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ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING PEDIATRIC DRUG ADMINISTRATION AMONG STAFF NURSES

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ABSTRACT

Background: Pediatric drug administration requires precise knowledge and careful practice due to the unique physiological characteristics of children. Nurses play a critical role in ensuring medication safety; however, errors in pediatric medication remain prevalent, often linked to gaps in knowledge and practice. **Aim:** To assess the knowledge and practice of staff nurses regarding pediatric drug administration and identify associations with selected demographic variables. **Methods:** A descriptive cross-sectional study was conducted among 100 staff nurses using a structured questionnaire. Data were analyzed using descriptive and inferential statistics, including mean, standard deviation, chi-square tests, and Pearson correlation. **Results:** The majority of staff nurses (49%) had inadequate knowledge, and 54% exhibited unsatisfactory practice related to pediatric drug administration. The mean knowledge score was 14.67 (SD = 6.08), and the mean practice score was 18.85 (SD = 6.90). Significant associations were observed between knowledge/practice scores and variables such as age, educational qualification, total nursing experience, and pediatric ward experience ($p < 0.05$). A strong positive correlation ($r = 0.806$, $p < 0.05$) was found between knowledge and practice. **Conclusion:** This study highlights critical deficiencies in nurses' knowledge and practice concerning pediatric drug administration. These findings underscore the need for targeted education, clinical training, and supportive policies to enhance medication safety in pediatric settings.

KEYWORDS: Pediatric nursing, drug administration, knowledge, practice, medication errors, staff nurses, correlation, education.

INTRODUCTION

Safe medication administration is a critical component of pediatric nursing, where even small errors can have severe consequences due to children's physiological vulnerabilities. Pediatric patients are particularly susceptible to medication errors because of their developing organ systems, smaller body sizes, and the complexity of drug dosage calculations, all of which require precise nursing knowledge and attentiveness. Nurses, as the final checkpoint in the medication administration process, play a pivotal role in ensuring pediatric drug safety.

Numerous studies indicate that many medication errors occur at the administration stage, often due to insufficient pharmacological knowledge or lapses in nursing practice. For instance, a cross-sectional study evaluating nurses' pharmacological knowledge revealed that only 72.9% of responses were correct, and 61.5% of nurses cited inadequate knowledge as the primary challenge in drug administration.[1] Similarly, a study in Pune, India, showed that a majority of pediatric nurses possessed only average knowledge of drug calculations, with 61% never having attended relevant workshops.[2]

These knowledge gaps are linked to frequent and sometimes dangerous errors. In a Sudanese pediatric hospital, while many nurses demonstrated good knowledge during drug preparation, their practical application and post-administration protocols were found lacking, highlighting a disconnect between knowledge and practice.[3] Another study concluded that while 85.7% of pediatric nurses knew about drug dosage calculation principles, frequent interruptions and lack of systematic checks contributed to error occurrence.[4]

Despite these challenges, the literature suggests that continuing education and structured intervention programs significantly improve nurses' knowledge and reduce medication errors. For example, a review found that targeted training and the use of advanced technology improved nurses' attitudes and practices in pediatric medication safety.[5] Additionally, nurses' self-efficacy in drug administration has been shown to directly influence error rates, with pediatric nursing competence acting as a mediating factor.[6]

Moreover, practical experience and reflective learning through qualitative studies reinforce the importance of integrating individual responsibility with systemic support. Nurses have cited planning, attention to detail, communication, and adherence to safety checklists as essential to minimizing medication errors in pediatric care.[7]

Given this background, there is a pressing need to assess the existing knowledge and practices of nurses in pediatric drug administration, especially in high-risk settings. Such assessments can inform targeted interventions that enhance patient safety and clinical outcomes.

METHODOLOGY

Research Design

This study adopted a **descriptive cross-sectional research design** aimed at assessing the knowledge and practice of staff nurses regarding pediatric drug administration.

