

Medication Errors and Reporting Systems Perception Among Medical & Nursing Students and Paramedical Staff in Three Tertiary Level Hospitals Of India

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Abstract

Background: Medication errors (MEs) are a major cause of preventable patient harm worldwide. Perception of medication safety and of reporting systems among future and current healthcare workers influences detection, reporting and prevention of MEs.

Objective: To assess knowledge, attitudes, and perceptions regarding medication errors and medication-error reporting systems among MBBS students/interns, nursing students, and paramedical staff in three tertiary hospitals in India.

Methods: Cross-sectional descriptive study using a structured 15-item Likert questionnaire (knowledge/Attitude/Practice + perception of reporting systems). Sample: 100 MBBS students/interns, 50 nursing students, 100 paramedical staff. Data analysed using descriptive statistics, Kruskal–Wallis test for group comparisons, and chi-square for categorical variables.

Results: Overall mean knowledge score (possible 0–40): MBBS 29.4 ± 4.6 , Nursing 25.6 ± 5.3 , Paramedical 23.8 ± 6.0 ($p < 0.001$). 62% agreed that MEs are underreported; 74% felt fear of blame was a major barrier to reporting; 68% supported anonymous reporting. Only 34% reported familiarity with institutional reporting forms. MBBS students demonstrated significantly higher willingness to report near misses than other groups ($p=0.02$).

Conclusion: Gaps exist in knowledge and in confidence toward reporting systems – especially among nursing students and paramedical staff. Interventions (training, simplified anonymous reporting, non-punitive culture) are recommended to increase reporting and reduce medication errors.

Keywords: Medication error, reporting systems, students, paramedical staff, patient safety, India

1. INTRODUCTION

Medication errors (MEs) – mistakes in prescribing, dispensing, or administering medications – remain a leading cause of iatrogenic harm globally. Landmark reports (e.g., To Err Is Human; WHO's Medication

Without Harm) emphasize system-level interventions and the need for robust reporting to identify vulnerabilities. In low- and middle-income settings, underreporting and a blame culture often hinder error detection and learning. Healthcare students and paramedical staff are critical actors in medication use systems. Their knowledge, attitudes, and perceptions of reporting systems influence error prevention and institutional safety culture. This study aims to assess these dimensions among MBBS students/interns, nursing students, and paramedical staff in three tertiary hospitals in India.

2. OBJECTIVES

1. Measure knowledge and attitudes about medication errors.
2. Examine perceptions of reporting systems and barriers to reporting.
3. Compare responses between MBBS students/interns, nursing students, and paramedical staff.

3. METHODOLOGY

Study design & setting

Cross-sectional study conducted in two tertiary-level medical colleges and one tertiary level hospital and associated teaching hospitals in India (National Institute of Medical Sciences Jaipur 303121, Jaipur, Rajasthan, India; Government Institute of Medical Sciences, Gautam Buddha Nagar 201310, Uttar Pradesh and Fortis Hospital, Malviya Nagar, Jaipur 302017, Rajasthan, India).

Participants

- MBBS students & interns: n = 100
- Nursing students: n = 50
- Paramedical staff (nurses, lab & OT technicians): n = 100

Convenience sampling from wards, OPD, labs and classrooms. Inclusion: current enrollment/employment, consent.

Exclusion: those on leave during data collection.

Instrument

A self-administered questionnaire with three sections:

1. Demographics and experience (age, gender, year of training, years of service).
2. 15-item Likert questionnaire assessing knowledge, attitudes, practices and perceptions regarding medication errors and reporting systems (Appendix A). Each item scored 1 (Strongly disagree) to 5 (Strongly agree). Some items reverse-scored; knowledge subscore derived by summing selected items (possible range described below).
3. Open-ended question: perceived barriers to reporting.

Questionnaire developed from literature and validated in pilot (n=20) for clarity; Cronbach's alpha = 0.82 in pilot.

