Available on: *http://nursingjurnal.respati.ac.id/index.php/JKRY/index*
Jurnal Keperawatan Respati Yogyakarta, 8(3), September 2021, 195 - 207

FACTORS AFFECTING THE ROLE OF NURSES IN MEDICATION SAFETY : A LITERATURE REVIEW

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Abstract

Mistakes during medical treatments are a rising concern in patient safety. Nurses are critical in ensuring the safe administration of drugs to patients, influenced by various factors. This literature review aims to identify factors influencing nurses in medication safety. The pieces of literature were sourced from the PubMed, Proquest, Science-Direct, and Willey Library electronic databases, with search terms of "risk factor or related factor", "nurse or nurse role," "medication error", "drug safety", "drug administration". The review process resulted in twenty-three original articles meeting the inclusion criteria. The review shows five main factors influencing a nurse's role in medication safety which are; organization & management (training programs, career paths, medication error reporting systems, staffing, information systems), working environment (additional routines, official shifts, number of service days, interruptions during action, workloads), work, learning culture), team (leadership style, oral and written communication), nurse's personal and work history (age, length of work, experience, education, knowledge and skills/competence, motivation and attitude, nurse awareness) and task (availability & use of protocol).

Keywords: *Nurse's Role; Medication Errors; Patient Safety; Medication System*

Article info: *Sending on July 31, 2021; Revision on October 26, 2021; Accepted on October 27, 2021*

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1. Introduction

Patient safety is a major health problem and a prerequisite to high-quality health care (Aboshaiqah, 2014). Drug administration is an important factor for patient safety, and drug administration errors can result in death and morbidity. Medication errors are failures of the treatment process that can harm or injure the patient (Ogunleye et al., 2016). Approximately 2-14% of inpatients experience medication errors, and an estimated 7000 patients die annually (Hammoudi, Ismaile, & Abu Yahya, 2018). Medication errors have become a serious patient safety problem globally due to the increasing associated morbidity and mortality (Alsulami et al., 2019). Data from the Joint Commission on Accreditation of Healthcare Organizations showed that 334 of 378 (88.35%) cases resulted in death or permanent loss of function related to drug administration (World Health Organization & WHO Patient Safety, 2009). Preventable adverse events are estimated to cause between 100,000 and 400,000 deaths in the United States per year. 1-5 medication errors contribute to preventable adverse events (Wahr et al., 2017). In Indonesia, medication errors can lead to lawsuits (Fatimah, 2016).

In general, the treatment process is carried out in stages by a multidisciplinary team. The process starts with prescribing, i.e., a doctor gives a prescription, followed by transcribing or checking by a pharmacist, then dispensing the drug, and finally, the drug is given to the patient by the nurse or administration. Medication errors can occur at any stage of this process (Alomari, Wilson, Solman, Bajorek, & Tinsley, 2018; Alsulami et al., 2019). The most common medication errors are the wrong dose, the wrong medication, the wrong patient, and neglecting to give the medication (Björkstén, Bergqvist, Andersén-Karlsson, Benson, & Ulfvarson, 2016). In addition, drug administration is a high-risk process carried out by nurses every day. Although this action involves health professionals from different disciplines, it is a key procedure in nursing practice (Asensi-Vicente, Jiménez-Ruiz, & Vizcaya-Moreno, 2018).

Nurses are crucial in drug administration, making the rate of medication errors higher for nurses than other health professionals as they frequently give drugs during shifts (Alomari et al., 2018). Approximately 40% of the time in the hospital is spent administering medication. One of the most common

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incidents in the nursing profession is medication errors. This is because nurses are the main actor in health services and the last person in the drug administration process responsible for medication errors (Zaree, Nazari, Asghary Jafarabadi, & Alinia, 2018). This error can harm the patient, including prolonged hospitalization, increased cost of care, and even death (Lee & Quinn, 2019; Wahr et al., 2017).