Setting of the Study

The study was conducted in **selected SPINH (J.K. Lone hospital) in Jaipur**, specifically in pediatric wards where nurses are regularly involved in administering medications to children.

Sample and Sampling Technique

A total of **100 staff nurses** were selected using a **purposive sampling technique**. Inclusion criteria required participants to have a minimum of six months of experience in pediatric care and be willing to participate in the study.

Data Collection Tool

A **structured questionnaire** was used to collect data. It included three sections:

1. **Demographic profile** of the participants
2. **Multiple-choice questions** to assess knowledge of pediatric drug administration
3. A **self-reported checklist** to assess current practices

Validity and Reliability

The tool's **content validity** was established through expert review in the fields of pediatric nursing and pharmacology. A **pilot study** was conducted to test the tool's reliability, which yielded a **reliability coefficient of 0.82**, indicating high consistency.

Ethical Considerations

Prior to data collection, **ethical approval** was obtained from the institutional ethical committee. Participants provided **written informed consent** after being fully informed about the study purpose and procedures. Anonymity and confidentiality were strictly maintained throughout the research process.

Data Analysis

Collected data were analyzed using **descriptive statistics** such as mean, standard deviation, frequency, and percentage. Analysis was performed using **Microsoft Excel** and **SPSS** software to interpret the knowledge and practice levels among nurses.

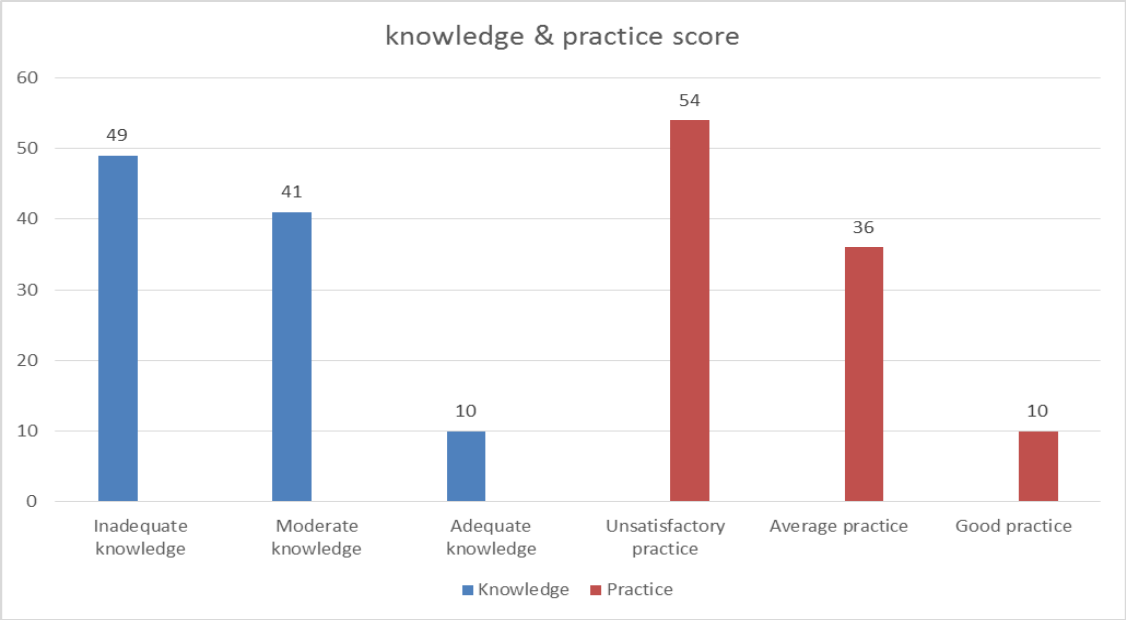

Figure 1: Knowledge and Practice Levels Among Staff Nurses on Pediatric Drug Administration.

