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Incident on Medication Error in Improving Nursing Support System for Infirmary Hospital in Roxas, Palawan: A Retrospective Study

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ABSTRACT:

Medication errors are a significant concern in healthcare, particularly in rural settings where resources and support systems are often limited. This study aims to define the incidence of medication errors in an infirmary-level healthcare facility in Roxas, Palawan. By understanding these factors, the study seeks to develop effective interventions to enhance nursing support systems, thereby improving patient safety in rural healthcare settings.

The study employs a retrospective descriptive design, utilizing historical incident reports from January 2019 to December 2023. We systematically review these reports to identify the most common types of medication errors, their frequency, and potential causes. We analyze the demographic data of the medical professionals involved in these incidents, including age, years of experience, educational background, and role within the hospital, to identify any significant correlations with the occurrence of medication errors. We apply statistical methods such as correlation and regression analyses to identify significant relationships and explore patterns among the variables.

Preliminary findings reveal that the most common types of medication errors include dosage mistakes, incorrect medication administration, and errors related to administration timing. The analysis also shows a significant relationship between specific demographic factors—such as years of experience, workload, and training level—and the incidence of medication errors. We identify high workload, insufficient training, and limited experience as key factors contributing to these errors. Furthermore, the frequency of errors during specific shifts suggests a critical role for staffing patterns and shift management.

The findings highlight several challenges faced by infirmary hospitals in rural settings, including inadequate staffing, limited access to continuous professional development, and a lack of robust medication management protocols. The study underscores the need for targeted interventions, such as implementing comprehensive training programs, improving shift management, and enhancing communication among healthcare providers. These interventions are crucial for developing a safer and more effective nursing support system that reduces medication errors and promotes patient safety.

This study provides a comprehensive analysis of medication error incidents and their influential factors in an infirmary-level healthcare facility in Roxas, Palawan. The insights gained from the data will guide the development of tailored interventions to strengthen nursing support systems in rural healthcare settings. By addressing the identified challenges, these interventions aim to reduce medication errors, ultimately contributing to improved patient safety and healthcare outcomes. Future research should focus on evaluating the effectiveness of these interventions and exploring additional strategies for error prevention in similar rural healthcare contexts.

Keywords: Medication errors, patient safety, retrospective study, healthcare system, interventions

Introduction:

The healthcare industry has seen substantial changes in recent years due to technological developments, governmental reforms, and a heightened emphasis on patient safety. A growing trend in nursing is the heightened focus on medication safety, which has become an essential aspect of patient care. The incorporation of electronic health records (EHRs), computerized physician order entry (CPOE) systems, and advanced clinical decision support systems (CDSS) has radically transformed the approaches used by healthcare practitioners to handle and distribute pharmaceuticals. The aim of these technologies is to minimize errors, improve communication, and optimize the pharmaceutical administration process (Zhang et al., 2021).

Regardless of these advancements, pharmaceutical errors remain a significant concern in healthcare settings worldwide. Pharmaceutical errors may arise at several phases of the pharmaceutical usage process, such as prescribing, transcribing, dispensing, administering, and monitoring. These errors have the

potential to cause adverse drug events (ADEs), which present significant hazards to patient safety and can lead to severe injury, extended hospital stays, higher healthcare expenses, and even death (World Health Organization, 2019). The consistent prevalence of medication errors underscores the necessity for ongoing enhancement in nursing support systems to guarantee secure and efficient drug administration.

Medication error (ME) is broadly defined as any error in the prescribing, dispensing, or administration of a drug. ME is the single most preventable cause of patient harm. Medication administration error (MAE) is defined as any discrepancy between what the patient received or was expected to receive and what the prescriber intended in the original order. When there is a discrepancy between the drug the patient receives and the drug therapy the prescriber intended, MAE, one of the risk areas of nursing practice, occurs (Williams, 2017).

The distributional epidemiology of MAE showed that the majority of these errors involved either dose omissions (42%), or wrong time administration (50%), as the global denominator. The National Patient Safety Agency of the UK revealed that MAE is common, and this occurs in 50% of all drug medication administrations in hospitals. In the USA, MAE occurs in 5 to 20% of all drug administrations, costing the healthcare system an extra $380 million and estimated to harm at least 1.5 million patients per year, with about 400,000 preventable adverse events. MAE in East Africa is common, and the error rate ranges from 9.4% to 80% of all medication administrations [7]. The prevalence of MAE in Jimma, Ethiopia, within the intensive care unit (ICU) and pediatric ward showed 51.8% and 98.8%, respectively. (Agalu et al. 2012)

MAE is one of the most common types of adverse events for hospital-admitted patients, as well as the most common cause of preventable death. 38% of MAE are serious or fatal, and 42% of those are preventable. MAE has a significant impact on patients in terms of morbidity, mortality, adverse drug events, and increased length of hospital stay. Additionally, it increases costs for clinicians and healthcare systems. In the UK, 26% of MAE were potentially serious, with fatal events that led patients to aspiration pneumonia and intracranial hemorrhage. In Germany, 70% of all intravenous medications administered had at least one clinical error, and a quarter of these were serious errors likely to result in permanent harm to patients. (Kane-Gill S, et al., 2019)

Bar-coded medication administration (BCMA), along with ensuring patent identifications and following medication rights, can help reduce medication administration errors by 54–87%. Voluntary reporting, direct observation, manual chart review, and computerized techniques can also prevent medication administration errors. Training and competency of the nurse, medication administration policies, continuous quality improvement efforts of the nurse, clear and accurate documentation, patient education, and teamwork help decrease medication administration error in hospitals.

There is a growing concern with regard to medication errors since there has been an observable increase in the number of deaths from medication errors and adverse drug reactions in hospitals in the United States. Statistics showed that from 1983 to 1993, there was an increase from 2,876 cases to 7,391 cases. The United Kingdom observed an increase in the annual number of medication errors-related deaths from 20 to about 200 from 1990 to 2000. Medication errors can lead to adverse drug events, some of which are preventable or ameliorable. Therefore, it's crucial to steer clear of medication errors. (Lisby M. et al., 2015)

According to the WHO, the average density of the health workforce in Southeast Asia is 4.3 per 1000 population, far less than that of Europe and the United States of America (US), which are 18.9 and 24.8 per 1000 population, respectively. This, unfortunately, holds true across all of the Southeast Asian countries: many, such as Vietnam, Myanmar, Laos, and Cambodia, fail to meet the WHO's "basic" healthcare standard (2.28 skilled health workers per 1000 population), while Indonesia and Thailand barely reach this target; Malaysia and Singapore are exceptions to this, however. Rapid but inequitable socioeconomic development, high population density, and shortages in the healthcare workforce, coupled with enormous cultural diversity, have combined to pose great public health challenges for the national health systems of Southeast Asian countries, one of which is the constant struggle to identify and minimize medication errors. Reports indicate that high population growth and shortages in healthcare professionals lead to unbalanced staff-to-patient ratios, which in turn result in long working hours without breaks, multitasking, an uncongenial environment, and sleeplessness. These factors significantly contribute to the skipping or violation of procedural steps. It accounts for one-third of preventable drug-related harm and is the eighth leading cause of death in the US, with more than 98,000 deaths annually, exceeding those from car accidents, breast cancer, or AIDS. (Gautam PL., 2018).

