



ORIGINAL ARTICLE

Medication errors in pediatric intensive care unit and measures to improve it.

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ABSTRACT... Objective: To ascertain the prevalence of medication mistakes among pediatric patients who are hospitalized to the critical care unit at Fatima Memorial Hospital in Lahore. **Study Design:** Cross-sectional study. **Setting:** Pediatric Intensive Care Unit, Fatima Memorial Hospital, Lahore. **Period:** December 2022 to December 2023. **Methods:** 131 health care workers and patients were interviewed and medication errors were categorized accordingly. Medication error was labeled as errors arising in prescribing, administration, and transcribing of medicines by the healthcare staff to the patients admitted to PICU. Data was entered and analyzed in SPSS version 25. **Results:** In this study, the average age of health care workers was 34.26 ± 9.07 years. Out of 131 candidates, 71 (54.2%) were males and 60 (45.8%) were females. Among them, 36 (27.5%) were doctors, 45 (34.4%) were nursing staff and 50 (38.2%) were technicians. The total work experience was 9.60 ± 5.96 years. The average age of children admitted in ICU was 7.31 ± 3.68 years. Out of 131 candidates, 64 (48.9%) were males and 67 (51.1%) were females. Out of 131 patients, medication error was noted in 27 (20.6%) cases. The most common type of medication error was prescription error [12 (9.2%) cases], followed by administration error [8 (6.1%)] and transcription error [7 (5.3%)]. **Conclusion:** The occurrence of medication error is although less in local setting, but not negligible. So further trials should be done and interventions should be made to lessen don the medication errors.

Key words: Administrative Error, Health Care Workers, Intensive Care Unit, Medication Error, Prescription Error, Transcription Error.

INTRODUCTION

In clinical settings, patient safety is regarded as one of the utmost considerations by healthcare practitioners. Medical mistakes pose a significant risk to the health and welfare of patients.¹ Medication errors, a prominent category of medical mistakes, have been shown to cause illness and death, as well as negative economic impacts.² A pharmaceutical mistake is defined as the failure to consider the potential for damage, risk, or any avoidable occurrence throughout the process from prescribing medication to the patient's actual use.³ The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) defines it as any avoidable incident that might result in incorrect medication usage or injury to the patient when the medication is being handled by healthcare professionals, patients, or consumers.⁴

Medication mistakes are a worldwide problem, with a fatality rate of 5.0%, with almost half of these cases being avoidable.⁵ The occurrence rate of adverse drug events within the hospital setting was found to be significant, with a range of 2 to 6 incidents per 100 admissions.⁶ Additionally, prescription mistakes are responsible for around 7000-9000 patient fatalities in the United States annually.³ Ensuring safety at medical facilities, especially in pediatric intensive care units (PICUs), is crucial due to the vulnerability of children who are unable to care for themselves and rely entirely on healthcare professionals for medical treatment.⁷ Moreover, children possess a less robust immune system compared to adults, resulting in a greater death rate and increased incidence of injuries caused by medical mistakes.⁸ Conversely, nurses working in Pediatric Intensive Care Units (PICUs) are responsible for managing several activities and addressing various disorders

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such as seizures, poisoning, unconsciousness, and numerous other medical issues.⁹ These several difficulties, in addition to numerous other ones, heighten the likelihood of harm to children in hospitals.¹⁰ The World Health Organization (WHO) considers children's safety in hospitals to be a significant and widespread problem. WHO underlines that neglecting children's safety leads to increased financial expenditures, heightened stress for patients and families, longer hospital stays, and higher health system expenses.¹¹

Considering the above facts and the potential need to reduce the morbidity as well as mortality among the pediatric population by preventing the medication errors caused by the healthcare staff must be targeted in Lahore. So, this study is planned to have insight into the matter and in turn categorize the medication errors and thus give recommendations for reducing them

OBJECTIVE

The objective of this study is to ascertain the prevalence of medication mistakes among pediatric patients who are hospitalized to the critical care unit at Fatima Memorial Hospital in Lahore.

