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Original Article

Medication Error Reporting Practices and Barriers Among Nurses in Tertiary Care Hospitals in Rawalpindi: A Cross-Sectional Study

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ABSTRACT

Objective: To find out the prevalence of common Medication Errors, fear factors, and barriers in reporting medication errors (MEs) in tertiary care hospitals in Rawalpindi.

Study Design: Cross-sectional survey

Place and Duration of Study: Two Tertiary care hospitals in Rawalpindi, Pakistan, from Mar to Jul 2024.

Methodology: Two hundred and twenty-eight nurses registered with the Pakistan Nursing Council, actively working in selected tertiary care hospitals, and having a minimum of one year of professional experience were selected through a non-probability convenience sampling technique. Data were collected through a standardized questionnaire, the Medication Administration Error Survey, on types of MEs, reasons for Medication Errors, Reporting practices, and barriers to MEs.

Results: Identified risk factors were Wrong Time of Dose by 56% of participants, Wrong Rate of administration of dose by 31%, different drug administration by 32%, and different route of administration by 30%. Wrong Time of administration, Wrong patient, and Wrong dose of drug were found statistically significant with work experience in IV MEs. Wrong patient and Wrong dose of drug were found statistically significant with training in medication administration. Wrong method of drug administration, wrong time of administration, Wrong patient, and Wrong dose of drug were found statistically significant with training in medication administration in IV Medication errors.

Conclusion: The study concludes that IV Medication errors were statistically significantly associated with Work Experience and Training for medication administration.

Keywords: Errors, Medication, Nurses, Perceptions

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INTRODUCTION

Medication Errors (MEs) are "preventable incidents that may lead to patient harm while medication is in the control of a health care professional, patient, or consumer" [1] High healthcare costs are attributed to MEs.[2] MEs are among the most commonly reported adverse drug reactions (ADRs)[3]. In a recent systematic review, Inappropriate drug, dosing errors, wrong route, and inappropriate time were reported as medication-related errors.[4] Another study reported that medication errors occurred due to the wrong drug, inappropriate dispensing, low-quality medical products, and labeling and nomenclature.[5]

As per the World Health Organization (WHO) report, low staffing accounted for 24% of MEs, inexperienced healthcare staff accounted for 17%, and lack of communication accounted for 16%.[6] In a study, it was reported that 400,000 MEs and 98,000 deaths occurred annually due to MEs in the United States of America, costing about $40 billion to healthcare and patients.[6] Organization for Economic Co-Operation and Development has projected a 15% rise in hospital expenditures due to MEs.[7] According to a study in Pakistan, knowledge about ME prevention was low among nurses.[8] Another study done in Pakistan reported that about 91% of the nurses committed MEs due to interruptions.[9]

Several factors are listed in the literature to improve patient safety, including professional, organizational, work-related, personal, and medication factors.[10] Evidence suggests that continuously educating nurses on patient safety and the use of Health informatics can improve patient safety.[5]

According to the Pakistan Economic Survey 2017–2018, 108,474 registered nurses were performing duties across the country.[8] This study can help nurses create focused training programs based on data from this study that will improve their skills in promoting a culture of safety. The objective of this study is to find

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out the prevalence of common MEs in tertiary care hospitals of Rawalpindi.

METHODOLOGY

This Cross-sectional study was conducted on nurses of different departments of two tertiary care hospitals in Rawalpindi, Pakistan, from Mar to Jul 2024. Participants were selected through a non-probability convenience sampling technique. Data were collected after approval by the Ethical Review Committee (Letter no.386-AAA-ERC-AFPGMI), dated 13th September 2023, from the Armed Forces Postgraduate Medical Institute.

Inclusion Criteria: Nurses of various categories aged 20 to 60 years, registered with the Pakistan Nursing Council, actively working in selected tertiary care hospitals, and having a minimum of one year of professional experience were included in the study.

