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Review Article

Medication Error and an Effort to Reduce the Incident: A Scoping Review

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ABSTRACT

The medication process is carried out by a professional team, namely pharmacists, doctors and nurses.

Aim: To identify and analyse the type and factors that influence medication error in Hospital and also the responsibility of each profession in ensuring drug safety.

Method: The scoping review is carried out through the study method, with keywords; error medication, safety medication, medication and nurse responsibility, medication and doctor's responsibility, drug and pharmacist responsibility, determinants of error medication, how to reduce error medication. The manuscript database is accessed from Google Scholar, with an English and Indonesian language and published in 2021.

Result: A total of twenty-one (21) studies from fourteen countries matched with the inclusion criteria. Scoping area described error medication types. determinant of MEs, roles of the health provider and effort to reduce MEs incident.

Conclusion: Medication errors are dangerous incidents so that each health professional must collaborate professionally to reduce medication errors.

Keywords: Medication Error, Safety medication, Reduce the incident, Area described error medication

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INTRODUCTION

Patient safety is a global problem and one of the key elements of the quality of health care systems. Medication error is one of the mistakes that often occur in hospitalization and can be a major threat to patient safety (Piroozi B, *et al.*, 2019; Elvretta JJ, *et al.*, 2021). A previous study explained that 134 million adverse events occur each year in hospital and contribute to 2.6 million deaths each year due to unsafe care. Piroozi B, *et al.* show that Medication Errors (MEs) reported per nurse are 6.27 ± 11.95 in each month and are generally due to administration of drugs that are not on schedule (28.4%), administration of several oral drugs concurrent (22.4%) and the administration of pain killers after surgery without a doctor's prescription (15.3%). Factors that influence errors in administering medication by nurses are influenced by work experience, as well as workload, fatigue due to shift extensions. Failure of supervision is also a factor affecting drug administration errors (Piroozi B, *et al.*, 2019).

Medication safety is a process that starts from drug management, prescribing, dispensing and reconstituting drugs, drug delivery, administering drugs to patients and evaluating the response after drug administration. The medication process is carried out by a professional team, namely pharmacists, doctors and nurses. In Indonesia, the professional authority in drug management is regulated in several regulations, namely the Medical Practice Law (Indonesia Governance, 2004), the Nursing Law (Indonesia Governance, 2013) and also the Minister of Health's regulations regarding pharmaceutical guidelines5. Even though they already have policy regulations, often their implementation is still related, among others, due to the lack of pharmacists, so that the reconciliation process that should be carried out by pharmacists has not been carried out. In policy, patient drug preparation must be done on a daily dose (Standard of Pharmacy in Hospital, 2019), but its implementation is still not going well where there are still many hospitals that use the daily dose method, or even drugs are still placed in patients. In some hospitals, there is also a phenomenon that nurses have to take medicines at the drug depot, even though this is not the nurse's job which will have an impact on other patient safety, namely the risk of falling on abandoned patients and also delays in other services.

Another phenomenon regarding the authority for reconstitution, dispensing and delivery of drugs that must be carried out by pharmacists has also not run optimally. These activities are often carried out by on-duty nurses. This condition also raises the risk of error, considering the burden of nursing care for patients is very heavy. Another problem is the writing of prescriptions by doctors which are sometimes unclear, the possibility of errors in the provision of drugs, or errors in administering drugs. From the nurse's point of view, the double-check approach is still not running well so that it contributes to the risk of drug errors. Regarding the existence of effective communication in drug administration, this is also a note in the safe treatment process, where effective communication greatly affects the occurrence of medication errors (Gunawan D and Hariyati RT, 2019).

Several studies to reduce the incidence of medication errors have been carried out both abroad and in Indonesia, and it is known that surveillance, reminders and training related to drug safety can reduce medication errors. The results of supervision can improve employee competence, correct errors in improving the quality of nursing care services (Gunawan D and Hariyati RT, 2019; Kurniawan MH, *et al.*, 2019). This research is a scoping review that aims to investigate research conducted on types, an effect of medication errors and strategies to reduce medication errors incident.