METHODS

This Cross-sectional study was conducted at Pediatric Intensive Care Unit, Fatima Memorial Hospital, Lahore for 18 months from December 2022 to December 2023 after approval from ethical committee (FMH-30/8/2022-IRB-1100).

The Sample size of 131 cases was calculate with 95% confidence level, 7% margin of error and percentage of medication error i.e. 21% after simple random sampling.

Sample Selection

Inclusion Criteria

All children admitted to PICU aged 01 months to 14 years and Healthcare staff involved in the care at PICU and involved in medication for the patients for at least six months.

Exclusion Criteria

Parents not want to take part in study.

Face-to-face interviews and review of patient charts were conducted and information was recorded about socio-demographic factors, diagnosis, and drug prescription information and medication errors were categorized accordingly. Medication error was labeled as errors arising in prescribing, administration, and transcribing of medicines by the healthcare staff to the patients admitted to PICU.

The data was entered and analyzed using SPSS version 25. Analyzed all variables using descriptive analysis. The researchers used a Chi-square test to examine the correlation between a socio-demographic characteristic and occurrences of medication mistakes. P-value ≤ 0.05 was considered significant.

RESULTS

In this study, the average age of health care workers was 34.26 ± 9.07 years. Out of 131 candidates, 71 (54.2%) were males and 60 (45.8%) were females. Out of 131 candidates, 36 (27.5%) had MBBS, 45 (34.4%) had education in nursing and 50 (38.2%) had education in allied health sciences courses. Among them, 36 (27.5%) were doctors, 45 (34.4%) were nursing staff and 50 (38.2%) were technicians. The total work experience was 9.60 ± 5.96 years. Mostly were performing in after noon duties [47 (35.9%)] and morning duties [44 (33.6%)] and 40 (30.5%) had night duties. The average age of children admitted in ICU was 7.31 ± 3.68 years. Out of 131 candidates, 64 (48.9%) were males and 67 (51.1%) were females. The most common diagnosis was sepsis [37 (28.2%)], followed by pneumonia [22 (16.8%)] and meningitis [19 (14.5%)], while 20 (15.3%) were admitted after surgery and few other causes of admissions were also noted. The mean duration of admission was 4.96 ± 1.40 days. Mostly children were receiving intravenous treatment [40 (30.5%)], followed by intramuscular treatment [34 (26.0%)], subcutaneous [31 (23.7%)] and 26 (19.8%) were receiving oral treatment. Table-I

Out of 131 patients, medication error was noted

in 27 (20.6%) cases, while 104 (79.4%) had appropriate medication according to diagnosis. Figure-1

The most common type of medication error was prescription error [12 (9.2%) cases], followed by administration error [8 (6.1%)] and transcription error [7 (5.3%)]. Details of prescription error, administration error and transcription error were given in Table-II below.

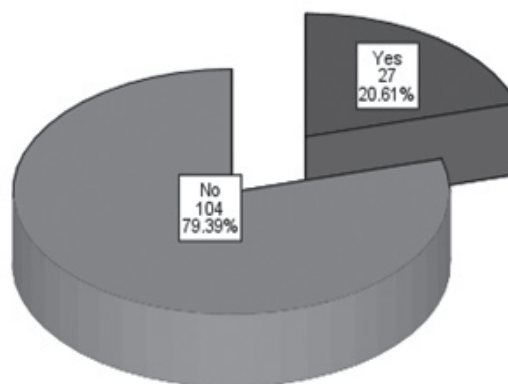


Figure-1. Frequency of medication error among ICU admitted patients (n = 131)

