevent medication errors, while a majority were slightly concerned regarding the risks posed by LASA drugs. A majority of the participants demonstrated that they were able to identify the category of a given pair of LASA drugs ($n = 211$, 52.75%) and how to correctly use tall man lettering (TML) ($n = 266$, 66.5%).

Most of the participants strongly agreed ($n = 220$, 55%) that additional training on LASA drugs was vital for healthcare professionals, while they were unsure whether the precautions at their workplace regarding LASA drugs were

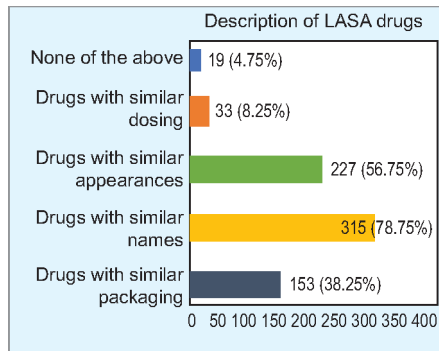


Fig. 1: Description of LASA drugs

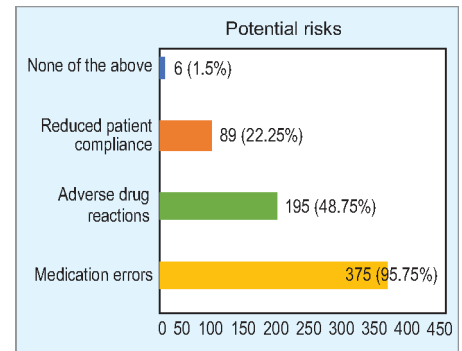


Fig. 3: Potential risks

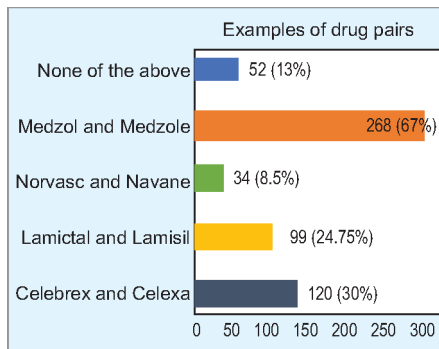


Fig. 2: Examples of drug pairs

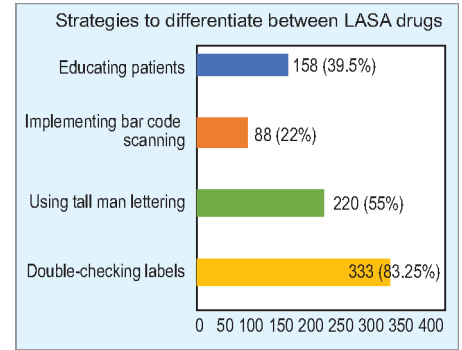


Fig. 4: Strategies to differentiate between LASA drugs

Table 1: Double-checking for LASA drugs prior to medication

Sr. No	Double-check for LASA drugs before administering medication	Number of participants (%)
1	Never	34 (8.5)
2	Rarely	60 (15)
3	Sometimes	136 (34)
4	Often	60 (15)
5	Always	110 (27.5)

sufficient ($n = 115$, 28.75%). Also, a large number of participants responded that they only checked sometimes ($n = 136$, 34%) for LASA drugs before administering drugs (Table 1).

The strategies favored by healthcare professionals to differentiate between LASA drugs were double-checking labels (333, 83.25%) and using tall man lettering ($n = 220$, 55%) while few of them implemented barcode scanning (88, 22%) (Fig. 4).

More than half of the participants had never seen the medication error reporting form ($n = 241$, 60.25%), while a very small number had attended any CME, webinar, or conference regarding LASA drugs ($n = 19$, 4.75%). The use of generic names in prescriptions helps prevent LASA errors. More than half of the participants ($n = 207$, 51.75%) frequently wrote or encountered

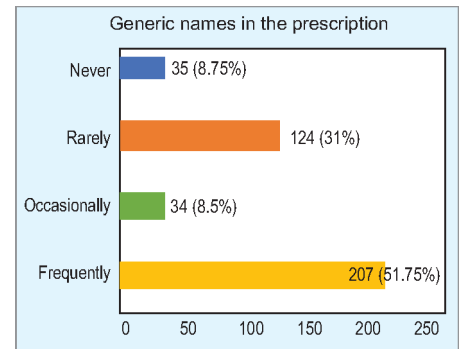


Fig. 5: Generic names in prescriptions

generic names of drugs in the prescriptions of patients (Fig. 5).

