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A Study to Assess Medication Errors and its Contributing Factors Among Nursing Staffs

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Abstract:

- ***Background:***

Medication administration is one of the most frequent and high-risk nursing responsibilities in hospitals. Errors at any stage of the medication-use process can cause preventable harm. Nurses serve as the final checkpoint before medicines reach the patient. Assessment of their knowledge regarding medication errors and contributing factors is essential for strengthening patient safety.

- ***Objectives:***

The study had three aims: to assess the knowledge of nursing staffs regarding medication errors and contributing factors; to classify the overall level of knowledge as good, average, or poor; and to determine the association between the level of knowledge and selected demographic variables.

- ***Methods:***

A quantitative descriptive cross-sectional study was conducted among 86 nursing staffs using non-probability convenience sampling. Data were collected through a structured online questionnaire on Google Forms with two sections: demographic/professional profile and a 19-item knowledge questionnaire on medication errors. Each correct response scored 1 mark, with a maximum score of 19. Data were analyzed using frequency, percentage, and chi-square test at $p < 0.05$.

- ***Results:***

Of 86 nursing staffs, 34.9% were below 25 years, 59.3% were female, 87.2% held B.Sc. Nursing qualification, and 55.81% were Junior Staff Nurses. Most (55.8%) had less than one year of clinical experience. Item-wise, the highest correct responses were for the purpose of double-checking high-alert medications (77.9%) and the definition of medication error (76.7%), while the lowest were for the number of Rights of Medication Administration commonly followed (26.7%) and the purpose of barcode medication administration (41.9%). Knowledge level was significantly associated with prior exposure to medication error ($\chi^2 = 6.951$, df = 2, $p = 0.031$), but not with years of clinical experience, formal training, or designation ($p > 0.05$).

- ***Conclusion:***

Knowledge of medication errors among nursing staffs at Sharda Hospital was predominantly average. Major gaps were identified in the Rights of Medication Administration and barcode medication administration systems. Staffs who had witnessed or encountered a medication error demonstrated better knowledge, indicating the value of learning from clinical experience alongside formal training. Continuous, practical, competency-based in-service education and structured debriefing after medication-error exposure are recommended to strengthen medication safety and patient safety.

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Keywords: *Medication Errors; Knowledge; Contributing Factors; Nursing Personnel; Patient Safety; Sharda Hospital.*

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I. INTRODUCTION

Quality healthcare depends on patient safety, and medication safety is a central pillar of safe nursing practice. Medication errors remain among the most common preventable adverse events in hospitals worldwide (Institute of Medicine, 2000; World Health Organization, 2017; World Health Organization, 2020; National Coordinating Council for Medication Error Reporting and Prevention, 2020). The medication-use process involves multiple professionals, and an error at any step may result in mild discomfort, permanent disability, or death.

The World Health Organization defines a medication error as any preventable event that may lead to inappropriate medicine use or patient harm while the medicine is under the control of a healthcare professional, patient, or consumer (World Health Organization, 2017). Errors may occur during prescribing, transcribing, dispensing, preparation, administration, or monitoring (Keers et al., 2013; Institute for Safe Medication Practices, 2019).

Nurses are usually the last professionals to handle a medicine before it reaches the patient. They must verify the right patient, drug, dose, route, and time. However, heavy workloads, long duty hours, interruptions, and administrative burden create conditions in which even competent nurses may commit errors (Keers et al., 2013; Gladstone, 1995; Tang et al., 2007; Fry & Dacey, 2007).

Sharda Hospital is a multi-specialty tertiary care teaching hospital serving diverse clinical areas including medical, surgical, ICU, emergency, paediatric, and obstetric-gynaecological units. Because medication administration is repeated several times during each shift, assessment of knowledge regarding medication errors among nursing staffs is both timely and necessary (Choo et al., 2010; Wolf, 1989).

Gladstone (1995) found that interruptions and heavy workload significantly contributed to drug administration errors, while underreporting remained a major concern. Tang et al. (2007) reported associations between inadequate staffing, high patient-to-nurse ratios, and medication errors. Armitage and Knapman (2003) emphasized communication failures as major contributors to medication incidents.

Cheragi et al. (2013) identified heavy workload, fatigue, look-alike packaging, and insufficient pharmacological knowledge as common causes. Mrayyan et al. (2007) and Wilkins and Shields (2008) reported that fear of blame and punitive culture reduced error reporting. Anderson and Townsend (2010) recommended double-checking high-alert medications, barcode medication administration, and structured education as effective preventive strategies.