Exclusion Criteria: Nurses who were posted within the past 03 months and who did not have rotation of at least 02 wards in the last year were excluded from the study. A sample size of 228 was calculated using the Open Epi calculator using the previous prevalence of medication administration errors = 81.9% ± at CI = 95% and margin of error= 5%.[11]

Data were collected using a validated, structured questionnaire which was filled by the participants on printed paper. The questionnaire was a Medication Administration Error Survey form, with a Cronbach's alpha reliability coefficient of 0.76.[12] 1st part of the questionnaire included Nurses' Socio-demographic and work-related Characteristics. In the 2nd Part of the questionnaire, nurses were asked about the frequency of the types of ME. In the 3rd part of the questionnaire, nurses were asked about reasons for Medication Errors (29 items) on a 6-point Likert scale: Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, and Strongly Agree.[13] In the 4th part, reporting practices were assessed by reporting on IV and Non-IV medicine. In 5th part of the questionnaire Barriers of MEs reporting having 18 questions on 5-point Likert Scale as Strongly Disagree, Disagree, Uncertain, Agree and Strongly Agree in 3 domains: fear factor barrier of Reporting (10 items),[14] process factors barrier (4 items), and administrative barriers related to the reporting process (with 4 items) were asked from the nurses. Statistical analysis was done using the Statistical Package for the Social Sciences 27. Age was grouped into ordinal variables. Frequencies and percentages were calculated for age as a categorical variable, marital status, religion, Professional Qualification, Hospitals, Work Experience, Type of wards, and training on medication administration. Chi-square tests were used to determine the association between the Type of medication errors (IV and Non-IV) and sociodemographic variables, including Professional Qualification of Nurses, Work Experience, and Training on Medication Administration.

RESULTS

Two hundred and twenty-nine participants were enrolled in the study after informed consent. All participants were female. Age was grouped into three categories which showed that there were 53(23%) participants in age group 20 – 30 years, age group 31 – 41 years had 149(65%) and 42 – 52 years age group had 27(12%) participants. There were 53(23%) participants with less than 5 years of work experience, while 176(77%) had work experience of more than 5 years. Demographic variables of participants are shown in Table-I.

Table–I: Demographic Variables of Study Participants (n=229)

Characteristics	Groups	n (%)
Ages (years)	20 – 30	53(23 %)
	31 – 41	149(65 %)
	42 – 52	27(12 %)
Marital Status	Single	43(19 %)
	Married	186(81 %)
Religion	Islam	227(99 %)
	Christian	02(1 %)
Professional Qualification	Nursing Diploma	47 (21 %)
	Bachelor of Science in Nursing	174(76 %)
	Master of Science in Nursing	8(3 %)
Hospitals	Pak Emirates Military Hospital	12(5 %)
	Combined Military Hospital	217(95 %)
Work Experience	≤ 5 years	53(23 %)
	> 5 years	176(77 %)
Types of Wards	Pediatrics	21(9 %)
	Gynecology	113(49 %)
	Surgical	43(19 %)
	Medical	32(14 %)
	Oncology	13(6 %)
	NICU	7(3 %)
Training on Medication Administration	No	168(73 %)
	Yes	61(27 %)

Table-II describes the response to individual items from the medication administration error survey. Frequencies of all items of the questionnaire are shown below;

An association was measured between work experience and IV and Non-IV Types of medication errors (MEs). Among Non–IV medication type errors, Wrong Time of administration and Wrong dose of drug were found statistically significant with *p*-values

Table-II: Responses of Study Participants against items from Medication Error Questionnaire (n=229)