Only 10% ($n = 42$) of participants had ever reported LASA errors. Few of the participants also suggested additional measures that could be employed to prevent LASA drug errors at their workplaces.

DISCUSSION

This study assessed the awareness, knowledge, attitude, and practice of LASA drugs among healthcare providers at a tertiary care teaching hospital in an urban metropolitan city. Our findings showed that 60% of healthcare providers were aware of the term "LASA drugs," while 67% of them could identify at least one pair of LASA drugs. These results are inconsistent with the study conducted

by Munshi et al.,¹⁰ which showed that 34% of resident doctors and 17% of pharmacists were aware of the term "LASA drugs". 55% of healthcare providers strongly agreed that additional training on LASA drugs was necessary to avoid medication errors and for better patient safety outcomes. 34% of healthcare providers sometimes double-check before administering LASA drugs.

A notable discrepancy was observed between knowledge and practice among healthcare providers. While a large proportion of participants recognized double-checking labels as an important strategy to prevent LASA errors, only a smaller proportion reported consistently implementing this practice. This highlights a gap between knowledge and actual practice, which may be attributed to factors such as high workload, time constraints, lack of standardized protocols, or insufficient reinforcement through training. Addressing this gap requires system-level interventions, including regular training programs, implementation of standard operating procedures, and incorporation of double-checking mechanisms into routine clinical workflows.

There are various strategies that can be used to differentiate between LASA drugs, such as double-checking labels, using tall man lettering, implementing barcode scanning, and educating patients. The majority of participants had never seen a medication error reporting form, whereas only 10% of healthcare providers had ever reported LASA errors. This is because of a lack of awareness about reporting of medication errors among healthcare providers. Few healthcare providers gave suggestions to prevent LASA errors at their workplace, such as conducting educational seminars on awareness of LASA drugs, workshops on reporting of LASA errors, prescription audits, double-checking the labels before administration and confirming once with the doctor, and storing LASA drugs in different cabinets with proper labeling.

The interventions to mitigate and prevent LASA errors could be taken at various levels. Regulatory authorities such as the United States Food and Drug Administration (USFDA), CDSCO, can contribute to reducing LASA errors by not approving those brand names that can create confusion with International nonproprietary names (INNs) and ones that incorporate INNs into them.^{11,12} At the drug policy level, immediate withdrawal of drugs with misleading names should be done, and regular updates or advisories on a list of misleading names should be released, along with the use of tall man lettering on drug labels.¹³ At the level of healthcare providers,

mentioning diagnosis and indications on prescriptions can help to avoid errors while dispensing, writing generic prescriptions, avoiding distraction while prescribing drugs, use of tall man lettering on prescriptions, timely training of healthcare providers on the updated list of LASA drugs, and use of computerized drug prescriptions.¹⁴ At the level of drug dispensing, using a double-check system to match the drugs dispensed with those prescribed, to confirm the dispensed drug is appropriate for the mentioned indication, and separately storing LASA drugs.

A limitation of this study is the possibility of recall bias. Respondents may not have been able to recall past experiences with LASA errors, resulting in either underreporting or overreporting of actual events, and thereby affecting the reliability of the findings. Also, social desirability bias is another limitation, as participants may have provided responses they believed were acceptable or expected, rather than being entirely truthful. If respondents were disinterested or hesitant to admit to errors, the data collected might not accurately reflect real practices or attitudes.

Another limitation is that a large proportion of participants in this study were doctors (81%), with relatively fewer nurses (12.75%) and pharmacists (3.25%). This uneven distribution may limit the generalizability of the findings, as nurses and pharmacists are also actively involved in dispensing and administration of medications, where LASA errors commonly occur.