Medication errors can be caused by individual errors and system errors (Zaree et al., 2018). Individual factors contributing to medication errors include negligence, forgetfulness or lack of attention, not following proper protocols, lack of knowledge, and inappropriate communication. Systemic factors also play a role in drug administration errors, including excessive roles, unclear communication or orders, and unclear guidelines. Furthermore, the clinical experience of nurses also affects medication errors. Nurses with less than two years of work experience tend to make mistakes than more experienced nurses (Björkstén et al., 2016). Musharyanti, Claramita, Haryanti, & Dwiprahasto (2019), in their research on nursing students, said that the lack of appropriate skills, supervision, and role models during clinical rotation could lead to medication errors by nursing students.

Nurses must always pay attention to the Standard Operating Procedures (SOP) for drug administration, a written guideline regarding the process of organizational activities, when, where, by whom, and how. The SOP for drug administration is applied through six principles of drug administration that need to be carried out by nurses, including the right patient, the right drug, the right time, the right route, and the right documentation (Kartika & Melani, 2017). The study showed that nurses have not fully implemented the six correct principles of drug administration; 5.7% of nurses do not mention the patient's name when administering medication and 98.9% of nurses have not applied the principles in the right way, 10% of nurses have not done the appropriate documentation (McLeod, Barber, & Franklin, 2015). Nurses experience several barriers in complying with the drug administration guidelines, including not practicing evidence-based research, lack of support, poor communication between multidisciplinary teams, and a working environment that does not support a safety culture (Hammoudi et al., 2018). For nurses, administering medication is an important responsibility, involving several complex skills to prevent errors (Kavanagh, 2017).

All of these medication errors can be avoided by preventing and minimizing errors, requiring systems and procedures to ensure the right patient receives the right drug at the right dose through the right route at the right time (World Health Organization (WHO), 2017). When nurses give drugs following the SOP, side effects and medication errors can be minimized (Pirinen et al., 2015). Nurses are medical professionals who interact the most with patients, and they are the last line in preventing medication errors (Musharyanti et al., 2019). Given nurse's significance in preventing medication errors, this literature review aims to determine the factors that influence the role of nurses in medication safety.

2. Method

This is a Literature Review. The search was limited to articles discussing factors related to medication errors in the drug administration and administration phase. The inclusion criteria included: Full text of the study must be available in English and Indonesian, published in January 2015 to December 2020, research articles with quantitative study designs (e.g., cross-sectional, prospective, and retrospective cohort). Exclusion criteria were: non-original publications such as letters to the editor, only abstracts and books, qualitative design, study protocol, meta-analysis, and review.

The literature search in this literature review used four databases with moderate quality criteria, namely PubMed, Proquest, Science-Direct, and Willey Library. The search technique used the specific keywords from the research question. The keywords used are Risk Factors, Factors Related, Nurse, Nurse's Role, Medication errors, Medication safety, Drug administration.

The initial search results obtained a total of 1463 articles. Researchers then screened titles and abstracts, the results obtained were 563 articles and 900 articles were issued. A total of 364 articles were entered into the next stage, namely a full text review and eligibility based on the inclusion and exclusion criteria that have been set. The final results of articles that meet the requirements are 23 articles. An overview of the literature search and review process can be seen in Figure 1 below.

3. Results and Discussion

The article review revealed several factors that directly affect the increasing role of nurses in medication safety and the hindering factors (Table 1). Some studies reveal factors of organization & management (training programs, career paths, medication error reporting systems, staffing, information systems), working environment (additional routines, official shifts, number of service days, interruptions during action, workloads), work, learning culture, team (leadership style, oral and written communication), nurse's personal and work history (age, length of work, clinical experience, education, knowledge and skills/competence, motivation and attitude, nurse awareness) and task (availability & use of protocol). The findings from this article review revealed the importance of nursing in the treatment management process. Safe treatment in hospitals remains a very complex and relatively difficult problem to solve.