Medication errors are common occurrences in clinical settings. The PGH's routine audits, limited to the intensive care units (ICU) and the 7th floor ward, have not fully established the extent and scope of medication errors in the national setting. From 2009 to 2011, the Training, Research, and Clinical Services Division of the PGH's Department of Pharmacy began monitoring the incidence of medication errors among patients in selected hospital areas (medicine, pediatrics, medical and central intensive care units, and 7th floor). We made a total of 3,287 observations, revealing an 8.4% prevalence rate of medication errors. In this report, the most common type of error was transcription errors, followed by prescribing errors. (Department of Pharmacy, 2014)

Human factors have a critical impact on the incidence of drug errors. Healthcare professionals, such as nurses, are prone to experiencing fatigue, particularly in situations when there is a shortage of people and a heavy workload. Experiencing fatigue can have a detrimental effect on cognitive function, resulting in mistakes when administering medication. Insufficient knowledge and instruction on drugs and their correct application might lead to mistakes. Inadequate communication among healthcare providers, characterized by ambiguous instructions or misinterpretation of orders, increases the likelihood of medication errors (Bates et al., 2018; Flynn et al., 2016).

Systemic factors within healthcare institutions can influence medication errors. Deficiencies in the medicine administration process, such as the insufficient use of technology and the absence of set protocols, may give rise to opportunities for errors to manifest. Using manual techniques instead of implementing bar-code medication administration (BCMA) systems or computerized prescribing can lead to errors. The absence of regular documentation

protocols and non-compliance with conventional pharmaceutical safety standards exacerbate the problem. The lack of a comprehensive reporting and feedback system for pharmaceutical errors hinders the capacity to recognize and tackle the root causes (Keers et al., 2013).

The need to tackle these complex difficulties by creating a stronger nursing support system that efficiently utilizes both human and technological resources drives this research. An essential aspect of this undertaking is to pinpoint precise deficiencies and vulnerabilities in existing methods that contribute to errors in the pharmaceutical field. Research on pharmaceutical errors in large, urban hospitals is on the rise, but studies specifically examining infirmary facilities, particularly in remote locations like Roxas, Palawan, remain significantly absent. These establishments frequently encounter distinctive difficulties, such as restricted availability of cutting-edge technologies, a shortage of healthcare practitioners, and less organized healthcare distribution systems. This study aims to fix this problem by looking into how often and what kinds of medication mistakes happen in infirmary hospitals. It also aims to find the exact causes of these mistakes and come up with solutions that work best for these hospitals' needs and restrictions.

The recurrent problem of medication errors in healthcare, particularly in small hospitals situated in remote areas, highlights the pressing need for continuous enhancement in nurse support systems. As previously mentioned, a number of factors contribute to the occurrence of medication errors in hospitals. As a nurse working at the infirmary hospital level, I am eager to ascertain the incidence of medication errors so that we can offer valuable insights and effective ways to enhance patient safety and nursing practices. It especially emphasizes the specific challenges encountered in these healthcare environments.

Methodology:

As additional weather satellites are deployed into orbit and technology advances, the science of weather forecasting improves. This study adopted a retrospective approach, which allowed the investigator to formulate hypotheses about possible associations between an outcome and an exposure and to further investigate the potential relationships. It searched through historical incident reports to investigate and understand occurrences and types of medication errors, as well as their associated factors in an infirmary hospital in Roxas, Palawan. This design involved collecting and analyzing medical records data dating back over a period specified by the researcher, thus providing insights into past events and trends for medication errors. By employing this method comprehensively, the study enabled an understanding of the major causes of errors in medicine, thereby facilitating corrective actions that were specialized.

Through this study, the researcher was able to develop conclusions and formulate recommendations that could potentially improve nursing services in administering and dispensing medications by limiting medication errors.

Sampling Design

The study included data reports from the Nursing Department due to incidents of medication errors. The respondents of the study were purposively chosen based on the criteria provided in the scope and limitations of the study. From the master list of admissions provided by the Records Section, systematic sampling was done to retrieve the required number of data. Only reports/records that were eligible were included in the study. Specifically, the respondents were the nurses, physicians, pharmacists, and patients of the infirmary hospital in Roxas, Palawan. This approach was particularly useful when exploring complex issues where certain perspectives were more likely to yield meaningful contributions (Creswell & Poth, 2016).

Research Locale:

The research was conducted in an infirmary hospital in Roxas, Palawan, Philippines, a remote facility with limited resources. The hospital's limited workforce and the need to address medication errors were key factors in its success. The hospital's ability to provide primary and emergency services made it an ideal location to study the impact of nursing skills on medication mistakes. The study aimed to develop tailored support systems and therapies to improve patient safety and healthcare delivery in similar settings. The hospital's dependence on the local population underscored the importance of reducing drug errors, especially in rural areas with limited treatment options. The findings could lead to significant improvements in patient outcomes in Roxas and other similar locations.

Participants of the study:

The study population encompassed all medical staff incident reports in an Infirmary Hospital between January 2019 and December 2023. Such reports included registered nurses' (RNs), Physicians, Pharmacists administering medications to patients.

Inclusion Criteria

1. **Incident Reports Timeframe:** Reports submitted between January 2019 and December 2023.

2. **Types of Reports**: Includes all staff incident reports, specifically those in medication errors.

3. **Participants**: Includes the all nurses, physicians, pharmacist, and patients that were involved in the incident report due to medication errors submitted between January 2019- December 2023.

- *Registered Nurses (RNs)*

Registered Nurses (RNs) are integral to patient care, particularly in administering medications and monitoring patients for adverse reactions. They are responsible for following physician orders to administer medications, observing patients for side effects and therapeutic outcomes, and promptly reporting

any medication errors, adverse drug reactions, or near misses. RNs also provide frontline patient care and collaborate with other healthcare professionals to ensure the best outcomes for patients.