In the Indian context, Govil et al. (2025) reported a substantial burden of medication errors in hospitals, while Senthil Kumar et al. (2023) found that 58.2% of nurses admitted to medication errors, with higher patient load associated with more errors. Kapur et al. (2026) reported high workload and fear of blame as major barriers to reporting. Limited evidence from Indian tertiary care settings makes the present study relevant.

The present study was undertaken to assess medication errors and their contributing factors among nursing staffs of Sharda Hospital and to examine the association between knowledge level and selected demographic variables. Previous literature has also highlighted the importance of communication, workload, fatigue, reporting culture, and structured medication-safety education in preventing medication errors (Armitage & Knapman, 2003; Cheragi et al., 2013; Mrayyan et al., 2007; Anderson & Townsend, 2010; Elden & Ismail, 2016; Sarvadikar et al., 2010).

- *Objectives of the Study*

To assess the knowledge of nursing staffs regarding medication errors and contributing factors and to determine the association between the level of knowledge and selected demographic variables.

II. RESEARCH METHODOLOGY

A quantitative, descriptive cross-sectional survey design was adopted for this study, as it allowed numerical data on nurses' knowledge of medication errors and contributing factors to be collected and statistically analysed at a single point in time, without manipulation of variables, while also permitting examination of associations between demographic characteristics and knowledge level. The study was conducted at Sharda Hospital, Greater Noida, a multi-specialty tertiary care teaching hospital, using a questionnaire administered via Google Forms to maximize reach within the limited data-collection period. The target population comprised staff nurses working at Sharda Hospital, and the final sample consisted of 86 nurses who fully completed the questionnaire over approximately four weeks (June–July 2026), a size considered adequate for a descriptive knowledge assessment given participant accessibility and time constraints. Non-probability convenience sampling was used, with the questionnaire link

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distributed via email, WhatsApp, and other messaging platforms; nurses who received and completed it within the study period were included, while incomplete responses, duplicate submissions, and forms with invalid demographic entries were excluded. Notably, 15 of the 86 responses (17.4%) came from nurses at other institutions (Government Medical College, Anantnag, and Kailash Hospital) rather than Sharda Hospital itself; these were retained for completeness but are acknowledged as a limitation of the convenience sampling approach, with the remaining 71 responses (82.6%) drawn from Sharda Hospital/Sharda University.

Data were collected using a structured, self-administered online questionnaire, with the form stating the study's purpose, emphasizing voluntary participation, and assuring confidentiality; submission implied consent, and anonymity was maintained throughout analysis. The questionnaire comprised two sections: Section A gathered demographic and professional data, including age, gender, qualification, designation, ward or area of posting, years of clinical experience, prior formal training in medication safety, primary source of such knowledge, average patient load per shift, and prior exposure to a medication error; Section B contained a 19-item multiple-choice knowledge test covering the definition, types, contributing factors, reporting requirements, and prevention strategies for medication errors, with each correct response scoring 1 and each incorrect response scoring 0, yielding a maximum possible score of 19. Face and content validity were established by reviewing items against the study objectives and standard references (NCC MERP, ISMP, WHO); however, because the tool was administered only once online, test-retest reliability could not be assessed, and this is acknowledged as a limitation. Prior to main data collection, the questionnaire was pilot-tested on nurses excluded from the final sample to check item clarity, functioning of the online form, and approximate completion time, with minor wording revisions made based on their feedback before the tool was finalized for the main study.

For data analysis, responses exported from Google Forms were screened for completeness and coded prior to analysis. Frequencies and percentages were used to summarize demographic and professional characteristics as well as item-wise knowledge responses. Each nurse's overall knowledge score, calculated out of a maximum of 19, was classified as Good, Average, or Poor using the Mean ± 1 Standard Deviation of the sample score. The chi-square test was applied to examine associations between knowledge level and selected demographic or professional variables — namely years of clinical experience, formal training received, designation, and prior exposure to a medication error — with the level of significance fixed at $p < 0.05$.

III. RESULTS

Demographic characteristics: Of 86 nursing staffs, 34.9% were below 25 years, 59.3% were female, 87.2% held B.Sc. Nursing qualification, and 55.81% were Junior Staff Nurses. Most (55.8%) had less than one year of clinical experience. Formal medication safety training was received by 73.3%, and 66.3% had witnessed or encountered a medication error. The detailed interpretation was given in table 1.