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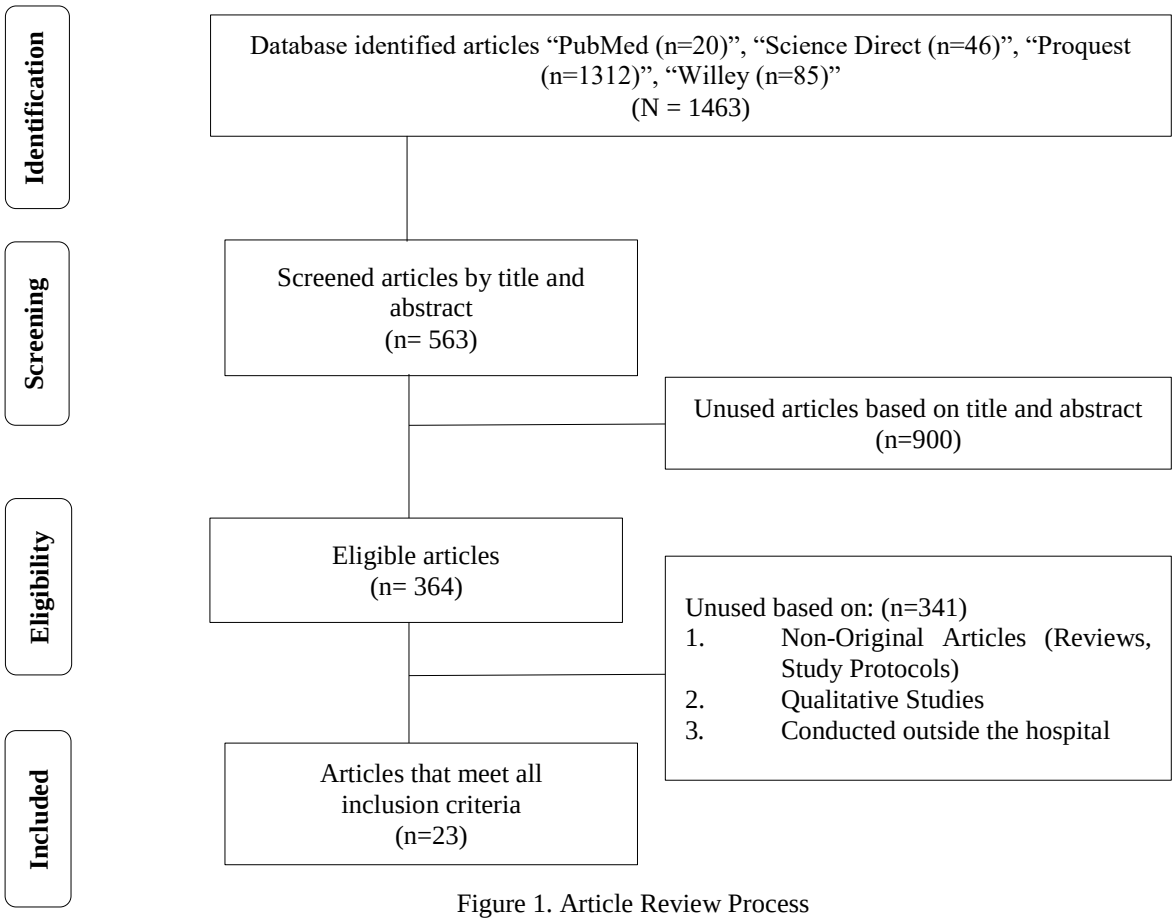

Figure 1. Article Review Process

Factors of the increasing role of nurses in medication safety

Several factors were identified that could enhance the role of nurses in medication safety, including:

