Assessing the Knowledge, Attitude and Behavior Towards Intravenous Medication Errors

Asifa Kiran[1], Rubina Shafqat[2], Ruqia Amin[3] and Rubina Jabeen[4]

https://doi.org/10.62345/jads.2023.12.4.52

Abstract

Medication errors occur during patient care and are widely reported globally. They pose a serious threat to patient safety. Accordingly, the present study has attempted to examine the influence of knowledge, attitude, and behaviour about intravenous medication error administration on intravenous medication errors. The study followed a quantitative deductive approach. Data were collected from the nurses working in Lahore General Hospital. The total population was 408 nurses. The sample size for the present study was 200 working in the general ward, emergency, intensive care, and operation theatres, among other departments. Data were collected using the questionnaire, and all the questions were adapted from the previous studies. Collected data were subjected to SPSS for analysis. Results of the study revealed that knowledge and behaviour regarding intravenous medication administration have a significant influence on medication errors. At the same time, On the other hand, attitude was not found to influence intravenous medication errors significantly. The study offers valuable insights into the theory and practice.

Keywords: Mediation Errors, Patient Safety, Intravenous Medication Errors.

Introduction

Patient safety is a top public issue in healthcare systems worldwide (Sheik et al., 2017). A long-standing correlation exists between medication errors, poor medical care, extended hospital stays, and a decline in patient trust in the hospital's services (Jolivot et al., 2016). According to the National Coordination Centre for Prevention and Reporting of Medication Errors (NCCMERP), pharmaceutical errors are avoidable incidents that could lead to improper medication use or patient harm. In contrast, the medication is under the care of a healthcare professional, patient, or consumer. According to the World Health Organization (WHO), medication errors are thought to be responsible for 42 billion dollars in annual costs worldwide, or 0.7% of global GDP. Drug errors are estimated to cost the global economy 42 billion dollars annually, or 0.7% of all health spending (Donaldson et al., 2017). By 2022, a global initiative must seek to cut the harm to patients brought on by drug errors by 50%.

The most frequent type of medical error today is medication error. According to research, nurses' knowledge, attitude, behaviour, and function all contribute to the likelihood of a mistake. A valid, reliable method for measuring the complexity of care in nurse medication errors is necessary, given the significance of the complexity of care in such errors and its role in providing prevention

[1]*Charge Nurse, General Hospital Lahore. Email: Zafariqbalasifakiran@gmail.com*
[2]*Charge Nurse, Punjab Institute of Neuroscience Lahore. Email: Rubiwaqar64@gmail.com*
[3]*Charge Nurse, Punjab Institute of Neuroscience Lahore. Email: RuqiaMubeshir234@gmail.com*
[4]*Principal, Superior College of Nursing, Lahore.*

Compliance with ethical standards: There are no conflicts of interest (financial or non-financial). This study did not receive any funding.

strategies. Per 100 hospitalized patients, there are roughly 17 pharmaceutical errors per day: 16% related to prescription, 27% to transcription, 48% to dispensation, and 9% to administration (Ministerio et al., 2022). Nurses should follow the six rights of medicine administration: the appropriate patient, the right drug, the correct route, the right time, the correct dose, and proper documentation to prevent medication errors before they reach the patient. MAE reporting is essential for error prevention. Reporting errors efficiently aids in preventing future mistakes that can damage patients and lessen their negative impact. Reporting MAEs also lowers the likelihood of future errors, lessens suffering for individuals, and saves money. The delivery of a medicine dose that differs from the prescription, as recorded on the patient's medication file, or from accepted hospital regulations and procedures is referred to as a medication administration error (MAE) (Wondmieneh et al., 2020)—errors in the preparation and delivery of intravenous medication fall under this category.