	F (%), mean ± SD
n	131
Age of health care provider (in years)	34.26 ± 9.07
Gender	
Male	71 (54.2%)
Female	60 (45.8%)
Education level	
MBBS	36 (27.5%)
Nursing	45 (34.4%)
Allied health sciences	50 (38.2%)
Designation	
Doctor	36 (27.5%)
Nurse	45 (34.4%)
Technician	50 (38.2%)
Total work experience (in years)	9.60 ± 5.96
Duty timing	
Morning	44 (33.6%)
Afternoon	47 (35.9%)
Night	40 (30.5%)
Patients' age (in years)	7.31 ± 3.68
Gender	
Male	64 (48.9%)
Female	67 (51.1%)
Diagnosis	
Sepsis	37 (28.2%)
Pneumonia	22 (16.8%)
Surgery	20 (15.3%)
Meningitis	19 (14.5%)
Other	33 (25.2%)
Duration of admission (in days)	4.96 ± 1.40
Type of treatment given	
Oral	26 (19.8%)
Intravenous	40 (30.5%)
Intramuscular	34 (26.0%)
Subcutaneous	31 (23.7%)

Table-I. Basic information of health care provider and children

Error Type	F (%)
Not applicable	104 (79.4%)
Prescription error	12 (9.2%)
Wrong dose	4 (3.1%)
Wrong drug	2 (1.5%)
Wrong route	1 (0.8%)
Drug Interaction	3 (2.3%)
Wrong time	2 (1.5%)
Administration error	8 (6.1%)
Omission	1 (0.8%)
Wrong time	2 (1.5%)
Wrong dose	1 (0.8%)
Wrong Preparation	1 (0.8%)
Wrong Technique	2 (1.5%)
Inappropriate Drug	1 (0.8%)
Transcription error	7 (5.3%)
Omission	1 (0.8%)
Wrong time	1 (0.8%)
Wrong drug	3 (2.3%)
Wrong dose	1 (0.8%)
Unordered dose	1 (0.8%)

Table-II. Distribution of different type of medication errors occur in ICU admitted patients (n = 131)

DISCUSSION

Errors are an inherent component of human existence. Several mistakes arise from the inherent process of cognitive and behavioral adaptations, which foster the acquisition of appropriate behavioral abilities. Implementing medical directives is a crucial component of the recovery process and the provision of patient care. Furthermore, it serves as the primary element of nursing performance and plays a significant role in ensuring patient safety.¹² Medication

mistakes may greatly influence patient safety and treatment costs and result in risks for patients and their families. Administering medication is perhaps one of the most crucial responsibilities of nurses, since any subsequent mistakes may have inadvertent and severe repercussions for the patient.^{12,13}

The primary vocational objective of nurses is to provide and enhance human well-being. Medication errors are prevalent and pose a significant risk to patient care. These errors are seen as a worldwide issue that raises death rates, prolongs hospital stays, and incurs additional expenses.¹⁴ Medication errors can occur due to a variety of factors. These include personal factors, such as insufficient knowledge, issues with prescribing, illegible handwriting, inaccurate dose calculations, incorrect strength or dosage form, improper method or route of administration, errors in patient orders or dispensing, mistakes in preparation and labeling, or unclear instructions for use. Additionally, environmental factors, such as an unsuitable work environment with high workload, noise, or tension, as well as improper storage conditions like exposure to heat or light, and invalid packaging, can contribute to medication errors.¹¹ Medical mistakes are not exclusive to doctors; they may also be committed by other healthcare practitioners such as pharmacists, dentists, and nurses, as well as pharmaceutical makers and patients.¹⁵

The repercussions of medical errors may vary from minor, inconspicuous mistakes to severe blunders that result in illness and death. Furthermore, these mistakes have economic repercussions such as extended hospitalization, the need for further medical interventions and therapies, and reduced efficiency due to time squandered during hospitalization.¹⁶ According to a recent research, over 237 million medical mistakes took place in the UK's primary and secondary healthcare facilities in the last year, resulting in a financial burden of £98 million on the UK National Health Service.¹⁷ Research indicates that the occurrence of medical mistakes is three times greater (1.1%) in children than in adults (0.35%).¹⁸ Precise dose estimates are

necessary for pediatric drugs since they are given according to the patient's body weight or surface area. Moreover, the presence or absence of various forms or potencies of medication might result in confusion and mistakes. The insufficient maturation of metabolism and elimination systems in preterm babies until the age of six months raises the risk of mistakes or toxicity in these individuals.^{11,15}