Organization & management factors

Hospitals need to determine the perceived barriers among nurses in reporting medication errors and encourage better reporting by creating an anonymous, effective, uncomplicated, efficient reporting system and supportive management rules and providing open feedback to nurses (Rutledge, Retrosi, & Ostrowski 2018; Vrbnjak, Denieffe, O'Gorman, & Pajnkihar, 2016). Hospitals should emphasize safety awareness and encourage recognizing mistakes (Hammoudi, Ismaile, & Abu Yahya, 2018; Kiymaz & Koç, 2018; Hung, Chu, Lee, & Hsiao, 2016; Biresaw, Asfaw, & Zewdu, 2020), conduct ongoing training programs on safe drug administration to reduce medication errors (Kiymaz & Koç, 2018; Wondmieneh, Alemu, Tadele, & Demis, 2020; Biresaw, Asfaw, & Zewdu, 2020; Di Simone et al., 2018), increase the career path of nurses with continuing education programs (Biresaw, Asfaw, & Zewdu, 2020; Di Simone et al., 2018), provide support and guidance to nurses (Hammoudi, Ismaile, & Abu Yahya, 2018), and develop procedures and protocols to prevent medication errors (Kiymaz & Koç, 2018; Wondmieneh, Alemu, Tadele, & Demis, 2020).

Working environment factor

Working environment factors include encouraging nurses' intentions to report medication errors, increasing teamwork (Hammoudi, Ismaile, & Abu Yahya, 2018). Kiymaz & Koç (2018) showed that nurses who enjoy working are satisfied with their team, and nurses working during the day shift have a lower risk of medication errors. To reduce the risk of errors, nurses should pay more attention to drug administration techniques, minimize interruptions during drug administration (using the no-distraction zone and "No-Talk" signboards) (Feleke, Mulatu, & Yesmaw, 2015), having additional people in the treatment room at the same time (Härkänen, Ahonen, Kervinen, Turunen, & Vehviläinen-Julkunen, 2015). The findings of Cottney & Innes (2015) indicate areas where health care providers should focus on medication error reduction strategies, namely: eliminating the requirement for nurses to perform other tasks simultaneously while conducting drug administration and ensuring that nurses' workloads are kept within acceptable limits.

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Researcher, Year, and Country	**Aim of Research**	**Sample & Setting**	**Research Design & Methods**	**Main Findings**	**Limitations**
Biresaw, Asfaw, & Zewdu (2020) Ethiopia	Assess knowledge, attitudes, and related factors towards patient safety	386 nurses at Teaching Hospital	Cross-sectional	Significant factors related to nurses' knowledge about patient safety are age, education level, length of work experience, training on patient safety, and information about patient safety	The cross-sectional nature of the study does not confirm a definite cause and effect relationship
B. Schutijser et al., (2018) Netherlands	Determine nurse adherence (over four years) to the injectable drug administration protocol and factors related to protocol compliance and the conducted strategies	Nurses from 16 hospitals were observed directly during intravenous drug administration (372 intravenous drug administration)	Prospective, Observational	Adherence to the injectable drug administration protocol has improved over the past four years. However, no significant changes were seen in complete protocol compliance. Adherence to 'hand hygiene and 'second nurse checkup' in the process remains low.	Differences in data collection between the first and second studies Observations were carried out by one researcher. There is no data on nurse characteristics Not all injectable drugs are included in the observation Nurses are aware of being observed, resulting in more compliance
Blignaut, Coetzee, Klopper, & Ellis (2017) South Africa	Determine the incidence of medication errors, deviations related to drug administration, and related factors	25 Nurses and nursing students; Medical and surgical units of eight Hospitals	Cross-sectional, Observational	Drug administration errors, especially time errors and omission errors, sixteen out of 50 dose calculations were answered incorrectly.	One observer; Hawthorne effect.
Cottney & Innes (2015**)** United Kingdom	Identify the incidence, types, and potential clinical consequences of medication errors and factors that may increase the risk of errors	47 Nurses in the Mental Health Care Room	Prospective	The most common error was dose omission (37%). Other errors were wrong dose (18%), wrong form (12%), and wrong timing (9%). As many as 11% of errors can cause serious injury to the patient.	The direct observation method makes it that only external factors can be measured while internal factors cannot
Di Simone et al. (2018) Italy	Describe the knowledge, attitudes, behavior, and training needs of Nurse pharmacology therapy management	103 nurses on duty in the Emergency Unit	Descriptive	Appropriate knowledge, positive attitude, and correct behavior related to drug preparation and administration	Descriptive analysis