Numerous studies have been conducted on the reporting of MEs by nursing personnel (Vrbnjak et al., 2016). However, only some have examined their knowledge, attitudes, and behaviours regarding the treatment and administration of IVs (Simone et al., 2016). With these facts in mind, we set out to investigate intravenous medicine delivery errors in the healthcare system in terms of knowledge, attitudes, and behaviours. There are no reliable instruments or in-depth studies that look at these factors at the hospital level to measure nurses' knowledge, attitudes, and behaviours during the preparation and delivery of IV medications. Thus, this study aimed to examine these three aspects in a hospital setting while also validating and culturally adapting the knowledge, attitudes, and behaviour questionnaire for the delivery of IV drugs. The significance of medication error is to assess how well various interventions reduce pharmaceutical errors that can occur during the prescription, administration, and supply of medications in adult medical and surgical hospital settings.

Literature Review

Nurses might not be aware of the maximum administration rate or believe that straying from it is not clinically relevant. Part of the nurse's duties include;

- Monitoring the patient before and after administering medications,
- Documenting everything that occurs during care and drug administration, and
- Rectifying and reporting any mistakes that are made.

But most importantly, a registered nurse is always honest, fair, and ethical in handling mistakes (Muzio et al., 2017). They reported that nurses' perspectives and awareness of prescription errors differed according to their level of education. Most research consistently showed that among RNs, the level of education was a significant predictor of MAEs. Thomas et al. (2017) discovered that the most common causes of pharmaceutical errors were insufficient electronic documentation skills and erroneous documentation, frequently resulting from inadequate training. However, Sulaiman et al. (2017) studied in a teaching hospital and found that the duration of the experience was related to the frequency of prescription errors.

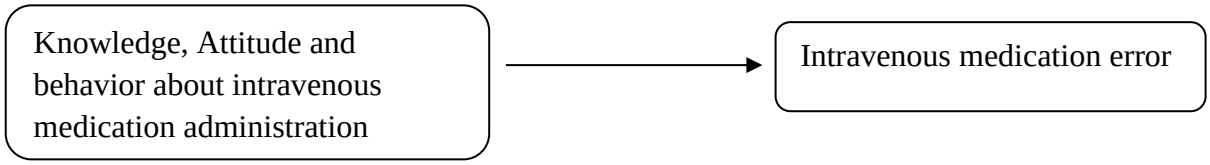
Furthermore, Rodziewicz et al. (2022) concluded that several factors, including healthcare professionals' workload, training and education, institutional policies and protocols, and fear of lawsuits or disciplinary actions, can make it difficult for them to recognize and report medication errors. The blame culture, fear of punishment, ignorance of the value of reporting medication errors, and lack of knowledge regarding the reporting process are some of the barriers that prevent healthcare professionals from adequately reporting medication errors. Hello and Moulton (2017) stated that recognizing and reporting medication errors allows healthcare professionals and

institutions to pinpoint issues and enhance patient care. In a different study conducted in Saudi Arabia. Alsulami et al. (2019) concluded that despite the substantial understanding of reporting requirements and awareness of medication errors, medical personnel significantly underreported medication errors. The potential to prevent mistakes and gain knowledge from them is provided by reporting pharmaceutical errors. According to Rodziewicz et al. (2022) reporting will result in a root cause study of the error, which will be used to build policies and protocols, raise awareness, offer training, and educate the public. It is crucial to record whether errors cause harm; even mistakes that miss the patient should be reported. Failure to report increases the risk of severe patient damage.

Al-Ahmadi et al. (2020) suggested that even mild weariness could result in medication errors. Furthermore, because several factors might intensify one another, exhaustion and emotional loads may partially coincide in time. The influence of healthcare personnel and workplace culture on drug safety was examined by a previous study (Machen et al., 2019). There are some factors present in professional healthcare settings, including individual hierarchy, a lack of trust in questioning or raising concerns about a senior staff member, and organization punitive policies for mistakes, which have been shown to impact medication safety practices. In a study, Kuitunen et al. (2021) concluded that the first two measures could decrease the number of mistakes with handling medications, improper doses, incorrect dosage forms, and quick administration (i.e. when supplying infusions rather than concentrated solutions). When used effectively, smart infusion pumps with drug libraries have been demonstrated to decrease the frequency of incorrect infusion rates and doses.