Table 1 Frequency and Percentage Distribution of Demographic and Professional Characteristics of the Nursing Staffs (N = 86)

Demographic / Professional Variable	Frequency	Percent (%)
1. Age (in years):		
Below 25 years	30	34.9
25–30 years	25	29.1
31–35 years	15	17.4
36–40 years	10	11.6
Above 40 years	6	7.0
2. Gender:		
Male	35	40.7
Female	51	59.3
3. Professional Qualification:		
GNM	7	8.1
B.Sc. Nursing	75	87.2
Post Basic B.Sc. Nursing	3	3.5

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M.Sc. Nursing	1	1.2
4. Designation:		
Junior Staff Nurse	48	55.81
Senior Staff Nurse	30	34.88
Ward Incharge	8	9.30
5. Area / Ward of Posting:		
Medical Ward	21	24.4
Surgical Ward	16	18.6
ICU	19	22.1
Emergency	5	5.8
Operation Theatre	7	8.1
Labour Room	10	11.6
Orthopaedic Ward	2	2.3
Psychiatric Ward	1	1.2
Respiratory Ward	5	5.8
6. Years of Clinical Experience:		
Less than 1 year	48	55.8
1–5 years	33	38.4
6–10 years	3	3.5
More than 10 years	2	2.3
7. Formal Training Received on Medication Safety:		
Yes	63	73.3
No	23	26.7
8. Main Source of Knowledge on Medication Safety:		
Nursing Education	49	57.0
In-service Education	13	15.1
Workshop/CNE	12	14.0
Self-learning	12	14.0
9. Ever Witnessed / Encountered a Medication Error:		
Yes	57	66.3
No	29	33.7

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Table 2 Frequency and Percentage Distribution of the Overall Level of Knowledge Regarding Medication Errors among Nursing Staffs (N = 86)

Level of Knowledge	Frequency	Percent
Good	10	11.6
Average	59	68.6
Poor	17	19.8
Total	**86**	**100.0**

As Table 2 shows, 68.6% of nursing staffs, majority of nursing staffs (68.6%) had average level of knowledge regarding medication errors, while 19.8% had poor level and only 11.6% had good level. Although poor knowledge was not the most common finding, a substantial majority of nursing staffs did not reach a consistently strong (Good) level, and there is clearly room to improve this through structured education.

Table 3 Item-Wise Distribution of Correct and Incorrect Responses to the Knowledge Questionnaire on Medication Errors among Nursing Staffs of Sharda Hospital (N = 86)

Item	Knowledge Questions Regarding Medication error	Correct Responses f (%)	Incorrect Responses f (%)
1	Definition of medication error	66 (76.7)	20 (23.3)
2	Most common medication error	55 (64.0)	31 (36.0)
3	Rights of Medication Administration	57 (66.3)	29 (33.7)
4	Number of Rights commonly followed	23 (26.7)	63 (73.3)
5	Factor contributing to medication errors	58 (67.4)	28 (32.6)
6	Stage with highest chance of error	49 (57.0)	37 (43.0)
7	Reporting of medication error	63 (73.3)	23 (26.7)
8	Risk from Look-Alike Sound-Alike (LASA) drugs	63 (73.3)	23 (26.7)
9	Example of medication administration error	59 (68.6)	27 (31.4)
10	Purpose of double-checking high-alert medications	67 (77.9)	19 (22.1)
11	Example of a high-alert medication	64 (74.4)	22 (25.6)
12	Action before administering medication	64 (74.4)	22 (25.6)
13	Consequence of not checking drug allergies	62 (72.1)	24 (27.9)
14	Communication method that reduces errors	52 (60.5)	34 (39.5)
15	Consequence of illegible handwriting	46 (53.5)	40 (46.5)
16	Documentation of medication errors	49 (57.0)	37 (43.0)
17	Effect of fatigue on nurses	57 (66.3)	29 (33.7)
18	Purpose of barcode medication administration (BCMA)	36 (41.9)	50 (58.1)
19	Best strategy to prevent medication errors	60 (69.8)	26 (30.2)

Item-wise findings: Correct responses were highest for purpose of double-checking high-alert medications (77.9%), definition of medication error (76.7%), example of high-alert medication (74.4%), and verification of patient identity (74.4%). The lowest correct response was for number of Rights of Medication Administration commonly followed (26.7%), followed by purpose of barcode medication administration (41.9%) and consequence of illegible handwriting (53.5%).