In our study, medication error was noted in 27 (20.6%) cases. A study from Karachi reported that 7.5% of missing doses and 17% were administered at the wrong time.¹⁹ In Quetta, Pakistan one study reported missed dose error of 74.4%, and another has a prevalence of medical administrative errors of 82.1%.^{20,21} The stated incidence rate of medicine administration mistake is 50% according to the "National Patient Safety Agency". Furthermore, the incorrect timing of medicine delivery mistakes has risks.²² The average rate of medical administration mistakes in the United Kingdom, Middle East, and East African nations ranges from 9.4% to 80%.²³ The research done in Pakistan found that there was a 7.5% rate of missing dosages errors, a 17% rate of incorrect time mistakes in a private healthcare environment, and a 27.45% rate of wrong time errors in public sector tertiary care facilities.^{21,24} In addition, a separate research conducted in Karachi, Pakistan revealed a drug mistake rate of 21%. A research has revealed that missed dosage mistakes and medicine administration errors had the greatest incidence, namely 74.4% and 82.1% respectively.²⁵

The predominant mistakes were linked to intravenous injections, accounting for 60.78% of the total.¹⁴ Kaushal et al. conducted an assessment of medication mistakes at a pediatric hospital and discovered that 61% of the errors were associated with intravenous infusions.²⁶ Medication mistakes may occur with any medicine, however the risk of error is higher for some kinds of pharmaceuticals due to their pharmacological features or excessive usage.²⁷ The incidence of complications resulting from mistakes in intravenous injections surpasses that of other routes of medication delivery. There have been reports documenting cases of death

and severe injury resulting from mistakes in intravenous injection, such as administering incorrect medications, incorrect dose, or incorrect dilution.²⁸

Dorothy and her colleagues discovered that out of the 110 participants, 52 individuals (47.3%) encountered a combined total of 78 medication mistakes (MEs). Out of them, 33 cases (42.31%) were identified as prescription mistakes, 29 cases (37.18%) as administration errors, 9 cases (11.54%) as transcription errors, and 7 cases (8.97%) as dispensing problems. In the logistic regression analysis examining the relationship between medication mistakes and other characteristics, it was found that urban dwellers had an adjusted odds ratio (aOR) of 4.59 (95% confidence interval [CI]: 1.08, 19.53, $p = 0.039$), indicating a considerably greater chance of encountering medication errors. Similarly, individuals with secondary level education had an aOR of 10.51 (95% CI: 1.43, 77.14, $p = 0.021$), indicating a significantly higher risk as well. Patients who received alkylating drugs had a significantly higher incidence of medication mistakes compared to other types of chemotherapy (adjusted odds ratio [aOR] = 2.87; 95% confidence interval [CI] = 1.07, 7.72; $p = 0.036$).²⁹

The incidence of pharmaceutical errors in local settings, although relatively low, is not insignificant. Additional studies and treatments should be conducted to reduce pharmaceutical mistakes. Enhancing the prevention of medication mistakes may be achieved by using computerized tools and other technology to include a patient's medical history. This facilitates expedited access to the necessary prescription information for the nurses.

CONCLUSION

The occurrence of medication error is although less in local setting, but not negligible. So further trials should be done and interventions should be made to lessen don the medication errors.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Zara Shafqat	Study design, Data collection.	
2	Abid Rafiq Chaudhry	Study concepts, Topic selection, Data interpretation, Reivew of article.	
3	Rashid Ayub	Review of article.	