H1: There is a significant relationship between knowledge about medication administration and medication errors.
H2: There is a significant relationship between attitude about medication administration and medication errors.
H3: There is a significant relationship between behavior about medication administration and medication errors.

Figure 1: Research framework



Methodology

Study Design

To make sure that the results are accurate, objective, and as generally applicable as feasible, Sharon (2018) defines a research design as a plan that provides the essential foundation for including every element of a quantitative survey. The layout was descriptive. The cross-sectional design and quantitative nature of the investigation. Data were gathered using standardized questionnaires that were self-administered. The nurses in each of the wards and units were given questionnaires to complete to learn more about the causes, impacts, and consequences of intravenous medication distribution and adverse drug events. Following is the regression model for the framework,

$$Intravenous\_Medication\_Error=\beta0+\beta1\cdot Knowledge+\beta2\cdot Attitude+\beta3\cdot Behavior+\epsilon$$

Where,

- *Intravenous_Medication Error* is the dependent variable
- $\beta0$ is the intercept term.
- $\beta1$, $\beta2$, and $\beta3$ are the coefficients associated with the independent variables Knowledge, Attitude, and Behavior, respectively.
- ϵ is the error term.

Population and Sample Size

A sample is a specific group from which data will be collected, whereas a population is the complete group from which inferences will be made. The sample size is always less than the whole population. The nurses of Lahore General Hospital (LGH) have been chosen as our population. This comprises the 408 nurses who work in the general ward, emergency, intensive care, and operation theatres, among other departments. Using the formula, the sample size was determined.

$$n = \frac{N}{1 + N(e)^2}$$

In this formula n = Sample size; N = Total population; e = Precision level

$$n = \frac{408}{1 + 408(.05)^2}$$

As per calculations, the sample size of the present study is 200 nurses working in LGH, Lahore.

Measurement and Data Collection

This section contains information on the questionnaire consisting of questions to assess the knowledge, attitude, and behaviour about intravenous medication administration, medication errors, and nursing care complexity. Knowledge, attitude, and behaviour were measured by 20-items (Muzio & Tartaglini al el.., 2016). The intravenous medication errors were measured by 08-items (Truter et al., 2017).

To gather data, we went to the Lahore General Hospital and briefly explained the study's objectives. We gave the questionnaires to each nursing department after getting their verbal approval to collect the data (emergency, ICU, Operation Theater, General ward). Nurses working at (LGH), Lahore, received 200 surveys. The secrecy of their response was promised to the participants. Participants are not under any pressure to respond in any way.

Data Analysis

The acquired data was examined using a social sciences statistical software (SPSS). The frequency of medication errors was shown using a frequency table with descriptive data. Additionally, data were subjected to inferential statistics. Pearson correlations measure the strength of the linear link between two variables. The link between the independent and moderators and the relationship between the moderators and the dependent were tested using regression. The moderator was used to evaluate the complexity of nursing care in connection to intravenous medication error and knowledge, attitude, and behaviour about intravenous drug delivery.

Results

Demographic Analysis

As per table 1, the majority of the respondents belonged to the gender female, whereas only two respondents were male. Further, the majority of the respondents belonged to age group 20-30. Similarly, 54 respondents were found to be between 31 and 40 years old, whereas only five belonged to the age group 41 to 50. Table 1 shows that the majority of the respondents were found to have a qualification diploma in nursing. Similarly, 71 respondents were found to have qualifications Post RN BSN. However, only 3 of the respondents have MSN qualifications. The majority of the respondents belonged to the ICU department.

Similarly, 13 respondents belonged to general ward, and 41 were from another department. As per the table, most respondents have experience in the current hospital between 1-5 years. Similarly, 74 respondents have 6-10 years of experience, and 6 have more than ten years of experience.