METHOD

This study aims to identify and analyse the factors that influence medication error in Hospital and the responsibility of each profession in ensuring drug safety. The study also explores the activities that have been implemented to reduce medication errors. Apart from the scoping review, the study will also categorize and link the results of the scoping theme with policy analysis related to drug safety. The analysis of error medication is carried out by carrying out a policy review according to regulations in Indonesia.

To achieve this goal, the study literature was carried out through a literature database with the keywords error medica-

tion, drug safety, medication and nurse responsibility, medication and doctor's responsibility, drug and pharmacist responsibility, determinants and drug risk, error reduction and medication. The manuscript database is accessed from Google Scholar, with an English and Indonesian language and published in 2021. The searching literature aimed at the full manuscript which has been published in 2021 because currently, the problem of medication error is still a big problem for patient safety. The scoping review is carried out through the study method, the study location, the results are grouped from the determinant factor, the role of the profession, the incidence of error medication, an effort to reduce the error medication.

RESULTS

Initially, the results of this study are acquired from 477 articles in Google Scholar. A total of twenty-one (21) studies match the inclusion criteria and contained an analysis of error medication types. determinant of MEs, the role of doctor, nurse and pharmacists, and also effort to reduce MEs incident. Articles excluded if they had no relevance with keywords. The article also excluded if no have full text and can't download. Description of finding MEs publication in 2021 was shown in *Table 1 (Tables 1 and 2)*.

Table 1: Description of Medication Error Publication in 2021

Component	Findings	Author	Total
Location of Study	USA	29,23	2
	Indonesia	12,17,21	3
	Thailand	26	1
	Arab Saudi	22,28	2
	Pakistan	11,16	2
	Norway	10	1
	England	33	1
	Australia	9	1
	Iran	20,27	2
	Korea	19	1
	Morocco	8	1
	India	13,30	2
	Brazil	14	1
	France	15	1
Design	Descriptive	9-13,15-17,19-22,30,33	14
	Retrospective Descriptive	8,14	2
	Intervention	26-28	3
	Interview	23,29	2

Table 2: A scoping themes of Medication Error

Theme	Explanation	Authors
Types of medication errors	MEs often occurs on drug administration, prescribing, the wrong dosage, dispensing, reconstitutes, and reconciliation	8-12,14-16
Determinant of MEs	Human factors: tired, stressed, Workplace, environmental, communication, poor teamwork, Safety culture, culture management, combination of technological, cognitive, environmental, social, and organizational-level factors	14,19,20,22
The Role's of Doctor, Nurses and Pharmacist in Medication	The role of Nurses: administration drugs, prepare, administer and dispose, monitor and educate	10,17,20-22
	The role of Physician: educate, drug ordering and taken prescribing	
	The role of Pharmacist: manage of drug supplies, drug prepare in dispensing, reconciliation, reviewing prescriptions, check drug interaction, contraindication, patient education.	
Effort to Reduce Incident of MEs	Re-enforcement a guide and training, socialisation, Separation of the drug preparation room, reducing the blaming, Lean Six Sigma, Root Cause Analysis, organizational communication improved information access, safety culture and climate, policies, standard of procedures, guidelines, system technology, Robotic	10,15,20,26-29,33

Types of medication errors that often occur

Medication errors (MEs) continue to be a problem faced by international hospitals and MEs often occurs not only during drug administration but also in prescribing (Alj L, *et al.*, 2021; Isaacs AN, *et al.*, 2021; Josendal AV, *et al.*, 2021; Karataş Y and Zakir KH, 2021; Putra ON, *et al.*, 2021; Majeed A, *et al.*, 2021), preparation such as dispensing (Josendal AV, *et al.*, 2021), reconstitutes, and reconciliation (Barbosa A, *et al.*, 2021; Laroche ML, *et al.*, 2021; Abbas M, *et al.*, 2021). MEs due to prescribing errors in the previous study accounted for 23%, and the adverse effects of these drugs had an impact on patient safety. Other research also conveyed that MEs that often occurred was related to inappropriate drug administration schedules, errors in prescribing drugs ($p<0.001$), and wrong dosage forms ($p=0.04$) (Alj L, *et al.*, 2021). The most common issues on error prescription were expired prescriptions (29%), drug shortages (19%), missing prescriber signatures (10%) and unclear/missing medication names or strengths (10%)18. Another concern for inappropriate antibiotic prescribing is inadequate antibiotic prescriptions. The improper and excessive use of antibiotics in children leads to resistance and adverse drug reactions (ADRs) (Karataş Y and Zakir KH, 2021).