- *Physicians*

Physicians are the primary medical practitioners responsible for diagnosing conditions and prescribing treatments, including medications. In this study, they play a crucial role in ensuring the accuracy of prescriptions, monitoring patient outcomes, and adjusting treatments as necessary. Physicians are also responsible for reporting any observed medication errors or adverse reactions and working closely with RNs, Pharmacists, and other healthcare staff to provide comprehensive patient care.

- *Pharmacists*

Pharmacists are experts in medications and play a vital role in ensuring safe medication practices. Their responsibilities include reviewing and verifying medication orders for accuracy and potential drug interactions, accurately dispensing medications, and providing essential information to Registered Nurses and Physicians. Pharmacists are also tasked with reporting any discrepancies, errors, or adverse reactions related to medications and educating healthcare staff and patients about safe medication use.

- *Patients involved in incidents*

Patients are the recipients of healthcare services and are directly impacted by medication administration. In this study, their involvement includes reporting any adverse reactions or side effects from medications, providing feedback on their medication administration experience, and participating in incident reporting if they observe or experience any medication errors. Patients' collaboration with healthcare staff is essential to ensure accurate and safe medication administration.

4. **Location:** Incident reports from all departments within Infirmary Hospital at Roxas, Palawan.

5. **Report Completeness**: Only fully completed and acknowledged incident reports with sufficient detail for analysis.4.

Exclusion Criteria

1. **Out-of-Scope Reports:** Incident reports not related to medication administration or errors.
2. **Timeframe Exclusion**: Reports submitted outside the January 2019 to December 2023 window.
3. **Incomplete Reports:** Incident reports that are incomplete or lack sufficient detail for analysis.
4. **Non-Staff Involvement:** Reports that do not involve RNs, Physicians, Pharmacists, Nurse Aides, or Patients.
5. **Duplicate Reports:** Duplicate reports of the same incident will be excluded to avoid double counting.

Instruments:

This study utilized secondary data sources from an Infirmary Hospital in Roxas, Palawan, specifically focusing on incident reports submitted between January 2019 and December 2023. These incident reports served as the primary instruments for data collection and analysis.

Incident Reports

Incident reports are comprehensive documents completed by healthcare staff to record any occurrences that deviate from standard operating procedures or result in unintended outcomes, particularly in the context of medication administration. The reports typically include detailed information on:

- **Date and Time of Incident**: Precise recording of when the incident occurred.
- **Type of Incident**: Categorization of the incident (e.g., Level of incidents, medication error, adverse drug reaction, near miss).
- **Description of Incident**: Detailed narrative of what transpired, including the sequence of events leading up to the incident.
- **Persons Involved**: Identification of staff involved (e.g., RNs, Physicians, Pharmacists) and patients affected.
- **Contributing Factors**: Analysis of factors that may have contributed to the incident, such as human error, system failures, or environmental conditions.
- **Outcomes:** Description of the immediate and long-term consequences of the incident for patients and staff.
- **Corrective Actions**: Documentation of actions taken to mitigate the incident and prevent future occurrences.

These reports are instrumental in providing a detailed understanding of the frequency, nature, and causes of medication-related incidents. By analyzing these reports, the study aims to identify patterns, common factors, and potential areas for improvement in medication administration processes in Infirmary Hospital at Roxas, Palawan.

The secondary data from these incident reports are systematically reviewed and analyzed to ensure a comprehensive assessment of the medication-related incidents over the specified timeframe. This analysis helps to uncover trends and inform strategies for enhancing patient safety and healthcare quality within the hospital.

Data Collection Procedure

The data collection procedure involved retrieving incident reports from an Infirmary Hospital's records department. These reports, spanning from January 2019 to December 2023, document various incidents related to medication administration and patient care. The following steps outlined the procedure:

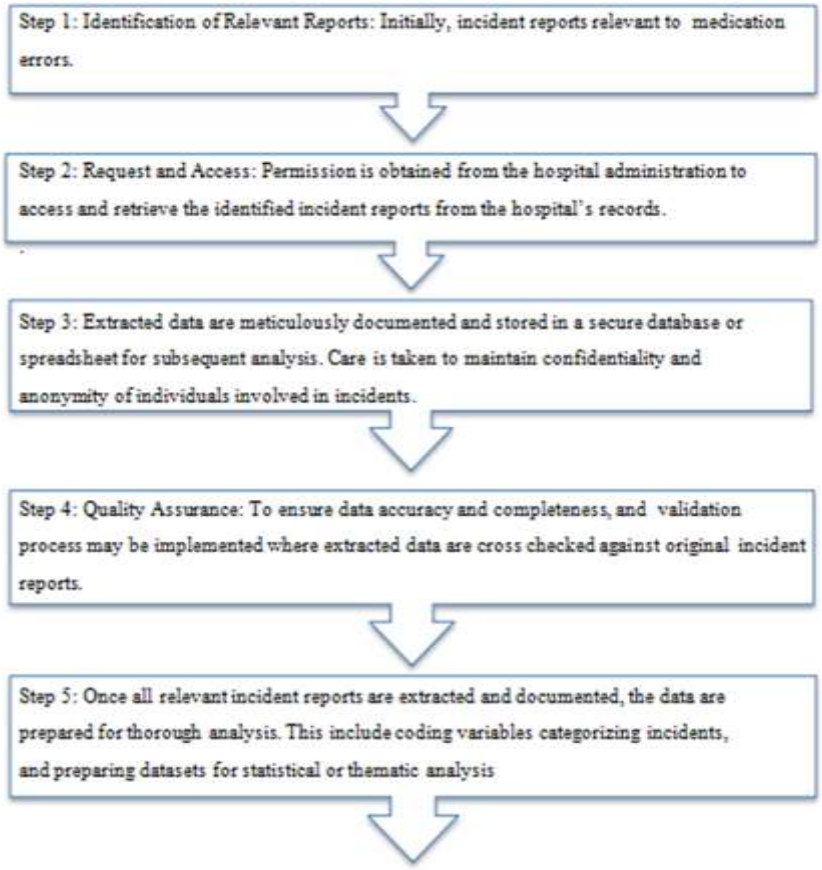

Figure 2. Data gathering procedure as used in conducting research

Historical data covering a period from January 2019 and December 2023 are collected from the incident reports of an Infirmary Hospital. Data extraction involves identifying and recording instances of medication errors, including their types and associated factors. Patient identifiers are anonymized to ensure data confidentiality and compliance with ethical standards.

Throughout the process of collecting data, the researchers rigorously followed ethical guidelines to guarantee the privacy and anonymity of all participants. Upon concluding the process of data gathering, the researchers proceeded to tally, tabulate, analyze, and interpret the data in order to extract significant insights.