Table 1: Demographics

Variable	Categories	Frequency	Percent
Gender	Male	8	4.0
	Female	192	96.0
Age	20-30	141	70.5
	31-40	54	27.0
	41-50	5	2.5
Qualification	Diploma nursing	126	63.0
	Post RN/BSN	71	35.5
	MSN	3	1.5
Department	ICU	146	73.0
	Ward	13	6.5
	Other	41	20.5
Job nature	Permanent	184	92.0
	Contractual	16	8.0
Designation	Head Nurse	7	3.5
	Charge Nurse	193	96.5
Experience	1-5	120	60.0
	6-10	74	37.0
	More then 10	6	3.0
Shift	Morning	152	76.0
	Evening	35	17.5
	Night	13	6.5

Descriptive Analysis

Table 2 shows the values of mean, minimum, and maximum for the items related to computing knowledge, behavior, attitude, nursing care complexity, and intravenous medication. The maximum values of mean and standard deviation are 3.3258 and .89374. As per Table 2, all the values of Skewness and Kurtosis for knowledge, behavior, attitude, nursing care complexity, and intravenous medication are between -2 to +2. It affirms that there is no issue of data normality.

Table 2: Descriptive statistics

	N	Min	Max	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
K	200	1.29	5.00	3.4479	.58905	-.566	.172	1.711	.342
B	200	2.00	5.00	3.9371	.68033	-.736	.172	.650	.342
A	200	1.17	5.00	3.9175	.76166	-1.063	.172	2.080	.342
IME	200	1.62	5.00	3.5281	.61130	-.322	.172	-.613	.342

Reliability and Validity

Table 3 shows the values for both reliability and validity analysis. Table shows that Cronbach's Alpha value is above 0.7. So there is no issue of reliability. Values of KMO for all the variables are greater than 0.50. Bartlett's test must be significant (p 0.05). As a result, the instrument for knowing is legitimate because all of the established requirements were satisfied.

Table 3: Reliability and validity

Variable	Cronbach's Alpha	No. of Items	KMO	Bartlett's Test of Sphericity	
				Approx. Chi-Square	Sig.
Knowledge	.600	7	.514	226.050	.000
Behavior	.748	7	.790	491.913	.000
Attitude	.833	6	.765	576.666	.000
Medication Errors	.828	8	.777	725.433	.000

Regression

Regression analysis was conducted to examine the relationship between variables. To examine the direct effect of knowledge, attitude, and behavior on intravenous medication multiple regressions were used to examine the hypothesis relationships. Table 4 shows the values of R, R-square, and adjusted R square which are .463, .215, and .210 respectively. The result table 4 shows the model summary of the current results that a total of 21.5(50.22%) variation occurs in the intravenous medication due to knowledge, attitude, and behavior Anova is significant ($p<0.05$) and it represents that the research model is significant. Moreover, table 4 shows that knowledge has a significant positive ($P<0.05$, $t=7.090$) relationship with intravenous medication. However, table 4 shows that if one unit increase in knowledge occurs then intravenous medication will increase with a beta value of 3.251.

Table 4: Model summary

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.280[a]	.079	.064	.85722	1.619

ANOVA						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	12.286	3	4.095	5.573	.001[b]
	Residual	144.026	196	.735		
	Total	156.313	199			

Path coefficients					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	Std. Error	Beta		
K--> IME	-.251	.464		7.011	.000
B--> IME	-.412	.107	-.274	-3.866	.000
A--> IME	.181	.140	.139	1.287	.200

Discussion

Any avoidable incident that causes the patient harm due to professionals or patients is considered a medication error. These occurrences could be connected to professional activity and medical procedures. The current investigations have demonstrated that a lack of information and training causes improper behaviour and attitudes toward patients. The study aims to evaluate nurses' knowledge, attitudes, and behaviours regarding the delivery and preparation of intravenous medications in hospitals. The findings will outline the implications for daily life and potential directions.

The study aimed to ascertain how nurses' attitudes, knowledge, and practices related to medication errors and the complexity of treatment. Events including prescription failures, drug naming, preparation, dispensing, distribution, delivery, education, follow-up, and use may be connected to professional practice and health care procedures or systems. Medication mistakes may or may not have a negative effect; many mistakes do not result in damage or injury but point to a lack of safety in medical care. Research on the distribution of medication errors shows that mistakes frequently result from nurses' ignorance, bad attitudes, or poor behaviour during medical operations.