Survey items	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The names of many drugs are similar	116(51 %)	39 (17 %)	8 (3 %)	38(17 %)	20 (9 %)	8 (3 %)
Different medications look alike	57(25 %)	40 (17 %)	12 (5 %)	91(40 %)	20 (9 %)	9 (4 %)
The packaging of many medicines is similar	112(49 %)	25 (11 %)	15 (7 %)	46(20 %)	18 (8 %)	13 (6 %)
Physician medication orders are not legible	97(42 %)	24 (10 %)	36(16 %)	36(16 %)	24 (10 %)	12 (5 %)
Physician's orders are not clear	81(35 %)	42 (18 %)	29(13 %)	41(18 %)	24 (10 %)	12 (5 %)
Physicians change orders frequently	57(25 %)	60 (26 %)	49(21 %)	25(11 %)	28 (12 %)	10 (4 %)
Use of abbreviations in writing orders	61(27 %)	60 (26 %)	42(18 %)	29(13 %)	24 (10 %)	13 (6 %)
Verbal orders for prescription	58(25 %)	65 (28 %)	47(21 %)	25(11 %)	22 (10 %)	12 (5 %)
Pharmacy delivers incorrect dose	89(39 %)	36 (16 %)	38(17 %)	25(11 %)	33 (14 %)	8 (3 %)
Incorrect preparation of drug at Pharmacy	84(37 %)	51 (22 %)	22(10 %)	46(20 %)	18 (8)	8 (3 %)
Incorrect Medicine label by Pharmacy	91(40 %)	44 (19 %)	22(10 %)	53(23 %)	9 (4 %)	10 (4 %)
Pharmacist not available 24 hours a day	83(36 %)	57 (25 %)	24(10 %)	46(20 %)	9 (4 %)	10 (4 %)
Cheaper Drug Brands	83(36 %)	35 (15 %)	28(12 %)	64(28 %)	9 (4 %)	10 (4 %)
Poor Communication between HCWs	57(25 %)	51 (22 %)	26(11 %)	76(33 %)	12 (5 %)	7 (3 %)
Many patients on the same medication	56(24 %)	47 (21 %)	29(13 %)	73(32 %)	15 (7 %)	9 (4 %)
Unit staff do not receive enough in-service training on new medicines	65(28 %)	34 (15 %)	43(19 %)	60(26 %)	15 (7 %)	12 (5 %)
New information is difficult for new medicine	49(21 %)	45 (20 %)	30(13 %)	82(36 %)	9 (4 %)	14 (6 %)
Nurses have limited knowledge of medications	53(23 %)	28 (12 %)	44(19 %)	81(35 %)	9 (4 %)	14 (6 %)
Pulling of Nurses between teams	73(32 %)	37 (16 %)	22(10 %)	62(27 %)	21 (9 %)	14 (6 %)
Miscommunication in case of delayed schedule for medicine	63(28 %)	40 (17 %)	29(13 %)	66(29 %)	19 (8 %)	12 (5 %)
Non-compliance with approved medication administration procedure	58(25 %)	43 (19 %)	37(16 %)	60(26 %)	31 (14 %)	10 (4 %)
Interruption while preparing drugs	60(26 %)	43 (19 %)	41(18 %)	59(26 %)	15 (7 %)	11 (5 %)
Inadequate unit staff levels	53(23 %)	53 (23 %)	34(15 %)	59(26 %)	16 (7 %)	14 (6 %)
Inadequate time for medicine communication	35(15 %)	59 (26 %)	34(15 %)	78(34 %)	14 (6 %)	9 (4 %)
Orders not transcribed	152(66 %)	32 (14 %)	0 (0 %)	29(13 %)	16 (7 %)	0 (0 %)
Error in medication Kardex	152(66 %)	0 (0 %)	0 (0 %)	44(19 %)	33 (14 %)	0 (0 %)
Equipment malfunction	35(15 %)	27 (12 %)	63(28 %)	56(24 %)	37 (16 %)	11 (5 %)
Nurses unaware of known Allergy	33(14 %)	28 (12 %)	62(27 %)	78(34 %)	17 (7 %)	11 (5 %)
Patients are off ward for other care	41(18 %)	37 (16 %)	47(21 %)	61(27 %)	31 (14 %)	12 (5 %)

of <0.001 and 0.005, respectively. Similarly, among IV Medication type errors, Wrong Time of administration, Wrong patient, and Wrong dose of drug were found statistically significant with p-values of 0.007, 0.002, and 0.005, respectively. Similarly, the association between training in medication administration and Types of medication errors (MEs) showed that among Non –IV Medication type errors, Wrong time of administration and Wrong dose of drug were found statistically significant, with p-values of 0.009 and 0.008, respectively. While among IV Medication type errors, all variables of wrong method of drug administration, wrong time of administration, Wrong patient, and Wrong dose of drug were found statistically significant with p-values of <0.001. Details of association between these described variables are shown in Table-III;

Association between Professional Qualification and Types of medication errors (MEs) showed that Non–IV medication type errors, Wrong route of drug administration, and Wrong dose of drug were statistically significant with p-values of 0.003 and 0.012, respectively. Details of the association between these described variables are shown in Table-IV;

Table-V shows the frequency of fear factors towards reporting MEs, the frequency of administrative barriers in reporting MEs, and the frequency of process barriers in reporting MEs as described by the study participants.