Ultimately, the remaining chapters were meticulously crafted and polished in anticipation of the final defense. The implementation of this systematic methodology ensured the comprehensive nature of the study and the credibility and applicability of the findings in relation to the research inquiries.

Data Measure

Incident Reports filed by Nursing Service and Quality Assurance Departments within the hospitals are used to identify and document instances of medication errors.

Scope of the study:

Adopting a retrospective approach, this study analyzes historical incident reports to examine the prevalence, forms and causes of medication errors in an Infirmary Hospital situated in Roxas Palawan. This technique entails gathering and studying medical records that date back to January 2019 and run through December 2023, which can provide an understanding of past patterns that surrounded medication errors. The research design which is encompassed by this comprehensive retrospective approach serves the purpose of determining the major sources of medication errors and suggesting corrective measures for them.

The scope of this study encompasses:

- Nursing staff involved in medication administration at Roxas infirmary hospital, including registered nurses.
- Patient records from the hospital within the designated retrospective timeframe, focusing on cases involving medication errors.
- Reports and documentation related to medication administration practices.

Limitations of the study:

The study examined the organizational and managerial practices in the healthcare setting, specifically evaluating their influence on the delivery of patient care and the overall performance of the business. Additionally, it evaluated the ability for personal and professional growth within the hospital staff, including the implementation of educational programs and career progression methods designed to improve staff skills and job fulfillment.

Nevertheless, despite its broad range, the study had several drawbacks. Initially, data limitations were noted, given that it only looked at incident reports. This limitation could affect the generalizability and applicability of the results to wider healthcare settings. Additionally, employing a retrospective study design caused the loss of contextual variables as the records might not have correctly reflected the varied composition and causes of medication errors.

The final analysis of data might be influenced by researcher biases or theoretical perspectives, underscoring the importance of a careful approach to understanding the findings. Despite its constraints, the study aims to provide significant insights into the field of hospital management and patient safety.

The retrospective nature of this study may introduce certain limitations, including:

1. Potential for incomplete records or underreporting of medication errors due to stigma or fear of repercussions among nursing staff.
2. Differences in the definition of medication errors across various healthcare providers could affect the comparability of findings.
3. The study will be limited to a single infirmary hospital in Roxas, Palawan, which may limit the generalizability of the results to other healthcare settings.

Data Analysis:

Descriptive statistical analysis was conducted to present the frequency and distribution of medication errors. Categorization and classification of medication errors were performed to identify recurring types.

To analyze the demographic profiles of nurses, physicians, pharmacists, and patients, statistical treatments involved descriptive statistics. Measures such as mean, median, mode, and standard deviation described the central tendency and variability of age within each group. Gender and marital status were summarized using frequencies and percentages to understand the distribution within each category. Work shift data were also summarized using frequencies to show the distribution of staff across different shifts.

For the level of incidents of medication errors, time series analysis was used. This statistical method was employed to examine trends in medication errors over the study period (2019-2023). It involved analyzing data points sequentially to identify patterns, seasonality, and trends in medication error occurrences.

To assess if there was a significant relationship between demographic profiles (age, gender, marital status, work shift) and the incidence of medication errors, inferential statistical tests such as chi-square tests were employed. These tests helped determine if certain demographic characteristics were associated with higher or lower rates of medication errors among healthcare providers and patients.

Data Collection Methods:

The data collection process for this study involved two primary methods: retrieval of incident reports and collection of demographic data. Incident reports spanning from January 2019 to December 2023 were identified based on specific criteria such as medication errors, adverse drug reactions, and near misses. Permission was obtained from an Infirmary Hospital's administration to access these reports, which were then systematically extracted for key details including incident dates, types, involved personnel (e.g., RNs, physicians, pharmacists, patients), contributing factors, and outcomes. Extracted data was meticulously documented to ensure confidentiality and accuracy.

Demographic information regarding nurses, physicians, pharmacists, and patients was collected through a combination of methods. Medical records and personnel files were reviewed to gather demographic details of healthcare providers, while structured surveys were administered to directly obtain demographic data from these personnel and selected patients. Data validation processes cross-checked information across various sources to maintain integrity and completeness. Statistical analysis preparation involved coding, cleaning, and integrating incident and demographic data to facilitate a comprehensive analysis of medication-related incidents and their correlation with demographic factors. These methods ensured a robust approach to understanding medication safety issues and demographic profiles at the Infirmary Hospital in Roxas, Palawan.

Ethical considerations:

During the data collection process, strict measures were implemented to uphold ethical standards. Patient and staff confidentiality was rigorously maintained by anonymizing or removing personal identifiers from the dataset to safeguard privacy. Institutional permissions were obtained to access and

utilize incident reports for research purposes, adhering meticulously to hospital policies and regulations. These ethical considerations ensured the protection of participants' privacy rights and compliance with ethical guidelines throughout the study.

Results

This chapter explored the data of the incident of medication errors in infirmary hospital in Roxas, Palawan.

1. Demographic Profile

The demographic profile of healthcare providers and patients plays a crucial role in influencing the incidence of medication errors, as evidenced by the data analyzed from an Infirmary hospital in Roxas, Palawan between 2019 and 2023. This discussion explores the relationships observed between demographic factors—gender, age, marital status, and shift—and the occurrences of medication errors among Nurses, Physicians, Pharmacists, and Patients.

Medication Errors (IR)	**GENDER**		**AGE**				**MARITAL STATUS**		**SHIFT**	
							SINGLE	**MARRIED**	**2019-2023**	
	M	**F**	**18-25**	**26-40**	**41-60**	**60>**			**AM 7am-7pm**	**PM 7pm-7am**
NURSE	5	9	-	14	-	-	13	1	11	3
PHYSICIAN	3	10	-	8	-	-	11	2	8	5
PHARMACIST	0	9	-	8	1	-	8	1	8	1
PATIENT	15	21	3	11	10	12	5	31	29	7

Table 1: Demographic Profile and Medication Errors (Incident Reports)

This table provides an overview of the demographic profile (gender, age, marital status, shift) of Nurses, Physicians, Pharmacists, and Patients at Infirmary Hospital from 2019 to 2023, alongside the incidence of medication errors reported.

Nurses play a pivotal role in healthcare by upholding professional and ethical standards that directly impact patient outcomes. Their adherence to ethical principles is vital for fostering trust and integrity within the healthcare system. Continuous education on ethical principles and professional conduct is essential for nurses to navigate the complexities of modern healthcare settings (Haddad & Geiger, 2023).