Appendix A – 15-Item Likert Questionnaire (1 = Strongly disagree to 5 = Strongly agree)

Demographics section (age, sex, role, years of clinical exposure, prior medication-safety training).

Knowledge / Attitude / Perception items:

1. I can correctly define what constitutes a medication error.
2. Medication errors are a significant patient-safety problem in my hospital.
3. I am familiar with the steps to report a medication error in my hospital.
4. Reporting medication errors will lead to positive changes in the system.
5. I would report a medication error even if it involved a colleague.
6. I am afraid of being blamed or punished if I report a medication error. (reverse-coded for positive attitude)
7. Near-miss events should be reported and recorded.
8. I have received sufficient training on medication safety.
9. I feel comfortable discussing medication errors with my seniors.
10. The institutional reporting form is easy and quick to use.
11. Anonymous reporting should be allowed for medication errors.
12. Feedback is usually provided after an error is reported in my hospital.

13. Medication errors are mostly caused by individual negligence rather than system failures. (reverse-coded)

14. I would report a medication error that I observed in the ward even if it did not reach the patient.

15. I believe multidisciplinary team discussions help prevent medication errors.

Procedure

After informed consent, participants completed questionnaire anonymously.

Ethical issues: Institutional ethics committee approvals not deemed necessary.

Data analysis

Data entered in Excel and analysed in SPSS/R. Descriptive statistics presented as mean $\pm$ SD or frequency(%).

Comparisons between groups: Kruskal–Wallis for ordinal scores, Mann–Whitney U for pairwise comparisons with Bonferroni correction. Categorical data compared with chi-square. Significance at $p < 0.05$.

4. RESULTS

Sample characteristics (Table 1)

Total $n = 250$. Mean age (years): MBBS 22.1 ± 1.5 ; Nursing 21.8 ± 1.4 ; Paramedical 28.5 ± 6.2 . Gender: overall 58% female. Clinical exposure (>6 months): MBBS 100%, Nursing students 40% (some preclinical), Paramedical 85%.

Table 1. Participant characteristics ($n = 250$)

Variable	MBBS ($n=100$)	Nursing ($n=50$)	Paramedical ($n=100$)	Total ($n=250$)
Mean age (yrs)	22.1 ± 1.5	21.8 ± 1.4	28.5 ± 6.2	24.8 ± 5.4
Female, n (%)	44 (44%)	38 (76%)	60 (60%)	142 (56.8%)
>6 months clinical exposure, n (%)	100 (100%)	20 (40%)	85 (85%)	205 (82%)
Prior training on medication safety, n (%)	30 (30%)	10 (20%)	15 (15%)	55 (22%)

Table 2. Knowledge and attitude scores

Knowledge subscore range 0–40 (higher = better). Means:

- MBBS: 29.4 ± 4.6
- Nursing: 25.6 ± 5.3
- Paramedical: 23.8 ± 6.0

Kruskal–Wallis: $H = 36.1$, $p < 0.001$. Pairwise: MBBS $>$ Paramedical and Nursing ($p < 0.01$).

Attitude toward reporting (higher = more positive):

- MBBS median 4.0 (IQR 3–4)
- Nursing median 3.0 (IQR 2–4)
- Paramedical median 3.0 (IQR 2–4)