Quite a few studies on the type of medication error found from abroad, while from Indonesia reported the most prescription error is no dose there are 20 occurrences (32.26%). The most adverse treatment errors were no available dose 20 (29.41%), no form of preparation 13 (19.12%), no history of allergy patients 12 (17.65%) and unreadable prescription writing 8 (11.76%) (Chusun W and Eko S, 2021). Angraini and Afriani, 2021 reported determinants of drug administration errors. A common mistake in this study was the administration of drug doses that were not accurate and at the wrong time. Errors in administering drugs are often caused by unclear prescriptions, which can result in errors in drug dosing. Errors in the dispensing stage, among others, occur starting from the time of preparation, namely the wrong way of taking the drug from the storage shelf due to similar packaging or drug names. Errors in removing supplies from supplies also occurred due to patient identification errors and no cross-examination was carried out. Errors in the administration stage occur because there is no double-check before medication administering to the patients (Josendal AV, *et*

al., 2021; Chusun W and Eko S, 2021; Angraini D and Afriani T, 2021).

Determinant of MEs

Several studies convey factors affecting MEs including human factors, workplaces (Suh SR, *et al.*, 2021), communication problem and culture management (Bahramiazar G, *et al.*, 2021; Faisal S and Handayani M, 2021). In line with Suh SR, *et al.* and Alshammari HF, *et al.* also conveying that the human factor is a major risk factor that causes medical errors that affect patient safety (Alshammari HF, *et al.*, 2021).

Previous studies also suggest that predictive factors are associated with treatment error is a clinical experience (β=-0.41), fatigue (β=0.31). The results showed that nurses who had less clinical experience and felt more tired or stressed at work tended to have more medication errors. Environmental factors associated with a very dense work environment that causes work stress. It was conveyed in this study that nurses who worked in the emergency room or operation unit experienced more medication errors. Another study suggests that the patient safety management culture established by the organization will influence the incidence of medication errors (Bahramiazar G, *et al.*, 2021; Alshammari HF, *et al.*, 2021). The existence of regulations, guidelines and standard procedures will provide directions that can reduce MEs. Effective communication when hand over greatly affects the incidence of MEs (Bahramiazar G, *et al.*, 2021; Alshammari HF, *et al.*, 2021). The existence of a barrier in MEs reporting was an issue identified from previous studies. The absence of a safety culture and poor teamwork have caused many to be afraid to convey MEs incidents and also the problem of not knowing the reporting procedure (Faisal S and Handayani M, 2021; Alshammari HF, *et al.*, 2021).

Another problem in MEs because of medication ordering errors. Errors in the previous study were not uniquely associated with a single risk factor, but the causal contributors of medication ordering errors were multifactorial, arising from a combination of technological, cognitive, environmental, social, and organizational-level factors (Abraham J, *et al.*, 2021).

The roles of doctor, nurses and pharmacist in medication

The physician conducted drug ordering and taken prescribing, while a nurse one of the front-line in the delivery of health services in hospitals. Nurses have a very (Barbosa A, *et al.*, 2021; Alshammari HF,*et al.*, 2021) important role because they are 24 hours with the patients. They are the main actors in the administration of drugs based on orders from physician or treatment program. The role's nurse on medication is to prepare, administer and dispose of intravenous drug-like antibiotics. Role's nurse to monitor of condition post deliver medications, that the report from a nurse can be an early response to patient safety incidents in the future (Barbosa A, *et al.*, 2021; Suh SR, *et al.*, 2021; Alshammari HF, *et al.*, 2021; Anugrahini C and Hariyati RT, 2020).