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Table 4 Association between the Level of Knowledge Regarding Medication Errors and Selected Variables

Years of Clinical Experience	**Good**	**Average**	**Poor**	**Total**	**χ^2**	**df**	**P**
Less than 1 year	8	34	6	48	9.074	6	0.1694(NS)
1–5 years	2	23	8	33			
6–10 years	0	1	2	3			
More than 10 years	0	1	1	2			
Formal Training Received on Medication Safety	**Good**	**Average**	**Poor**	**Total**	**χ^2**	**df**	**P**
Yes	6	45	12	63	1.232	2	0.54(NS)
No	**4**	**14**	**5**	**23**			
Designation	**Good**	**Average**	**Poor**	**Total**	**χ^2**	**df**	**P**
Junior Staff Nurse	5	34	9	48	0.372	4	0.985(NS)
Senior Staff Nurse	4	20	6	30			
Ward Incharge	1	5	2	8			
Ever Witnessed / Encountered a Medication Error	**Good**	**Average**	**Poor**	**Total**	**χ^2**	**df**	**P**
Yes	3	41	13	57	6.951	2	0.0309(NS)
No	7	18	4	29			

Association findings: No significant association was found between knowledge level and years of clinical experience ($\chi^2 = 9.074$, df = 6, p = 0.1694), formal training ($\chi^2 = 1.232$, df = 2, p = 0.54), or designation ($\chi^2 = 0.372$, df = 4, p = 0.985). A significant association was found with prior exposure to medication error ($\chi^2 = 6.951$, df = 2, p = 0.031).

IV. DISCUSSION

The present study found that most nursing staffs (68.6%) had average knowledge regarding medication errors. Only 11.6% demonstrated good knowledge, indicating that while basic concepts are understood, comprehensive medication safety knowledge remains incomplete.

Item-wise analysis revealed stronger understanding of general concepts such as definition and reporting of medication errors, but significant weakness in specific foundational areas, especially the Rights of Medication Administration. Only 26.7% correctly identified the classical five rights, suggesting that advanced terminology or informal workplace practices may be replacing core fundamentals.

Prior exposure to medication error was the only variable significantly associated with knowledge level. This supports the importance of experiential learning, but also indicates that exposure alone is insufficient unless supported by structured debriefing and education.

Years of experience, formal training, and designation did not significantly influence knowledge level in this sample. This may reflect variation in training quality, limited clinical experience of the sample, or the cross-sectional nature of the study.

Findings are consistent with international literature emphasizing workload, interruptions, communication failures, and reporting culture as contributors to medication errors. The study adds local evidence from a tertiary care teaching hospital in India and supports targeted educational interventions.

V. CONCLUSION

Nursing staffs at Sharda Hospital demonstrated predominantly average knowledge regarding medication errors. Identified gaps were chiefly related to Rights of Medication Administration and barcode medication administration. Prior exposure to medication error significantly influenced knowledge level, whereas clinical experience, formal training, and designation did not. These findings suggest that medication-safety knowledge is likely to improve through continuous, practical, and experience-based educational interventions rather than through professional designation or length of service alone. Regular competency-based education, clinical supervision, structured debriefing after medication-error exposure, and reinforcement of safe medication-administration practices are recommended to strengthen medication safety and improve patient outcomes.

VI. IMPLICATIONS

Nursing practice: Reinforcement of Rights of Medication Administration and technology-based safeguards is needed for all categories of nursing staff.

- Nursing education: Curriculum and continuing education should address identified knowledge gaps.
- Administration: Structured in-service training and post-error debriefing should be institutionalized.
- Research: Future studies should use probability sampling, validated tools, and practice observation to strengthen evidence.

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RECOMMENDATIONS

- Conduct periodic competency-based in-service education on medication safety.
- Provide structured debriefing after every witnessed or reported medication error.
- Emphasize Rights of Medication Administration and barcode medication administration in training.
- Use probability sampling and validated tools in future research.
- Combine knowledge assessment with observation of actual medication administration practices.

LIMITATIONS

- Non-probability convenience sampling limits generalizability.
- Self-reported knowledge may not reflect actual medication administration practice.
- Cross-sectional design prevents cause-effect inference.
- Small sample size (N = 86) from mainly one institution.
- Formal test-retest reliability of the tool was not established.

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