CONCLUSION

This study highlights gaps in awareness and reporting of LASA errors among healthcare providers. While a considerable proportion of participants were aware of LASA drugs, inconsistencies between knowledge and practice were observed, along with poor reporting of medication errors. To address these issues, a multidisciplinary approach involving healthcare professionals, nursing staff, and pharmacists is required.

SOURCE OF FUNDING

None.

CONFLICT OF INTEREST

None.

APPENDIX

Questionnaire on knowledge, attitude, and practice of look-alike sound-alike (LASA) drugs.

Section 1: Demographics

1. Age:

1. 20–30 years
2. 31–40 years
3. 41–50 years
4. 51–60 years
5. 61 years and above

2. Gender:

1. Male
2. Female
3. Other

3. Profession:

1. Doctor
2. Nurse
3. Pharmacist
4. Other (please specify): _____

4. Years of experience:

1. 0–5 years
2. 6–10 years
3. 11–15 years
4. 16–20 years
5. More than 20 years

Section 2: Knowledge

5. Have you ever heard of look-alike, sound-alike (LASA) drugs?

1. Yes
2. No

6. Which of the following best describes LASA drugs? (Select all that apply.)

1. Drugs with similar packaging
2. Drugs with similar names
3. Drugs with similar appearances
4. Drugs with similar dosing
5. None of the above

7. Which of the following are examples of LASA drug pairs? (Select all that apply.)

1. Celebrex and Celexa
2. Lamictal and Lamisil
3. Norvasc and Navane
4. Medzol and Medzole
5. All of the above

8. What are the potential risks associated with LASA drugs? (Select all that apply.)

1. Medication errors
2. Adverse drug reactions
3. Reduced patient compliance
4. None of the above

9. Which organization issued recommendations for LASA drugs?

1. World Health Organization guidelines
2. Institute for Safe Medication Practices guidelines

3. Central Drugs Standard Control Organization guidelines
4. Food and Drug Administration guidelines

10. What is the primary purpose of understanding LASA drugs?

1. To reduce the cost of drug development
2. To increase pharmaceutical sales
3. To discover new brand names for existing drugs
4. To prevent medication errors

11. The following pair belongs to which category of LASA drugs?

Cetralon (cetirizine) and Cetro (cetirizine)

1. Similar brand names with different generic compositions
2. Similar brand names with the same generic composition
3. Generic drug pairs
4. Similar brand names with an additional letter

12. Which of the following LASA pairs is written in tall man lettering (TML)?

1. ALPRAZolam and LORazepam
2. HYDROcodone and oxyCODONE
3. Paroxetine and fluoxetine
4. Tramadol and trazodone

Section 3: Attitude

13. How concerned are you about the risks associated with LASA drugs?

1. Not concerned
2. Slightly concerned
3. Moderately concerned
4. Very concerned
5. Extremely concerned

14. Do you believe that additional training on LASA drugs is necessary for healthcare professionals?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

15. Do you think your workplace takes sufficient measures to prevent LASA drug errors?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree

5. Strongly agree

Section 4: Practice

16. How often do you check for LASA drugs before administering medication?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Always

17. What strategies do you use to differentiate between LASA drugs? (Select all that apply.)

1. Double-checking labels
2. Using tall man lettering
3. Implementing barcode scanning
4. Educating patients
5. Other (please specify): _____

18. Have you ever reported an incident involving LASA drugs?

1. Yes
2. No

18.1. If yes, what kind of incident was it?

Answer: _____

18.2. If yes, how often do you report such incidents?

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

19. Have you ever seen the medication error reporting form?

1. Yes
2. No

20. How often do you write or see generic names in prescriptions given to patients?

1. Frequently
2. Occasionally
3. Rarely
4. Never

21. Have you ever attended continuing medical education (CME) sessions, webinars, or conferences regarding LASA drugs?

1. Yes
2. No

22. What additional measures would you suggest to prevent LASA drug errors in your workplace? (Open-ended).

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