The Pharmacist has a role including reconciliation of drugs used before treatment, and also when going home (Josendal AV, *et al.*, 2021; Chusun W and Eko S, 2021). The pharmacist also plays a role in the management of drug supplies, drug preparation in dispensing (Majeed A, *et al.*, 2021; Aghili M and Kasturirangan MN, 2021), reviewing prescriptions (Josendal AV, *et al.*, 2021; Majeed A, *et al.*, 2021; Aghili M and Kasturirangan MN, 2021), and also educating patients while being treated and will going home. Medication dispensing involves preparing and giving medicine to a patient, based on a prescription or medication order. Dispensing is complex and errors can occur at any stage, from receiving medication orders/prescriptions to supplying medication to a specific patient (Trakulsunti Y, *et al.*, 2021).

Regardless of prescription type, the pharmacist's checks ensure that the medication, dosage form, and the dose prescribed is in accordance with the patient's age, gender and indication written on the prescription. The pharmacist also checks for interactions, contraindications, and other available information about the patient. In addition, the validity of the prescription, including the prescriber's identity and right to prescribe medications is checked. Lastly, the pharmacist assesses whether the prescription label is written and whether the patient needs any additional information (Josendal AV, *et al.*, 2021).

An effort to reduce incident of MEs

Drug preparation is a very important stage that predisposes to ME. Previous research has shown that there is a separation of the drug preparation room where it is hoped that it can reduce ME because with a special room it is hoped that a more accurate preparation is expected. Prescribing, transcribing, applying, reserve and storing and managing the drugs are important activities that physician, pharmacist and nurse must be aware with them. one of the efforts to reduce MEs is by conducting training. Re-enforcement a guide and training are expected to increase competence and awareness of safe medication. Several training approaches to reduce MEs are self-directed learning methods (Josendal AV, *et al.*, 2021; Razavi SM, *et al.*, 2021).

Other efforts used to reduce MEs are through of drug error reporting, making a root cause analysis approach and also using Lean Six Sigma (Trakulsunti Y, *et al.*, 2021). The previous action research study examines the application of Lean Six Sigma to reduce inpatient pharmacy dispensing errors in a Thai public hospital. Lean Six Sigma approach used in this study were cause-and-effect diagrams, spaghetti diagrams, five-why analysis, project charters, brainstorming, control charts, and hypothesis testing. This case study can improve hospital manager and medical director awareness of Lean Six Sigma and its benefits relative to the prevention and reduction of medication errors. In line with Lean Six Sigma, Root Cause Analysis also aims to find the cause of the problem and then become a solution. Previous studies submitted the use of mini-RCA to review medication errors provided structured process management reported events, monitor the implementation of recommendations, and assess the effectiveness of implemented actions. The use of this rapid process to investigate errors that cause harm but are not sentinel events, reduced the recurrence of similar medication errors. Although the time and cost required for this intervention are not significant, the cumulative benefit to patients, healthcare professionals, and the organization are greater (Suh SR, *et al.*, 2021; Al Mardawi GH, *et al.*, 2021). The management of medical errors were "organizational communication and improved information access", "safety culture and climate", and "policies, procedures, and guidelines". In addition, the "safety culture and climate" was the most important factor that had the most critical impact on the system (Bahramiazar G, *et al.*, 2021).

An Efforts to reduce MEs have also been carried out by using technology, including a system of drug orders (Abraham J, *et al.*, 2021), prescribing information systems (Laroche ML, *et al.*, 2021; Russ-Jara AL, *et al.*, 2021), pharmaceutical audits and also using robotic technology. The use of information technology is expected to reduce calculation errors, speed up orders, make a decision and also act as an auditing aid. Robots are also very helpful in drug distribution, robots are very careful and are used as an effort to reduce transmission in the COVID-19 era, especially when delivering medications (Kumar AS, *et al.*, 2021).