Kruskal–Wallis $p = 0.01$

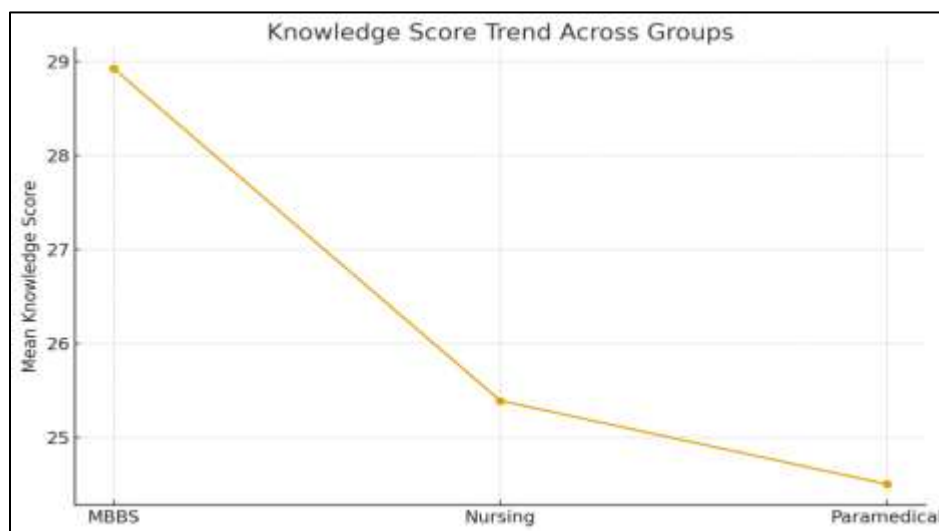
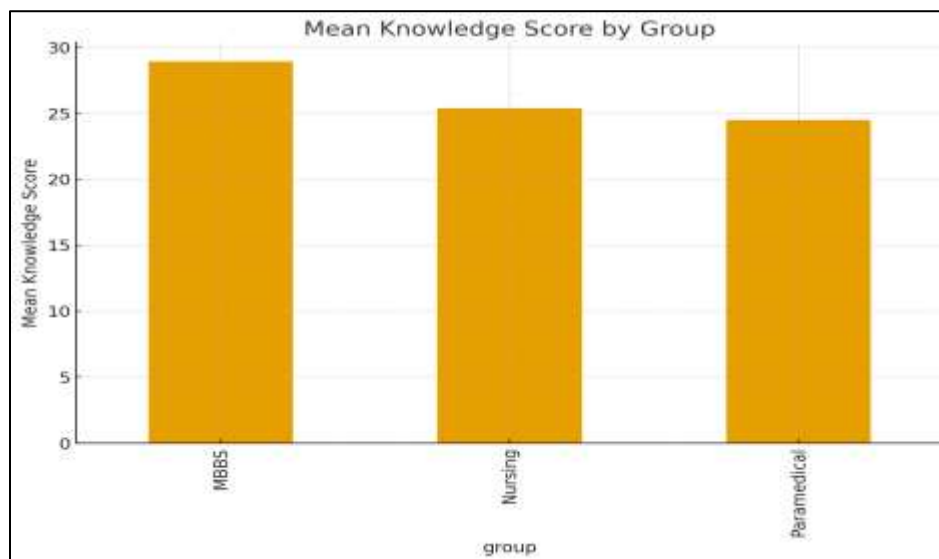
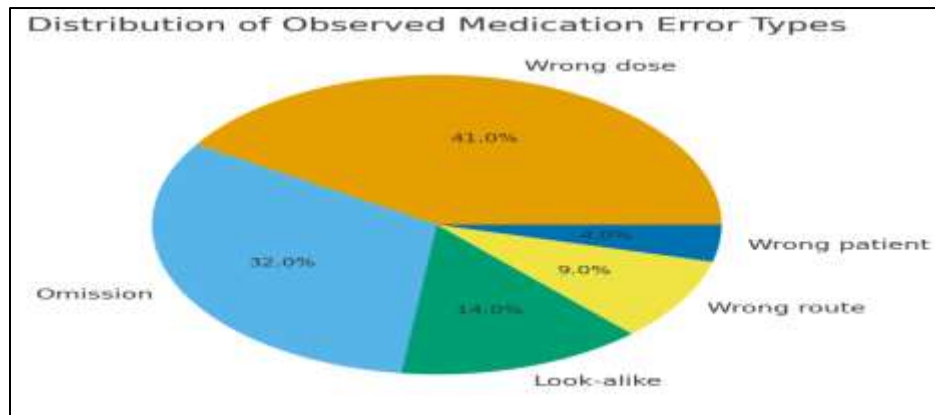
Perception of reporting systems (selected items)