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Feleke, Mulatu, & Yesmaw (2015) Ethiopia	Assess the magnitude and factors related to medication errors in nurses	82 nurses in the hospital inpatient room	Prospective, Observational	Significant factors related to medication errors were found in nurses between the ages of 18-25 years, having less than or equal to 10 years of work experience, having a nurse-to-patient ratio of 7:10, interference with drug administration, night shift drug administration.	Small sample size, Lack of random variation in study estimates
Härkänen, Ahonen, Kervinen, Turunen, & Vehviläinen-Julkunen (2015) Finland	Describe the frequency, type, and severity of medication errors in medically and surgically hospitalized patients and study the relationship between medication errors and related factors	32 nurses who administered 1,058 drugs to 122 inpatients in four hospital medical and surgical rooms	Cross-sectional	Medication errors (63.4%) and 18.3% documentation errors. 59.1% of nurses conducted the wrong administration technique in drug administration, and 3.4% errors caused harm to the patient.	The complexity of the treatment process and related factors is limited due to the observation method.
Hammoudi, Ismaile, & Abu Yahya (2018) Saudi Arabia	Assess contributing factors of the occurrence and reporting of medication errors from the nurse's perspective	367 Nurses in Four Hospitals	Cross-sectional	The main factors related to medication errors by nurses were drug packaging, nurse-doctor communication, pharmacy process, nurse staffing, and writing problems. The main barriers to misreporting by nurses are administrative response, fear of reporting, and disagreement over the definition of error	Potential nonresponse bias associated with the sampling method.
Hung, Lee, Liang, & Chu (2016) Taiwan	Knowing the factors that influence the attitudes and intentions of nurses towards reporting medication errors	596 Nurses in all Teaching Hospitals	Cross-sectional	Altruism, and attitudes of nurse managers and coworkers, and nurses' attitudes toward reporting medication errors affected nurses' intentions towards reporting medication errors.	Convenience sampling technique, Differences in the number of expert and non-expert nurses in the research hospital
Hung, Chu, Lee, & Hsiao (2016) Taiwan	Exploring the effect of nurses' attitudes and intentions on drug administration error reporting and reporting behavior	596 Nurses in all Teaching Hospitals	Cross-sectional	Attitudes of nurse managers and coworkers were predictors of nurses' attitudes toward reporting drug administration errors. Nurses' attitudes affect their intention to report medication errors	Sampling Technique, How long the respondent knows the nurse manager.

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Kiymaz & Koç (2018) Turkey	Determine the attitudes and tendencies in making medical errors and their factors	284 Nurses in 19 Hospitals	Cross-sectional	91.2% of nurses stated that excessive workload was the cause; 85.1% stated that the number of nurses was insufficient, and 75.4% stated fatigue and burnout.	Local area and using descriptive exploratory design
Lappalainen, Härkänen, & Kvist (2020) Finland	Describes medication safety, transformational leadership, and relationships evaluated by the Nurse	161 Nurses in Three Hospitals	Cross-sectional	There was a moderate but statistically significant correlation between transformational leadership and medication safety. A nurse's medication competence and nursing process management are significantly related to medication safety.	Low questionnaire response rate
Márquez-Hernández et al., (2019) Spain	Explore the knowledge, attitudes, and behavior of nurses towards medication errors	276 Nurses at Teaching Hospital	Cross-sectional	Significant differences were found between knowledge and attitudes, indicating that having more appropriate knowledge correlates with more positive attitudes.	Studies focused on specific health institutions, Sample size
Mula, Solomon, & Muula (2019) Malawi	Exploring the level of nurse adherence to the 'Five Rights' of antibiotic administration and the influencing of the implementation	Prospective observation of 23 nurses, followed by interviews with 13 nurses, in Two Hospital Treatment Rooms	Cross-sectional	10.1% received antibiotics on time, and 69.4% received antibiotics the right way.	Focusing on pneumonia as a case may limit the generalizability of the findings. It is difficult to obtain factual information about the behavior of nurses in administering drugs when using methods such as audits
Morelock & Kirk (2019) United States	Identify patterns of medication errors concerning shifts, days of the week, units involved, severity, class of medication, and causes of errors and their solutions	Nurses and 605 treatment events from Two Hospitals	Retrospective	There were no significant findings when comparing severity with changes in morning or evening service. The medication with the most errors is antibiotics, and the most common reason for the error is dose omission Critical care wards and acute care units are responsible for 80.1% of the total number of errors	Difficult to analyze using statistically strong techniques
Nguyen, Nguyen, van den Heuvel, Haaijer-Ruskamp, & Taxis (2015)	Determine the prevalence and potential clinical outcomes of medication preparation and administration errors, and	Nurses with 5271 drug administration in six rooms in two hospitals	Prospective	One-third of medication preparation and administration is potentially clinically relevant. Related errors include Administration technique, preparation	Some cases were missed to be observed