Table – III: Association of Type of MEs with Work Experience (n=229)

Type of MEs			Professional Experience		p-Value
			≤ 5 Years	> 5 Years	
Non-IV Medication	Wrong route of administration	Yes	35(15%)	138(60%)	0.066
		No	18(8%)	38(17%)	
	Wrong time of administration	Yes	29(13%)	137(60%)	<0.001
		No	24(10%)	39(17%)	
	Wrong patient	Yes	30(13%)	132(58%)	0.010
		No	23(10%)	44(19%)	
	Wrong dose	Yes	29(13%)	132(58%)	0.005
		No	24(10%)	44(19%)	
IV Medication	Wrong method of administration	Yes	28(13%)	118(51%)	0.059
		No	25(10%)	58(25%)	
	Wrong time of administration	Yes	25(10%)	119(52%)	0.007
		No	28(13%)	57(25%)	
	Wrong patient	Yes	24(10%)	120(52%)	0.002
		No	29(13%)	56(24%)	
	Wrong dose	Yes	24(10%)	117(51%)	0.005
		No	29(13%)	59(26%)	
			Training for Medication Administration		
			Yes	No	
Non-IV Medication	Wrong route of administration	Yes	55 (24%)	118 (52%)	0.002
		No	6 (3%)	50 (22%)	
	Wrong time of administration	Yes	52 (23%)	114 (50%)	0.009
		No	9 (4%)	54 (24%)	
	Wrong patient	Yes	51 (22%)	111 (48%)	0.010
		No	10 (4%)	57 (25%)	
	Wrong dose	Yes	51 (22%)	110 (48%)	0.008
		No	10 (4%)	58 (25%)	
IV Medication	Wrong method of administration	Yes	52 (23%)	94 (41%)	<0.001
		No	9 (4%)	74 (32%)	
	Wrong time of administration	Yes	51 (22%)	93 (41%)	<0.001
		No	10 (4%)	75 (33%)	
	Wrong patient	Yes	51 (22%)	93 (41%)	<0.001
		No	10 (4%)	75 (38%)	
	Wrong dose	Yes	51 (22%)	90 (39%)	<0.001
		No	10 (4%)	78 (34%)	

Table – IV: Association of Type of MEs with Professional Experience (n=229)

Types of MEs			Professional Qualification			p-Value
			Diploma	Bachelor	Master	
Non-IV Medication	Wrong route of administration	Yes	29 (13%)	138 (60%)	6 (3%)	0.045
		No	18 (8%)	36 (16%)	2 (1%)	
	Wrong time of administration	Yes	25 (10%)	134 (59%)	7 (3%)	0.003
		No	22 (10%)	40 (17%)	1 (0.5%)	
	Wrong patient	Yes	27 (12%)	129 (56%)	6 (3%)	0.080
		No	20 (9%)	45 (20%)	2 (1%)	
	Wrong dose	Yes	25 (10%)	131 (57%)	5 (2%)	0.012
		No	22 (10%)	43 (19%)	3 (1%)	
IV Medication	Wrong method of administration	Yes	26 (11%)	116 (51%)	4 (2%)	0.254
		No	21 (10%)	58 (25%)	4 (2%)	
	Wrong time of administration	Yes	26 (11%)	112 (49%)	6 (3%)	0.403
		No	21 (10%)	62 (27%)	2 (1%)	
	Wrong patient	Yes	24 (10%)	114 (50%)	6 (3%)	0.147
		No	23(10%)	60 (26%)	2 (1%)	
	Wrong dose	Yes	24 (10%)	113 (50%)	4 (2%)	0.175
		No	23 (10%)	61 (20%)	4 (2%)	

Table – V: Types of Barriers in Reporting MEs (n=229)

Fear Factors towards Reporting Medication Errors					
Description of Item	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
Fear of Consequences	78 (34%)	42(18%)	57(25%)	25(11%)	27(12%)
Recognized as Incompetent Nurse	43 (19%)	46(20%)	80(35%)	30(13%)	30(13%)
Blamed by Head Nurse	60 (26%)	43(19%)	62(27%)	32(14%)	32(14%)
Blamed by Doctors	66 (29%)	55(24%)	41(18%)	35(15%)	32(14%)
Blamed by Colleagues	69 (30%)	41(18%)	27(12%)	60(26%)	32(14%)
Impact on Annual Evaluation Report	69 (30%)	39(17%)	55(24%)	34(15%)	32(14%)
Impact on Salary and Benefits	37 (16%)	34(15%)	32(14%)	78(34%)	48(21%)
Negative attitude towards Nurse	32 (14%)	41(18%)	60(26%)	43(19%)	53(23%)
Judicial Issues	60 (26%)	37(16%)	29(13%)	62(27%)	41(18%)
Confidentiality Breach	60 (26%)	32(14%)	51(22%)	43(19%)	43(19%)
Administrative Barriers to Reporting Errors					
Description of Item	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Inappropriate Reaction to Errors	32(14%)	34(15%)	30(13%)	80(35%)	53(23%)
Exaggerated Response on Reporting MEs	27(12%)	32(14%)	30(13%)	96(42%)	42(19%)
False Beliefs in Managers	30(13%)	39(17%)	25(11%)	87(38%)	48(21%)
Lack of Encouragement on Reporting MEs	25(11%)	34(15%)	37(16%)	87(38%)	46(20%)
Process Barriers in Reporting MEs					
Description of Item	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Too much time to contact administration	18(8%)	22(9%)	50(22%)	112(49%)	27(12%)
MEs are not important	18(8%)	25(11%)	53(23%)	108(47%)	25(11%)
Unclear definition of MEs	16(7%)	25(11%)	53(23%)	110(48%)	25(11%)
Forgot to Report MEs	21(9%)	39(17%)	41(18%)	112(49%)	16 (7%)