In our research, we establish that some elements significantly contributed to age and drug class errors, while the outcome, gender, and admission duration were insignificant. The use of drug sheets decreased the errors highly significantly by 20%. This shows the importance of using the drug sheet and may give a reasonable explanation for the high percentage of errors because all the records contained drug sheets. So, we raise the value of the proper use of the drug sheet and the proper prescribing in the files. Any unfavourable, unintended, or avoidable incident that can lead to improper drug use, a risk to the patient, or both is considered a pharmaceutical error. Many things, including a prescription error, a prescription that was transmitted incorrectly, incorrect tagging, packing, or nominating, incorrect setup, distribution, medication, teaching, monitoring, and incorrect use, might lead to such an occurrence.

Study Implications

The theoretical framework is based on theories of learning and group behaviour. It examines how knowledge accumulates over time and spreads through levels, how to convert individual knowledge into community knowledge effectively, and how people and groups choose which methods are efficient and which are inefficient. Our research confirms the requirement for qualified and experienced hospital nurses to reduce drug errors. Our findings confirm the requirement for qualified and trained hospital nurses to reduce drug errors.

This study illustrates that the questionnaire extract may be used to assess knowledge, attitudes, and behaviours related to medication errors. It also shows that the extract performs well regarding internal consistency and validity, which should be considered in future research. To prevent drug errors, correct action is linked to intolerable knowledge. Having a positive outlook can help prevent mistakes during drug preparation and administration. Approximately 83% of the sample believed that to improve care and reduce errors; preventive measures should be taken, such as frequent training, authoritative principles that should be strained considering the available scientific evidence, continuous evaluation of clinical ills, and error reports. There is a need to improve the calibre of research in this field; all researchers must provide a consistent set of outcome measures of medication errors or internationally recognized terminology and definitions of key concepts; (2) training and supervision of healthcare professionals with the participation of medication safety pharmacists in the population; (3) empowering and educating patients and the public, especially those with chronic diseases and polyphasic disorders. As a result, research would improve in quality, nursing care would be less complicated, strategies to spot and prevent mistakes would be developed, and the community would have a better environment to practice safe self-care.

Conclusion

In conclusion, interpretations made by nursing staff when preparing and verifying drugs occur frequently, especially when other nurses start them. One of a nurse's top priorities in a hospital is intravenous drug delivery. The findings of this investigation are encouraging. Adopting appropriate behaviour to prevent medication errors depends on the experience and competence of hospital nurses. The encouraging outcomes of this investigation serve as a positive indicator for potential advancements in medication safety protocols. However, it is imperative to acknowledge that pursuing excellence in healthcare requires a comprehensive strategy encompassing continuous education, regular skill assessments, and a supportive work environment. The integration of these elements can contribute significantly to the sustained enhancement of nursing competence in drug preparation and verification.

Limitations and Future Directions

Several restrictions should be considered while interpreting the findings. First, the results cannot be applied to other settings because this thesis's study was conducted only at one teaching hospital (Lahore General Hospital Lahore). For instance, certain aspects of care delivery, ward management, medication preparation, and staffing procedures may differ from those in other hospitals and units. Hence, this is a limitation of our investigation. It will investigate a path for brand-new researchers. Second, the study's cross-sectional design ignored the population's present behavioural shifts. This study will encourage future scholars to view this idea from a fresh perspective, even though it does not apply to all types of populations. Third, the current study is

purely quantitative and excludes the qualitative component. Both sides of a subject should be taken into account. This is the gap in my research.