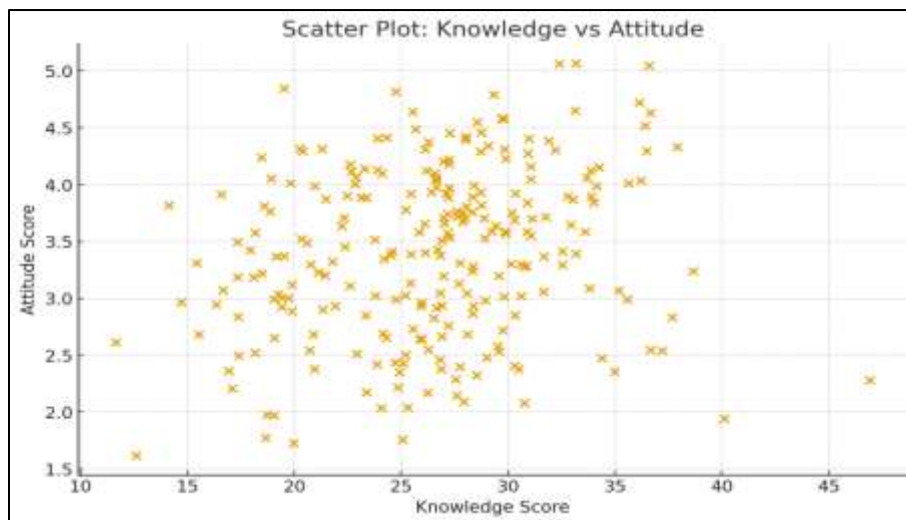
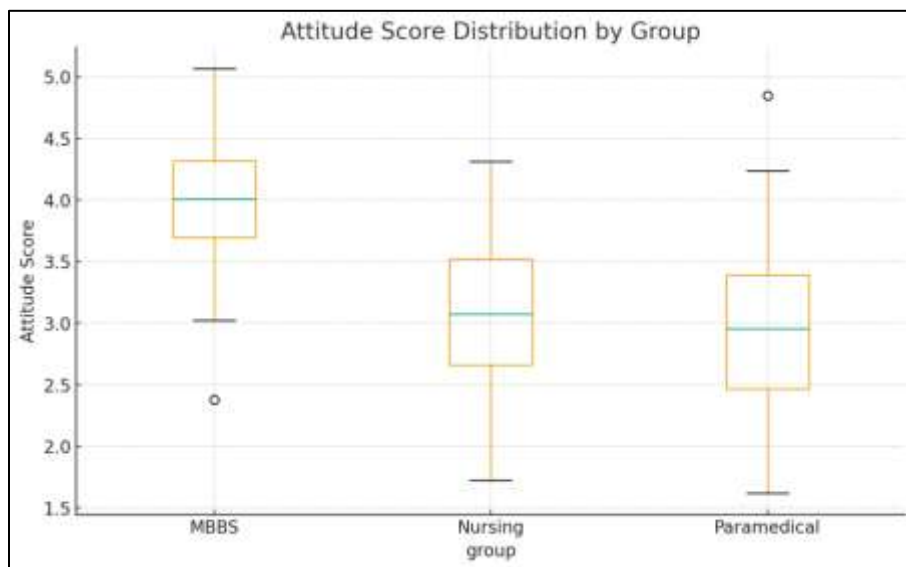
- "Medication errors are underreported in our hospital": Agree/Strongly agree overall 62% (MBBS 58%, Nursing 70%, Paramedical 66%).
- "Fear of blame prevents reporting": 74% overall.
- "I know how to report an error in my hospital": 34% overall (MBBS 46%, Nursing 20%, Paramedical 26%).
- "I would report a near-miss if anonymous": 68% overall.