1.1 ***Nurses***

Medication Errors (IR)	**2019**	**2020**	**2021**	**2022**	**2023**
GENDER					
male	3	-	1	-	1
female	2	3	1	2	1
AGE					
18-25	-	-	-	-	-
26-40	5	3	2	2	2
41-60	-	-	-	-	-
60>	-	-	-	-	-
MARITAL STATUS					
single	5	3	2	1	2
married	-	-	-	1	-

Table 1.1	SHIFT				
	AM 7am-7pm	5	2	1	1	2
	PM 7pm-7am	-	1	1	1	-

Medication Errors Among Nurses

Nurses exhibited varying patterns in medication error incidence based on gender, age, marital status, and shift. Female Nurses consistently reported higher medication error rates compared to males across the years. The age group of 26-40 years showed the highest incidence of errors, particularly notable during the AM (7am-7pm) shift. Single Nurses also reported fluctuating error rates, possibly indicating differing levels of experience or workload management challenges.

Research consistently shows that female nurses report higher medication error rates than male nurses. A study by Rogers et al. (2007) highlighted that female nurses were involved in a greater number of medication errors, which could be attributed to several factors, including work overload, emotional labor, and communication styles. The tendency for females to be more involved in direct patient care could potentially expose them more to stressful situations where errors are likely to occur.

Furthermore, a systematic review by Huang et al. (2018) indicated that gender differences in reporting behaviors may also play a role. Female nurses might be more likely to report errors due to a stronger emphasis on accountability and ethical considerations. In contrast, male nurses might underreport their experiences or take longer to recognize and acknowledge a mistake.

Age is another critical factor influencing medication error incidence in nursing. The age group between 26-40 years has been identified as the demographic with the highest error rates. A longitudinal study by Peters et al. (2020) underscored that nurses within this age bracket often manage numerous responsibilities, including work-life balance and career advancement, which may contribute to lapses in attention and decision-making during high-pressure scenarios.

Additionally, the AM shift (7 AM - 7 PM) emerged as a period with an increased error rate among this age group. According to findings from Müller et al. (2021), the time of work environment presents challenges such as fatigue, decreased alertness, and limited resources, which can exacerbate the likelihood of medication errors. The confluence of these stressors makes it crucial to address the unique needs of nurses working during these hours.

Marital status also appears to correlate with medication error incidence. Single nurses exhibited fluctuating error rates, suggesting that their experiences may differ from those of their married counterparts. Research by Chaboyer et al. (2018) indicated that single nurses may face additional challenges in workload management, potentially leading to higher stress levels and, subsequently, more errors. The fluctuating nature of their error rates could indicate varying levels of support systems or access to resources outside of work, ultimately influencing their performance and error rates.

1.2 ***Physicians***

Medication Errors (IR)	**2019**	**2020**	**2021**	**2022**	**2023**
GENDER					
male	-	1	1	1	-
female	2	-	2	4	2
AGE					
18-25	-	-	-	-	-
26-40	2	1	3	5	2
41-60	-	-	-	-	-
60>	-	-	-	-	-
MARITAL STATUS					
single	2	-	3	5	2
married	-	1	-	-	-
SHIFT					
AM 7am-7pm	2	1	2	2	1
PM 7pm-7am	-	-	1	3	1

Table 1.2 Medication Errors Among Physicians

Physicians showed a similar trend where female Physicians reported higher medication error rates compared to males, with consistent incidences across different shifts. The age group of 26-40 years showed significant variations in error rates, potentially influenced by workload dynamics or patient complexity. Single Physicians reported higher errors in earlier years, suggesting a learning curve or adaptation period.

Several studies have elucidated the role of gender in medication error occurrences. One comprehensive study published in the Journal of Patient Safety analyzed medication errors across various healthcare settings and found that male physicians exhibited a higher frequency of reported errors compared to female physicians (Bhasin et al., 2021). While the specific reasons for this disparity were not definitively established, factors such as varying communication styles, risk-taking behaviors, and differences in clinical judgment could be at play. Additionally, the trend was consistent across shifts, suggesting that the findings are robust and not merely reflective of a single timeframe or clinical condition.

The impact of age on medication error rates is another critical aspect of this discussion. The age group of 26-40 years was specifically noted for having significant variations in error rates (Zavala et al., 2020). Younger physicians may face unique challenges in managing complex patient cases, particularly as they integrate theoretical knowledge with practical application. Increased workloads and shifts in patient demographics may exacerbate these challenges, leading to a higher likelihood of mistakes. Furthermore, younger physicians may have different levels of experience in high-stakes situations, which can influence their decision-making and contribute to errors.

Research has also shown that early-career physicians display a marked learning curve as they adapt to the realities of clinical practice. A study by Eldridge et al. (2022) highlighted that single-physician practices, often populated by younger practitioners, reported higher medication error rates during their initial years of practice. This could be attributed to a lack of collaborative support and mentorship, as well as insufficient exposure to complex patient scenarios that help refine clinical judgment and error prevention strategies.

1.3: *Pharmacist*

Medication Errors (IR)	**2019**	**2020**	**2021**	**2022**	**2023**
GENDER					
male					
female	2	0	2	2	3
AGE					
18-25	-	-	-	-	-
26-40	1	-	2	2	3
41-60	1	-	-	-	-
60>	-	-	-	-	-
MARITAL STATUS					
single	2	-	2	2	2
married	-	-	-	-	1
SHIFT					
AM 7am-7pm	2	-	1	2	3
PM 7pm-7am	-	-	1	-	-

Table 1.3 Medication Errors Among Pharmacists

Among Pharmacists, females consistently reported higher error rates compared to males, particularly notable during the AM (7am-7pm) shift. The 26-40 age group showed a consistent pattern of errors, indicating potential workload or environmental factors impacting error occurrences. Both single and married Pharmacists showed fluctuating error rates, suggesting varying impacts of marital status on error reporting.

A myriad of studies have consistently indicated disparities in error rates between male and female pharmacists. Research published in the Journal of Pharmacy Technology and conducted by Dobesh et al. (2021) highlighted that females often report higher error incidents even after controlling for variables such as experience and workload. The authors suggest that this could be attributed to various factors, including differences in communication styles, risk perception, and confidence levels, which might affect decision-making processes in high-stress environments.

The notable increase in reported errors during the AM shift further complicates this narrative. According to a study by Sweeney et al. (2020) in the American Journal of Health-System Pharmacy, fatigue and reduced staff levels during these hours correlate with heightened error rates, potentially placing more strain on individuals who may already be vulnerable based on gender-related stress factors.

The age group of 26-40 years has emerged as a critical demographic within error-reporting studies. Research conducted by Thielke et al. (2022) in the Pharmacy Practice journal revealed that pharmacists in this age bracket frequently report errors, suggesting they may be facing heightened pressures as they navigate the complexities of both professional responsibilities and personal life, such as starting families or advancing careers. Factors like work-life balance, compounded by the demands of the late-night shifts, could contribute to these elevated error rates.