Above figure 1 bar graph illustrates the distribution of staff nurses (n = 100) based on their levels of knowledge and practice regarding pediatric drug administration. The knowledge levels are categorized as Inadequate (49%), Moderate (41%), and Adequate (10%), while the practice levels are grouped as Unsatisfactory (54%), Average (36%), and Good (10%). The graph reveals that the majority of nurses fall into the moderate knowledge and unsatisfactory practice categories, indicating a gap between understanding and application.

Table 1: Demographic Characteristics of Staff Nurses (n = 100).

Demographic Variable	Frequency (n)	Percentage (%)
Age of Staff Nurses		
≤ 30 years	34	34.0%
31–40 years	28	28.0%
41–50 years	25	25.0%
> 50 years	13	13.0%
Professional Education		
G.N.M	33	33.0%
B.Sc. Nursing / Post Basic B.Sc. Nursing	47	47.0%
M.Sc. Nursing	15	15.0%
Specialized Nursing Course	5	5.0%
Total Years of Experience as Staff Nurse		
< 1 year	29	29.0%
1–5 years	30	30.0%
6–10 years	25	25.0%
> 10 years	25	25.0%
Experience in Pediatric Unit/Ward		
< 1 year	30	30.0%
1–3 years	37	37.0%
4–6 years	23	23.0%
> 6 years	10	10.0%
Currently Working Area		
Pediatric Medical Ward	21	21.0%
Pediatric Surgical Ward	26	26.0%
Pediatric Intensive Care Area	19	19.0%
Other Area	34	34.0%

The table shows that the largest group of participants (34%) were aged ≤ 30 years, and most nurses (47%) had a B.Sc. Nursing or Post Basic qualification. Experience levels were varied, with 30% having 1–5 years of pediatric experience. A considerable number (34%) were working outside core pediatric areas, indicating diverse deployment of nursing personnel. These demographic details help contextualize the variation in knowledge and practice levels found in the study.

Table 2: Knowledge and Practice Levels of Staff Nurses (n = 100).

Category	Level	Frequency (n)	Percentage (%)
Knowledge Regarding Pediatric Drug Administration			
Inadequate		49	49.0%
Moderate		41	41.0%
Adequate		10	10.0%
Practice Regarding Pediatric Drug Administration			
Unsatisfactory		54	54.0%
Average		36	36.0%
Good		10	10.0%

Table number 2 show that Nearly half of the staff nurses (49%) had **inadequate knowledge** regarding pediatric drug administration, and only 10% demonstrated adequate knowledge. Similarly, 54% of nurses fell into the **unsatisfactory practice** category, reflecting unsafe or suboptimal practices. These results underscore a critical gap between knowledge and safe practice, highlighting the urgent need for ongoing training and competency development programs in pediatric pharmacology and clinical care.

Table 3: Association Between Demographic Variables and Knowledge and Practice Scores (n = 100).

Demographic Variable	Knowledge (Chi-Square)	Practice (Chi-Square)	Significance
Age of Staff Nurses	54.287 (Significant)*	43.289 (Significant)*	Significant for both
Professional Education	12.882 (Significant)*	16.288 (Significant)*	Significant for both
Total Experience as Staff Nurse	80.727 (Significant)*	68.413 (Significant)*	Significant for both
Experience in Pediatric Unit/Ward	131.610 (Significant)*	114.943 (Significant)*	Highly significant for both
Currently Working Area	8.545 (Non-significant)	8.109 (Non-significant)	Not significant

*p < 0.05 considered statistically significant.

The association analysis shows that **age**, **professional education**, **total nursing experience**, and **experience in pediatric units** all had a **statistically significant relationship** with both knowledge and practice scores ($p < 0.05$). This suggests that more experienced and better-educated nurses tend to have higher competency in pediatric drug administration. However, the **current working area** did not significantly impact knowledge or practice, indicating that being posted in a pediatric ward alone is not enough—targeted training and experience are key contributors to safe and effective medication administration.

Table 3: Correlation Between Knowledge and Practice Scores of Staff Nurses (n = 100).