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Vietnam	identify factors associated with medication errors			technique, dose omission, and error, but not related to the treatment experience.	
Rutledge, Retrosi, & Ostrowski (2018) United States	Determining the barriers to reporting medication errors among nurses	395 Nurse at a Community hospital	Descriptive	A minority of nurses reported that the extra time involved in the documentation was likely a barrier to reporting, A third reported that the lengthy and time-consuming reporting process and fear of repercussions were barriers.	The study was conducted in a specialized hospital
Sassaki, Cucolo, & Perroca (2019) Brazil	Knowing the source and causes of interference during the drug administration process carried out by the nursing team and measuring the frequency, duration, and impact on the team's workload	24 Nurses on duty in the NICU	Cross-sectional, Observational	The main sources of distraction are nursing staff and self-distraction. The main causes are: information exchange and parallel conversation	Concurrent evaluation of multiple processes, Possible changes in professional behavior, One observer
Suclupe et al. (2020) Spain	Determine the prevalence and magnitude of medication errors and their relationship to the sociodemographic and clinical characteristics of the patient's and nurse's working conditions.	Nurse, 650 prescription errors and 294 administrative errors. Intensive Care Unit (ICU)	Observational, Cross-sectional & Ambispective Studi	The most common error is interference during drug administration. Among others: omission of dosage form, frequency or route of administration, illegible handwriting in prescribing, and interruption in administration. The nurse's morning shift and perceived workload were risk factors associated with the distraction.	Performed in one hospital The use of continuous infusion is not included in the prescription and administration of drugs
Schutijser et al., (2019) Spain	Determine the prevalence and magnitude of medication errors and their relationship to the sociodemographic and clinical characteristics of the patient's and nurse's working conditions.	Nurse in the Intensive Care Unit (ICU)	Cross-sectional & Ambispective	The most frequent error is interference during drug administration. Nurses' morning shift and perceived workload were risk factors associated with the disruption.	Performed in one hospital The use of continuous infusion is not included in the prescription and administration of drugs
Tsegaye, Alem, Tessema, & Alebachew (2020) Ethiopia	Assessing medication errors and related factors among nurses	414 nurses randomly selected from the Referral Hospital	Cross-sectional	Lack of training, unavailability of drug administration guidelines, interruption during drug administration, poor communication with other nurses when	The cross-sectional nature of the study does not confirm a definite cause and effect relationship Hawthorn effect

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				encountering problems were significantly related to medication errors.	
van der Veen et al., (2020) Netherlands	Identifying potential risk factors related to alternative problem solving performed by nurses in administering drugs using barcodes	272 nurses in Four Hospitals	Prospective, Observational	The procedural solution is the most common. Other solutions are related to patient scanning (since there is no barcode on the patient wristband) and related to drug scanning (including scanning before actual drug administration, scanning drugs for more than one patient at a time, and ignoring computer or scanner alerts	Observer fatigue & inaccurate observations; Hawthorne effect.
Wondmieneh, Alemu, Tadele, & Demis (2020) Ethiopia	Assess the magnitude and factors that cause errors in drug administration to nurses	298 nurses in three hospitals	Cross-sectional	Factors such as lack of adequate training, unavailability of guidelines for drug administration, inadequate work experience, interruption during drug administration, and night shifts are significant predictors of medication error.	Tertiary hospital, reporting bias and observer bias