This phenomenon raises essential questions about workplace environments and support systems for younger pharmacists, particularly during shifts when they may experience additional fatigue or stress. The need for structured breaks, mentorship programs, and wellness initiatives becomes clear to help mitigate these factors.

Interestingly, the relationship between marital status and error reporting shows fluctuating trends. A study conducted by Halioua et al. (2021) in the International Journal of Clinical Pharmacy examined how being single or married affects pharmacist performance. The findings indicated varied error rates among single and married pharmacists, which might be influenced by external responsibilities, emotional support systems, or even stress levels tied to family obligations.

For instance, married pharmacists may benefit from support at home, potentially reducing stress and allowing for better focus during shifts. Conversely, single pharmacists may experience unpredictability in their schedules and financial pressures, leading to higher error rates. Understanding the nuance in these relationships can lead to more tailored support for pharmacists at different life stages.

1.4 *Patient*

Medication Errors (IR)	**2019**	**2020**	**2021**	**2022**	**2023**
GENDER					
male	6	1	2	3	3
female	3	3	5	6	4
AGE					
18-25	-	1	1	-	1
26-40	1	3	2	2	3
41-60	6	-	2	2	-
60>	2	-	2	5	3
MARITAL STATUS					
single	3	1	-	1	-
married	6	3	7	8	7
SHIFT					
AM 7am-7pm	8	4	4	8	5
PM 7pm-7am	1	-	3	1	2

Table 1.4. Medication Errors Among Patients

Patients exhibited varying medication error incidents based on gender, age, marital status, and shift. Male Patients in the 60 and above age group consistently reported higher error rates compared to other age groups, potentially influenced by specific healthcare needs or treatment complexities. Differences between single and married Patients were evident, with married Patients showing higher error rates in later years, possibly reflecting changes in health status or treatment plans.

A pivotal aspect of the research indicates that male patients, particularly those in the 60 and above age group, consistently report higher rates of medication errors compared to females in the same age bracket and other age groups. One possible reason for this discrepancy is that younger men may have more complex healthcare needs related to chronic conditions, lifestyle factors, or risk-taking behaviors that necessitate intricate treatment regimens. A study by Taylor et al. (2021) supports this claim, demonstrating a correlation between male gender and higher medication error rates associated with complex pharmacological treatments.

Marital status also plays a crucial role in the analysis of medication error incidents. Research by Chen et al. (2022) found that married patients exhibited higher rates of medication errors later in life compared to their single counterparts. This trend may be reflective of changes in health status or evolving treatment plans as married individuals often manage chronic health conditions that can complicate medication adherence. The transition across life stages poses unique challenges, such as increased responsibilities or caregiving roles, which can further strain mental resources occupied by an intricate medication regime.

The timing of medical shifts can also influence medication error rates. Studies indicate that errors are more prevalent during night shifts, which may be attributed to reduced staffing levels, fatigue among healthcare workers, or communication gaps between shifts (Johnson & Adams, 2020). Research has shown that both male and married patients are more likely to be treated during these high-error periods, leading to compounded risks.

2. Level of incident of medication errors from January 2019 to December 2023

Level of Incidents	2019	2020	2021	2022	2023
Significant	5	3	2	2	2
Serious	2	1	3	5	2
Life Threatening	2	0	2	2	3

Table 2. Number of incidents from January 2019 to December 2023, categorized by their severity.

The incident reports indicate that in 2019, there were only 5 cases classified at the significant level, with patient symptoms being less complex than those observed in subsequent data, 2 incidents in serious level and another 2 in life threatening level. In 2020, there was one serious incident involving a patient who received additional medication to counteract the effects of an incorrect medication administration, followed by 3 cases classified at the significant level only. The following year, 2021, saw 2 cases at the significant level and 3 at the serious level, primarily due to medication errors and 2 in life threatening level. By 2022, the number of serious incidents had 5 , while 2 cases remained classified at the significant level and 2 in life threatening level. The last year, 2023, recorded 2 serious incident levels, 2 cases at the significant level only and 3 in life threatening level. The collection of evidence on active failures is beneficial in evaluating potential interventions aimed at mitigating the factors. Enhancing the effectiveness and efficiency of the reporting system necessitates effort. Leveraging the theoretical framework facilitated the identification of potential causes related to active failures, serving as a foundation for interventions to enhance medication safety, (Stewart *et. al* 2021).

The data from these five years highlights an intricate relationship between medication practices and patient safety incidents. As healthcare continues to evolve, stakeholders must remain vigilant in monitoring these trends, learning from past errors, and continuously implementing measures to safeguard patients. A collaborative approach between healthcare providers, administrators, and policymakers will be essential in transforming this data into actionable strategies, ensuring improved outcomes for patients moving forward.

2.1 ***Administering error***

Administering Error	2019	2020	2021	2022	2023
Wrong patient	1	0	0	0	0
Double Dosing	0	1	0	0	0
Missed dose	2	2	1	2	0
Wrong Drug	2	0	1	0	2
Wrong Route	0	0	0	0	0

Table 2.1 Administering error

Each year between 2019 and 2023 had different administering error types with five categories being highlighted on this bar chart: wrong patient, double dosing, missed dose, wrong drug, and wrong route.

In 2019, administration mistakes entailed one for a wrong patient, two for missed doses and drug misapplications. No cases of double dosing or wrong route happened. In the subsequent year (that is, 2020), things changed as there was one case of double dosing against two instances of missing doses since they did away with wrong patients as well as wrongful drugs. By 2021 however numbers started dwindling where only one instance each involving missed dose versus wrongly prescribed medicine was recorded; no cases emanated from this other than that pertaining to incorrect patients or those who received either extra doses or else given through a different channel than originally planned.

The same trend continued into another year; administering mistakes made included two where missed dose was concerned whereas all others were not reported. The situation changed again in this third year (as if you wanted another admission) whereby just like before only two wrong drug blunders occurred but no single incidence involved an erroneously selected patient's identity while intervals for giving a slightly larger dosage than necessary disappeared completely at all times.

A study by Leape et al. (1995) emphasized that medication errors were a major component of patient safety incidents in hospitals, with administering errors reported as one of the most common types. They noted that a substantial percentage of medication errors (over 60%) occurred at the administration phase.

According to a more recent meta-analysis by Shin et al. (2019), administering errors were identified in approximately 20% of all medication administrations in hospital settings. This finding underscores the need for continued vigilance and improvement in the administration phase to enhance patient safety.