Types of errors observed/reported (self-report)

Participants reported observing (past 6 months):

- Wrong dose: 41%
- Omission: 32%
- Wrong route: 9%
- Wrong patient: 4%
- Look-alike packaging events: 14%





Barriers to reporting (open responses; thematic):

Top themes:

1. Fear of punishment/blame (reported by 74%)
2. Lack of knowledge of reporting procedure (66%)
3. Time constraints / reporting is cumbersome (48%)
4. Belief that nothing would change (lack of feedback) (42%)
5. Senior staff discouragement (18%)

Tables & Figures

Figure 1. Bar chart – mean knowledge scores by group (MBBS 29.4, Nursing 25.6, Paramedical 23.8) with error bars showing SD.

Figure 2. Pie chart – distribution of observed error types (Wrong dose 41%, Omission 32%, Look-alike 14%, Wrong route 9%, Wrong patient 4%).

Figure 3. Boxplot – attitude towards reporting system by group (median and IQR).

Figure 4. Bar chart – barriers to reporting (Fear of blame 74%, Lack of knowledge 66%, Time 48%, No feedback 42%).

Table 1. Participant characteristics.

Table 2. Knowledge item responses – item-level % agree/strongly agree across groups

5. DISCUSSION

This cross-sectional study (n=250; MBBS students & interns, nursing students, paramedical staff) reveals important gaps in knowledge and in confidence/awareness of reporting systems. MBBS students/interns had higher mean knowledge scores and somewhat more favorable attitudes toward reporting than nursing students and paramedical staff – likely reflecting differences in formal training and the emphasis on medication safety in the MBBS curriculum and clinical exposure.

Major barriers identified – fear of blame, lack of knowledge about reporting procedures, cumbersome reporting processes, and lack of feedback – align with findings from international and Indian studies. A non-punitive culture, simplified reporting (including anonymous/near-miss reporting), regular training, and feedback loops are repeatedly shown to increase reporting rates and facilitate system-learning.

The low proportion (34%) who know how to report suggests an urgent need for clear orientation/training and visible, accessible reporting mechanisms in these institutions. Near-miss reporting is particularly valuable: majority of participants expressed willingness to report near-misses if anonymous, indicating an opportunity to implement anonymous near-miss reporting systems to capture latent vulnerabilities.

Implications for practice

1. Integrate medication safety modules into undergraduate and nursing curricula and regular in-service training for paramedical staff.
2. Establish easy-to-use, possibly electronic and anonymous, reporting systems.
3. Promote a no-blame, learning culture with timely feedback to reporters.
4. Encourage interprofessional education on medication safety to align perceptions.

Strengths: Multi-professional sample in tertiary-care settings; instrument pilot-tested with good internal consistency; inclusion of open-ended responses enabling thematic analysis.

6. **LIMITATIONS:** Cross-sectional design; convenience sampling limits generalizability; data are self-reported and may be subject to recall or social-desirability biases. The study used a questionnaire – observations of real-world reporting behaviour and analysis of institutional incident-report data would complement these findings.

7. CONCLUSION

Perceptions of medication error reporting systems among students and paramedical staff show gaps in knowledge and persistent barriers to reporting – especially fear of blame and procedural unfamiliarity. Targeted educational interventions, simplification and anonymization of reporting, and culture change toward non-punitive learning are recommended to improve reporting and reduce medication-related harm in tertiary hospitals.

8. RECOMMENDATIONS

1. Mandatory induction training on medication-safety and reporting procedures for all new students/staff.
2. Simplify reporting (mobile/electronic forms) and allow anonymous/near-miss reporting.
3. Implement regular multidisciplinary morbidity & medication-safety meetings where de-identified incidents are discussed and improvement actions are fed back.
4. Periodic audits of medication incidents and public sharing of improvement outcomes to build trust.

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