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Team factor

Team factors such as leadership style, the attitude of coworkers, oral and written communication during drug administration are factors that can increase medication safety (Vincent, Taylor-Adams, & Stanhope, 1998; Vincent, 2003). Lappalainen, Härkänen, & Kvist (2020) showed that a culture that supports treatment safety must be created through transformational leadership, emphasizing the management of the nursing process. Studies by Hung, Lee, Liang, & Chu (2016) and Hung, Chu, Lee, & Hsiao (2016) conducted in Taiwan involving 596 nurses showed that the attitudes of nurse managers and coworkers influenced the intention to report medication errors. Other factors include improving communication skills between nurses and doctors (Hammoudi, Ismaile, & Abu Yahya, 2018; Hung, Lee, Liang, & Chu, 2016), enhancing nurses' competence and learning culture to improve safety in medicine (Lappalainen, Härkänen, & Kvist, 2020; Hung, Lee, Liang, & Chu, 2016; Hung, Chu, Lee, & Hsiao, 2016; Márquez-Hernández et al., 2019).

Nurse's personal and work history factor

Nurses should pay more attention to drug administration techniques, minimize interference during drug administration (Feleke, Mulatu, & Yesmaw, 2015), administering drugs using barcodes (van der Veen et al., 2020). The research of Hammoudi, Ismaile, & Abu Yahya (2018) showed that drug administration using barcodes (van der Veen et al., 2020) and the use of integrated health informatics, including computerized drug administration systems, helped reduce errors in drug administration.

Factors hindering nurse's role in medication safety

Several factors were identified that could hinder nurse's role in medication safety, including:

Organization & management factors

Lack of reporting on medication errors prevents the accurate collection of medication error-related data and prevents hospitals from making changes to harmful practices (Rutledge, Retrosi, & Ostrowski, 2018; Kiymaz & Koç, 2018). The main barriers of nurses to report errors are related to administrative responses, reporting fears, and disagreements about the definition of error (Hammoudi, Ismaile, & Abu Yahya, 2018). Research by Bifftu, Dachew, Tiruneh, & Beshah (2016) reported that educational status, disagreement about the definition of error, administrative reasons, and fear of reporting were factors that made nurses refuse to report medication errors. Challenges in the hospital system are related to the lack of adequate training programs (Tsegaye, Alem, Tessema, & Alebachew, 2020; Wondmieneh, Alemu, Tadele, & Demis, 2020).

Working environment factor

Another contributing factor is having additional nurse routines in the room (Mula, Solomon, & Muula, 2019; Cottney & Innes, 2015). Studies show that morning shift nurses (Suclupe et al., 2020; Schutijser et al., 2019; Härkänen, Ahonen, Kervinen, Turunen, & Vehviläinen-Julkunen, 2015), night shift nurses (Feleke, Mulatu, & Yesmaw, 2015; Wondmieneh, Alemu, Tadele, & Demis, 2020) have a risk for interference in the delivery of treatment. Studies consistently show that a high workload for nurses can increase medication errors (van der Veen et al., 2020; Suclupe et al., 2020; Schutijser et al., 2019; Hammoudi, Ismaile, & Abu Yahya, 2018; Kiymaz & Koç, 2018). Interruptions from coworkers and nurses themselves during treatment are factors that can increase the risk of errors (Feleke, Mulatu, & Yesmaw, 2015; Suclupe et al., 2020; Wondmieneh, Alemu, Tadele, & Demis, 2020; Tsegaye, Alem, Tessema, & Alebachew, 2020; Sassaki, Cucolo, & Perroca 2019). The research of Mekonen, Gebrie, & Jemberie (2020) showed that nurses who were distracted during drug administration were 4.7 times more likely to make medication errors than nurses who were not distracted. The risk of error is higher at any time of the day except the afternoon; this may be because the afternoon is the least busy time for nurses. Unlike in the morning, where nurses have to take blood samples, copy drug prescriptions, and in the morning and evening, nurses have to distribute food. This is what underlies interruptions during busy times in the room (Johnson et al., 2017; Prakash et al., 2014).