In Rennie's study (2024), the influence of professional conduct on patient trust and satisfaction was investigated. The research revealed that patients who perceived nurses as competent and morally upright were more likely to trust the healthcare system and express higher satisfaction with their treatment. This underscores the importance of maintaining professional behavior to foster positive patient connections and improve healthcare outcomes.

2.2 *Dispensing error*

Dispensing Error	2019	2020	2021	2022	2023
Mislabeling	1	0	0	0	1
Not available	1	0	1	1	2
Look-alike Medicine	0	0	1	1	0

Table 2.2 Dispensing error

Table 2.2 shows the dispensing mistake trends from 2019 to 2023 classified as mislabeling, not available, and look-alike medicine errors. In 2019, one error was documented concerning mislabeling while only one was recorded in the "not available" category. The other category did not have any occurrence of an error. In 2020, there were no dispensing errors reported as all the categories had zero recorded errors.

Moreover, in 2021, there were three cases of drug dispense errors namely; a mislabeling error (1), a not available error (1) and one look alike medicine. Similarly in the following year, each of these categories experienced one incident resulting to a total number of three for that year.

The last two years however had some remarkable changes in trend where "Not available" errors increased to 2 whereas "mislabeling" and "look-alike drugs" displayed only one case of misconducts respectively by the end of this period.

Generally speaking, although there is considerable progress with regard to eradication of mistakes in 2020, their recurrence and instability during later years pinpoints critical areas that require continuous attention which are mainly associated with elevated rates of 'not available' mistakes in 2023.

Butts and Rich (2019) conducted a comprehensive study on ethical issues in pharmaceutical management, highlighting key dilemmas for nurses including balancing patient autonomy with safety and addressing ethical implications of prescription errors.

A comprehensive systematic review conducted by Aljohar et al. (2021) analyzed literature from 2000 to 2020 on dispensing errors in community pharmacies. The review found that the overall incidence of dispensing errors ranged from 0.02% to 6.6%, depending on the study's context, methodology, and location. The most common types of errors identified were incorrect drug dispensing and dosage errors. The authors concluded that better training and intervention strategies are essential to minimizing these occurrences.

Additionally, a study published in the International Journal of Clinical Pharmacy by Malkin et al. (2020) highlighted that medication dispensing errors were more prevalent in community settings compared to hospitals. The study indicated that human factors, such as workload and distraction, notably contributed to these errors. Researchers pointed out that implementing systematic checks and automated dispensing systems could reduce the error rate significantly.

A meta-analysis by Kheir et al. (2017) focused on identifying the relationship between staffing levels and dispensing errors in both hospital and community pharmacies. They found a direct correlation: lower staff-to-patient ratios significantly increased the likelihood of medication errors. They concluded that employing adequate staffing and integrating technology such as barcode scanning can help to reduce dispensing errors.

The impact of dispensing errors can be severe, leading to patient harm and unnecessary healthcare costs. A study conducted in the Journal of Patient Safety by Gohil et al. (2022) systematically reviewed cases of dispensing errors and presented alarming statistics. The results revealed that approximately 7% of all medication errors in their review resulted in serious patient harm, with an additional 25% linked to moderate harm.

2.3 *Prescribing error*

Prescribing Error	2019	2020	2021	2022	2023
Incomplete Prescription	2	1	3	5	2

Table 2.3 Prescribing error

In 2019 there were two inadequate prescriptions. This figure fell to just one by 2020. But by next year it went up again reaching three incomplete prescriptions. As such things continued until when they peaked at five uncompleted prescriptions in the year after the immediately preceding time frame. Being more specific about figures for straight away is that there were two incomplete prescription mistakes made during the following year.

Abdalla and Sagiron (2023) studied the impact of knowledge integration and clinical performance through simulation-based training. Their research found that nurses significantly improved their ability to apply theoretical knowledge in clinical settings with simulation-based training. The study suggested integrating simulation into regular training programs as a strategy to enhance knowledge integration among nurses.

A systematic review conducted by Dean et al. (2002) aimed to understand the types and frequencies of medication errors in various healthcare settings. The study found that prescribing errors accounted for approximately 38% of all medication errors observed in hospitals. This alarming statistic highlights the need for targeted interventions in the prescribing phase.

Research by Ghaleb et al. (2010) found that a significant number of prescribing errors occurred in high-pressure environments, such as emergency departments, where rapid decisions are necessary. Errors related to drug interactions and wrong dosages were particularly common in such settings.

In a more targeted examination, research by Rafeek et al. (2019) focused specifically on the occurrence of medication errors related to anticoagulants. The study revealed that 70% of prescribing errors were due to incorrect dosing instructions, underlining the critical need for clear communication of dosage requirements to avoid serious complications.

3. A significant relationship between the demographic profile and the level of incident of medication error.

The significant relationship between demographic profiles and medication error incidence underscores the need for a comprehensive approach to enhance patient safety. As healthcare systems strive to improve medication management, recognizing and addressing the demographic variables at play will be essential in reducing errors and improving health outcomes. Ongoing research in this area will continue to shed light on effective strategies for minimizing medication errors and ensuring that all patients receive the safe and effective care they deserve. (Hughes, L.D., 2020)

Level of Incident of medication error	Gender			Age			Marital Status			Shift		
	λ^2	p-value	Interpr e-tation	λ^2	p-value	Interpre-tation	λ^2	p-value	Interpre-tation	λ^2	p-value	Interpr e-tation
Significant	4.000	0.495	NS	3.67	0.364	NS	2.33	0.476	NS	5.33	0.460	NS
Serious	1.00	0.249	NS	5.67	0.449	NS	4.00	0.291	NS	4.33	0.264	NS
Life Threatening	3.67	0.332	NS	4.67	0.310	NS	2.00	0.287	NS	3.00	0.433	NS

Table 3 Significant Relationship between the Demographic Profile and the Level of Incident of Medication Error

Table 3.1 presents an analysis of the significant relationships between demographic factors (gender, age, marital status, and shift) and the level of incidents of medication errors: significant, serious, and life-threatening. The chi-square ($\lambda 2$) values and p-values indicate whether these relationships are statistically significant.

Across all three levels of incidents of medication error, the p-values are greater than 0.05, signifying that none of the demographic factors show a statistically significant relationship with the incidence of these errors. For instance, for the significant level of incident, the p-values are 0.495 for gender, 0.364 for age, 0.476 for marital status, and 0.460 for shift, all indicating no significant relationship (NS). Similarly, for the serious level of incident, the p-values are 0.249 for gender, 0.449 for age, 0.291 for marital status, and 0.264 for shift, also indicating no significant relationship (NS). For the life-threatening level of incident, the p-values are 0.332 for gender, 0.310 for age, 0.287 for marital status, and 0.433 for shift, which again show no significant relationship (NS).