References

- Al-Ahmadi, R. F., Al-Juffali, L., Al-Shanawani, S., & Ali, S. (2020). Categorizing and understanding medication errors in hospital pharmacy in relation to human factors. *Saudi Pharmaceutical Journal*, *28*(12), 1674-1685.
- Alsulami, S. L., Sardidi, H. O., Almuzaini, R. S., Alsaif, M. A., Almuzaini, H. S., Moukaddem, A. K., & Kharal, M. S. (2019). Knowledge, attitude and practice on medication error reporting among health practitioners in a tertiary care setting in Saudi Arabia. *Saudi medical Journal*, *40*(3), 246.
- Donaldson, L. J., Kelley, E. T., Dhingra-Kumar, N., Kieny, M. P., & Sheikh, A. (2017). Medication without harm: WHO's third global patient safety challenge. *The Lancet*, *389*(10080), 1680-1681.
- Helo, S., & Moulton, C. A. E. (2017). Complications: acknowledging, managing, and coping with human error. *Translational andrology and urology*, *6*(4), 773.
- Jolivot, P. A., Pichereau, C., Hindlet, P., Hejblum, G., Bigé, N., Maury, E., & Fernandez, C. (2016). An observational study of adult admissions to a medical ICU due to adverse drug events. *Annals of intensive care*, *6*, 1-12.
- Kuitunen, S., Niittynen, I., Airaksinen, M., & Holmström, A. R. (2021). Systemic causes of in-hospital intravenous medication errors: a systematic review. *Journal of Patient Safety*, *17*(8), e1660.
- Machen, S., Jani, Y., Turner, S., Marshall, M., & Fulop, N. J. (2019). The role of organizational and professional cultures in medication safety: a scoping review of the literature. *International Journal for Quality in Health Care*, *31*(10), G146-G157.
- Muzio, D. M., De Vito, C., Tartaglini, D., & Villari, P. (2017). Knowledge, behaviours, training and attitudes of nurses during preparation and administration of intravenous medications in intensive care units (ICU). A multicenter Italian study. *Applied Nursing Research*, *38*, 129-133.
- Rodziewicz, T. L., Houseman, B., & Hipskind, J. E. (2022). *Medical error reduction and prevention.* StatPearls.
- Sharon, E. A., Velayutham, K., & Ramanibai, R. (2018). Biosynthesis of copper nanoparticles using Artocarpus heterophyllus against dengue vector Aedes aegypti. *Int J Life Sci Scienti Res eISSN*, *2455*(1716), 1872-1879.
- Sheikh, A., Dhingra-Kumar, N., Kelley, E., Kieny, M. P., & Donaldson, L. J. (2017). The third global patient safety challenge: tackling medication-related harm. *Bulletin of the World Health Organization*, *95*(8), 546.
- Simone, D. M., Arrigoni, A., Rossetti, G., Gruarin, P., Ranzani, V., Politano, C., & Pagani, M. (2016). Transcriptional landscape of human tissue lymphocytes unveils uniqueness of tumor-infiltrating T regulatory cells. *Immunity*, *45*(5), 1135-1147.
- Sulaiman, Z. H., Hamadi, S. A., Obeidat, N. M., & Basheti, I. A. (2017). Evaluating medication errors for hospitalized patients: the Jordanian experience. *Jordan J Pharm Sci*, *10*(2), 87-101.
- Thomas, L., Porter, D. P., & Fishbein, J. S. (2017). Impact of interruptions, distractions, and cognitive load on procedure failures and medication administration errors. *Journal of Nursing Care Quality*, *32*(4), 309-317.

- Truter, A., Schellack, N., & Meyer, J. C. (2017). Identifying medication errors in the neonatal intensive care unit and paediatric wards using a medication error checklist at a tertiary academic hospital in Gauteng, South Africa. *South African Journal of Child Health*, *11*(1), 5-10.
- Vrbnjak, D., Denieffe, S., O'Gorman, C., & Pajnkihar, M. (2016). Barriers to reporting medication errors and near misses among nurses: A systematic review. *International Journal of Nursing Studies*, *63*, 162-178.
- Wondmieneh, A., Alemu, W., Tadele, N., & Demis, A. (2020). Medication administration errors and contributing factors among nurses: a cross sectional study in tertiary hospitals, Addis Ababa, Ethiopia. *BMC nursing*, *19*(1), 1-9.