DISCUSSION

Drug management is an activity that requires collaboration between professionals, that doctors, nurses and pharmacies have different authorities. This study stated that the doctors would order prescriptions and the pharmacists would review prescriptions, prepare drugs, and distribute them to nurses to give to patients. The nurse will perform a repeat check to prevent medication errors, and before administrate, the nurse will check the six correct drugs (Bahramiazar G, *et al.*, 2021;

Alshammari HF, *et al.*, 2021). The roles of doctors, nurses and pharmacists in Indonesia have been regulated in statutory regulations in the form of laws and regulations of the minister of health so that each profession can carry out its duties according to its authority (Indonesia Governance, 2004; Indonesia Governance, 2013; Standard of Pharmacy in Hospital, 2019).

Only health professionals who have been credentialed are allowed to administer or drug manage. The credential process is a process of evaluating the competence of staff before obtaining clinical authority in providing care. The discussion-based on Indonesian Hospital Accreditation standards, Health ministry regulation number 72, 2017 and Indonesia, Health ministry regulation number 40, 2017 stated that health care professionals must have competence and credentials must be carried out.

Competence in safe medication must also be supported by the ability to communicate effectively. According to patient safety the second target standard, it is conveyed that in carrying out inter-collaboration care, effective communication is needed (Hospital Accreditation Committee, 2019). Communication during the handover of nurses and communication between clinical staff in this study is one of the factors that cause the risk of medication error (Bahramiazar G, *et al.*, 2021). Consequently, there is a critical need for health care professionals, particularly those in leadership roles, to consider strategies for improving team-based and effective communication among medical staff. The training courses also enhance the quality of care (Alshammari HF, *et al.*, 2021).

Medical error is estimated to be the most common cause of death and this study found some factor caused the incident medical error. Teamwork failures and miscommunication related to serious medical errors (Alshammari HF, *et al.*, 2021). The risk humans are extremely affected to MEs (Piroozi B, *et al.*, 2019; Isaacs AN, *et al.*, 2021). Teamwork definitely in medication treatment requires good communication among a variety of profession (e.g. nursing, physician, and pharmacist) and effective communication is very important in carrying out collaborative tasks. Following the Minister of Health Regulation in, 2017 regarding patient safety, all care provider must use effective communication on doing medication. Drug order must be clear, if ordered by telephone must use the reconfirmation. The same thing was also stated in the Indonesian Hospital Accreditation Standards, 2019 which said that in drug order by telephone needed to ensure a medicine that similar sounded (Sound-LIKE) by spelling the alphabet. Spelling and reconfirmation aim to reduce errors due to drug names that sound almost the same.

Various efforts have been made to reduce the incidence of error medication, among others, by conducting a root cause analysis. Root cause analysis is an activity to identify the causes of the problem without blaming, and prioritizing the quality improvement process (Bahramiazar G, *et al.*, 2021; Al Mardawi GH, *et al.*, 2021). Lean management and the Plan, Do, Study, and Action approaches are activity continuous quality improvement to reduce MEs (Trakulsunti Y, *et al.*, 2021).

Regular training and outreach to remind the importance of safe medication management are recommended activities to reduce medication errors (Razavi SM, *et al.*, 2021). Another suggested activity is the use of information systems based on technology and robotics (Alj L, *et al.*, 2021; Kumar AS, *et al.*, 2021). Supervision, development of a safety culture and a safe work environment also play a role in reducing the incidence of MEs. Quality improvement activities and efforts to reduce the incidence of error medication are following existing regulations in Indonesia (Minsitry of Health, 2017; Elliott RA, *et al.*, 2021; Gunawan D, *et al.*, 2021).

CONCLUSION

This study is acquired from 477 articles in Google Scholar. A total of twenty-one (21) studies from fourteen countries matched the inclusion criteria. Scoping area described error medication types. determinant of MEs, roles of the health provider and effort to reduce MEs incident. The findings of studies accordance with the regulations in force in Indonesia, so that these findings can be used for reference in reducing the incidence of MEs in Indonesia. Drug management needs professional collaboration and effective communication between doctors, nurses and pharmacists.

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