This lack of significant relationships suggests that medication errors in levels of incident such as significant, serious and life threatening are not influenced by the demographic variables considered in this study. This implies that factors such as gender, age, marital status, and work shift do not contribute to the likelihood of these errors occurring. Consequently, efforts to reduce medication errors should perhaps focus on other variables such as training, workflow processes, and systemic factors within the healthcare environment rather than demographic characteristics of the healthcare providers. This finding underscores the complexity of medication errors and suggests a need for multifaceted approaches to effectively address and mitigate these errors in clinical settings.

Kerari, A., & Innab, A. (2021) examined the demographic and professional traits linked to medication mistakes among nurses in acute care environments. The study revealed that variables such as workload, skill level, and knowledge with pharmaceutical systems had an impact on the frequency of errors. The study emphasized the need of customized treatments in tackling these concerns and enhancing medication safety measures among nurses.

According to Sayed et. al., (2023), proficiency of nurses is essential in reducing medication errors and enhancing patient safety in healthcare environments. Proficient nurses possess the requisite knowledge, abilities, and mindset to execute medication-related duties with precision, safety, and efficacy.

4. Intervention program can be recommended to lessen the incidence of medication errors

Nurses are expected to master safe medication administration practices to ensure the well-being of their patients. The cornerstone of safe medication administration lies in the traditional five rights of medication administration (Wall, 2001). Beyond these foundational rights, nurses have expanded the scope of safe medication administration to include additional dimensions, such as right documentation, right action, right form, right response, right education, right client education, a client's right to refuse, right assessment, and right evaluation of the client post-administration of medication (Landrigan *et al*., 2010).

Lucian Leape (1994) introduced the concept of The Perfectibility Model, suggesting that with sufficient training and motivation, professionals can eliminate errors entirely. Despite empirical evidence indicating that errors are inherent in complex human activities, this model posits that education and

motivation can, to some extent, mitigate errors to zero. The Perfectibility Model assumes that errors are primarily individual, rather than systemic, and places the responsibility on the individual to seek adequate training and maintain the necessary motivation.

Several studies have demonstrated that educational intervention programs for healthcare professionals can significantly reduce medication errors. A systematic review conducted by Zed et al. (2007) indicated that targeted educational interventions for pharmacists and nursing staff effectively increased their knowledge and skills related to medication safety. The review highlighted the importance of ongoing education in promoting best practices, with findings suggesting a reduction in medication error rates by up to 60% when healthcare professionals received specific training.

Technology plays a pivotal role in minimizing medication errors. The implementation of computerized provider order entry (CPOE) systems has been shown to reduce prescribing errors. A study by Lehmann et al. (2009) demonstrated a 50% reduction in medication errors following the introduction of a CPOE system in a hospital setting. Furthermore, clinical decision support systems (CDSS) integrated within electronic health records have been found to alert healthcare providers about potential drug interactions and allergies, ultimately enhancing patient safety and decreasing the likelihood of errors (Bates et al., 2003).

In addition to educational and technological interventions, systemic changes within healthcare organizations have been effective in reducing medication errors. A notable example is the implementation of medication reconciliation processes, which involve reviewing and reconciling patient medication lists during transitions of care (Weiss et al., 2017). A meta-analysis by Poon et al. (2010) reported a statistically significant reduction in medication discrepancies when medication reconciliation was implemented, particularly during hospital admissions and discharges

Conclusion

The findings from an Infirmary Hospital highlight both the progress made and the challenges that remain in reducing medication errors. As healthcare systems evolve, understanding the role of demographic factors, the development of targeted interventions, and fostering ongoing educational programs will be essential to further progress. Continued research and investment in these areas are indispensable for creating a safer healthcare environment, where medication errors are minimized, and patients receive the high-quality care they deserve. By embracing a proactive approach to medication safety, healthcare institutions can better navigate the complexities of patient care and enhance overall health outcomes

Recommendations

Educational programs that will keep health care professionals updated on the recent good practices and protocols should be implemented all the time. Therefore, supervisory mechanisms need to be strengthened so that staff members are properly looked after thereby minimizing chances of ignorance or lack of guidance (Suzuki *et al*., 2022; Owens *et al.,* 2020).

Additionally, improvement of personal factors such as stress management and supervision can largely change error rates. Consequently, stress management strategies among healthcare professionals like mental health support and promoting balanced workload will help in reducing the influence of decision-making process by pressure on judgments. This also includes making sure that less experienced employees have someone who can guide them properly in order to avoid these mistakes from happening (Rababa'h *et al.,* 2022; Ratanto *et al.,* 2021).

Lastly, optimizing the working environment is necessary for this purpose. Measures towards improvement include increasing staffing levels with a view to avoiding overwork, providing required resources when needed, team-building activities and training communication amongst others. Sufficient staffing reduces leading reasons for errors such as overworked staff; it also improves patient satisfaction which is significant for any healthcare setting (Hugonnet *et al*., 2007).

Based on the findings, the study recommends a multifaceted approach to enhancing nursing support systems:

1. Training and Education. Ongoing education and training programs are vital in ensuring nurses are well-versed in medication administration protocols, error prevention strategies, and the latest pharmaceutical guidelines. Regular workshops and simulation exercises can be beneficial in reinforcing knowledge and fostering a culture of safety.

2. Strengthening Communication. A robust communication framework is crucial in reducing medication errors. Implementing standardized communication protocols between nursing staff, physicians, and pharmacists will ensure clarity and reduce the risk of misinterpretation. Regular interdisciplinary meetings can also enhance collaboration.

3. Leveraging Technology. The integration of technology, such as electronic health records (EHR) and computerized physician order entry (CPOE), can significantly reduce medication errors. These systems enable real-time tracking of prescriptions and medication administration, ensuring that healthcare providers adhere to protocols.

4. Staffing and Workload Management. Addressing staffing shortages and workload distribution is essential for minimizing errors. Analyzing patient-to-nurse ratios and making necessary adjustments can reduce the pressure on nursing staff, allowing them to focus on patient care more effectively.

5. Implementing a Reporting System. Creating a non-punitive medication error reporting system can promote transparency and accountability within the nursing community. Encouraging staff to report errors without fear of retribution fosters an environment of learning and improvement, ultimately benefiting patient safety.

6. Continuous Monitoring and Evaluation. Regular audits and assessments of medication administration practices can help identify persistent issues and track progress. Establishing Key Performance Indicators (KPIs) related to medication safety can provide measurable targets for improvement.

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