DISCUSSION

This multicenter study was conducted to assess medication error frequency, types, and barriers. All participants in our study were female, with the majority 149(65.1%) between the ages of 31 and 41. A study by Fathallah *et al.,* showed that more than half of the participant nurses were female, aged 25 to 35 years.[13] This can be attributed to the fact that younger nurses primarily interact directly with patients, while older nurses transition to managerial duties. The majority of nurses with a bachelor's degree in the study could be due to a national trend of placing newly graduated nursing students in tertiary care hospitals; similar results were seen in study by Samundeeswari *et al.*[14] Two-thirds of nurses, 168(73.4%), had not attended a formal training program regarding medication administration, which is quite similar to the findings of the study of Wondmieneh *et al.*[15] This could be caused by the heavy workload that nurses have, excessive time constraints, or an incorrect understanding of the risks. The most frequent type of error was "wrong time"; similar results were obtained in a study by Shitu *et al.*[16]

Our study showed that compared to intravenous (IV) medication errors, nurses were more likely to report non-IV drug errors (62% vs 72%); Al-zoubi *et al.,* showed similar results (41% and 70%)17. This pattern raises the possibility that nurses are reluctant to disclose IV errors because they believe they are more serious or have more repercussions. Mirzaei *et al.,* reported main obstacles to reporting MEs were excessive workloads, worries about the consequences of MEs, and uncertainties about their nurse manager's response. Merely 28.9% of nurses in Kermanshah's teaching hospitals reported their MEs to their nurse managers.[18] The current study shows that major fear factors included impact on their salary and benefits, fear of judicial issues after reporting, and negative attitudes towards reporting. Schroers *et al.,* reported obstacles in the reporting process and administrative issues.19 According to a study conducted by Rutledge *et al.,* the biggest barriers to error disclosure are fear of lawsuits and the fear of losing patients' confidence.[20] For reporting practice barriers, a significant portion of nurses 136(59.4%) were unsure or indicated a lack of clarity regarding the definition of MEs. Training facilities can help staff identify and report faults accurately, preventing repeated errors from being made by others.[21] For administrative barriers, the majority of nurses felt manager responses didn't reflect the severity of errors, and they felt a lack of encouragement from directors and concerns about false beliefs or inappropriate reactions from leadership regarding errors.[22]

In our study, a number of nurses felt a lack of encouragement from directors after reporting MEs. This may suggest a trend that nurses with more experience and qualifications report non-IV errors more frequently, possibly due to greater confidence or understanding of reporting protocols, and that nurses working in Gynecology wards are more likely to report non-IV errors. Training in medication administration and work experience are significantly associated with IV medication errors as well. This aligns with research suggesting that nurses with experience are more likely to report such errors, as described in the literature.[8] Additionally, our findings are consistent with current literature that shows no significant relationships between ME frequency and other variables such as age, marital status, and socioeconomic status.

LIMITATION OF STUDY

Limitations of our study include only a small sample included in this study. The study was conducted in a tertiary care hospital, which may have better procedures in place than peripheral hospitals. Multicenter studies should be conducted with a representative sample of peripheral hospitals.

CONCLUSION

The most frequently reported errors were non-IV medication errors, and reporting processes were identified as the major barrier to reporting MEs; it was found to be significantly associated with work experience of greater than 5 years, working in the Gynae department, and having a bachelor's degree.

RECOMMENDATION

In conclusion, nursing management in Pakistan should take steps to avoid and minimize MEs among nurses, given the detrimental effects of MEs on patient safety, care quality, and hospital performance, by addressing the barriers by appropriately addressing the fear factors, administrative barriers, and barriers of the reporting process, and ensuring adequate training of nurses on drug administration.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SP & SM: Data acquisition, data analysis, critical review, approval of the final version to be published.

MSS & SSS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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