Team factor

The team factors include unclear written communication regarding prescription documentation and transcripts. Examples are illegible handwriting on prescriptions, incomplete prescriptions related to patient age data, diagnosis, premedication, and details of cytotoxic drugs- dosage form, drug name, dose with units, diluent, route, and time of administration, prescription written using abbreviations, and nurses copying the prescription incorrectly. (Suclupe et al., 2020; Mathaiyan, Jain, Dubashi, & Batmanabane, 2016) And poor verbal communication among nurses (Tsegaye, Alem, Tessema, & Alebachew, 2020), nurses, and doctors (Hammoudi, Ismaile, & Abu Yahya, 2018).

Nurse's personal and clinical experience factor

Age, length of work experience, clinical experience, education, knowledge and skills/competence, motivation and attitude, and nurses' awareness are individual factors that can influence medication errors. One study explained that nurses aged between 18-25 years had more potential to make medication errors (Feleke, Mulatu, & Yesmaw, 2015); another factor is nurses' educational background and length of work experience (Blignaut, Coetzee, Klopper, & Ellis, 2017). Studies consistently show that nurses' work experience and having less than ten years of work experience may affect medication errors (Feleke, Mulatu, & Yesmaw, 2015;

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Wondmieneh, Alemu, Tadele, & Demis, 2020; van der Veen et al., 2020). The six working days system (Sunday off) (Härkänen, Ahonen, Kervinen, Turunen, & Vehviläinen-Julkunen, 2015), fatigue, physical and mental fatigue, and exhaustion factors into it as well (Kiymaz & Koç, 2018), competency gaps related to poor understanding inconsistency of the drug dosing intervals (Mula, Solomon, & Muula, 2019) also affect medication errors. Research by Oguz, Alasehirli, & Demiryurek (2015) reveals that nurses need more comprehensive pharmacology education during their education and working period, as nurses receive and administer the drugs.

Procedural error factor

These factors include preparation techniques (e.g., not washing hands before administering drugs, nurses only use one glove for different patients and they do not change gloves even though contamination is seen, patient bracelets are not read and patient names are not asked, nurses mixing incorrectly or using the wrong solvent/diluent, crushing tablets or capsules that should not be crushed), wrong timing of drug administration (example: a medication that should be administered at18.00 is administered at 16:30, the actual time of drug administration not recorded), dose calculation error (Example: Ceftriaxone 2 g, the nurse gives 1 g), method of drug administration (example: insulin is administered intradermally not subcutaneously), documentation of drug administration (example: recording is done before the drug is given) (Blignaut, Coetzee, Klopper, & Ellis, 2017; Nguyen, Nguyen, van den Heuvel, Haaijer-Ruskamp, & Taxis, 2015; Cottney & Innes, 2015; Feleke, Mulatu, & Yesmaw, 2015). Another factor is the unavailability of protocols (Tsegaye, Alem, Tessema, & Alebachew, 2020; Wondmieneh, Alemu, Tadele, & Demis, 2020) and non-adherence to drug administration protocols (Blignaut, Coetzee, Klopper, & Ellis, 2017; Schutijser et al., 2019).

4. Conclusions and Suggestions

Overall the findings of this review suggest that medication error is a multifactorial problem. This review has compiled, summarized, and synthesized the research regarding factors that can enhance and hinder nurse's role in medication safety. This is presented in the framework proposed by Vincent et al. (1998) and Vincent (2003). The reviewed articles showed consistent results of enhancing and hindering factors of the nurse's role in medication safety. Knowing the factors that can hinder the nurse's role will effectively increase the nurse's role in providing medication safety.

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