Variable	Mean	Median	Standard Deviation (SD)	Correlation (r)	Significance
Knowledge Scores	14.67	17.00	6.08		
Practice Scores	18.85	16.00	6.90	**r = 0.806*** (Positive correlation)	*Significant ($p < 0.05$)*

*** Pearson correlation coefficient (r), *p < 0.05 indicates statistical significance.

DISCUSSION

Medication safety in pediatric settings remains a key priority due to children's increased vulnerability to drug errors, requiring nurses to maintain high levels of knowledge and clinical practice competence. This study assessed the knowledge and practice of staff nurses on pediatric drug administration, as well as their association with demographic variables and interrelation between knowledge and practice scores. The findings provide a critical lens into current competency levels and their influencing factors.

Knowledge of Pediatric Drug Administration

In this study, nearly half of the nurses (49%) demonstrated inadequate knowledge regarding pediatric drug administration, while only 10% were found to have adequate knowledge. The mean knowledge score was 14.67 (SD = 6.08). These results align with several prior studies indicating suboptimal knowledge levels among pediatric nurses. For instance, a cross-sectional study by Lan et al. (2014) found that only 72.9% of pediatric nurses could answer pharmacology questions correctly, with insufficient pharmacological knowledge being a leading cause of medication errors.[1] Similarly, Rai and Devi (2019) reported that 59% of pediatric nurses had only average knowledge regarding drug calculations, with significant gaps identified in core concept.[2] Rahayu et al. (2020) emphasized that even experienced nurses may struggle with proper medication dosing unless continuously trained and assessed.[8]

Further supporting this, a recent review by Siby et al. (2024) found that consistent educational interventions significantly improved nurses' medication safety practices and knowledge in pediatric hospitals (Siby et al., 2024).

Practice of Pediatric Drug Administration

In this study, more than half of the nurses (54%) demonstrated unsatisfactory practice, with only 10% classified as good. The mean practice score was 18.85 (SD = 6.90), indicating considerable variability. These findings mirror global challenges in translating drug knowledge into safe practice. Alomari et al. (2020) noted a 56.9% reduction in medication errors after targeted nurse-led interventions, suggesting practice quality is highly modifiable with structured support and training.[9]

Gezer & Alemdar (2024) found a clear link between nursing competence and reduction in medication error tendencies, with pediatric nursing skills acting as a key mediator in practice quality.[6] Similar barriers to safe practice—such as workload, distraction, and unclear protocols—were identified by Moraes et al. (2022), suggesting institutional systems also play a crucial role.[7]

Association Between Demographics and Knowledge/Practice

Statistically significant associations were observed between nurses' age, education level, total nursing experience, and their knowledge and practice scores. These findings are consistent with prior studies. For instance, Sears et al. (2016) reported that experienced nurses, though more likely to report errors, committed less severe errors compared to less experienced peers.[10]

Moreover, Mohammed et al. (2022) found that educational programs significantly improve nurses' attitudes and practices regarding pediatric medication errors, especially among those with prior gaps in formal training.[11] These studies emphasize the importance of both academic qualifications and work experience in shaping safe nursing behaviors.

Correlation Between Knowledge and Practice

A strong positive correlation ($r = 0.806$, $p < 0.05$) was observed between knowledge and practice scores, indicating that enhanced knowledge significantly predicts better practice performance. This is reinforced by findings from Can Gezer & Alemdar (2024), who showed that higher drug administration self-efficacy and nursing competency are directly correlated with lower error rates.[6] Similarly, Moraes et al. (2022) and Gimenes et al. (2016) emphasized that structured protocols, when understood and applied, reduce the likelihood of medication-related mishaps.[7,12]

CONCLUSION

This study highlights significant knowledge and practice gaps among pediatric nurses in drug administration, strongly influenced by demographics and positively correlated with each other. Regular training, clinical exposure, and structured institutional policies are vital for improving pediatric medication safety.

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