Medication Error Incidence (Parenteral Therapy) at Government Hospital in Magelang

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ABSTRACT

Patient safety is the key to maintain the quality of health services. One of the most important things to achieve patient safety is to identify medication errors and its causes. Most cases of medication errors are reported by nurses, because nurses are the therapeutic team. The purpose of this study is to determine factors affecting medication error by nurse in giving parenteral therapy at Government Hospital in Magelang. A cross-sectional analytic study was carried out on 67 nurses working in hospital wards. The data were collected using a questionnaire filled by respondents to see medication errors within 3 months. The final number of medication errors were 91 incidents in 3 months. The most frequent errors were wrong time (51.7%), wrong dose (14.2%), wrong document and wrong drug (9.9%), wrong route (8.8%), and the least was wrong patient (5%). Although the medication error incidences were not sentinel events and didn't affect to SNARs criteria, but it still affecting on the quality of health services in the hospital. The significant independent determinant of medication errors is working experience at Government Hospital in Magelang (p 0,001), while the other determinants are not. Conclusion in this study was significant correlation between work experience in hospital and medication error, where respondents with work experience at Government Hospital in Magelangless than 5 years tend to be at higher risk doing medication errors than those who having worked more or equivalent to 5 years.

Keywords : Medication Error, Nurse, Parenteral therapy

ABSTRAK

Keselamatan pasien merupakan kunci dalam menjaga kualitas pelayanan kesehatan. Salah satu hal yang penting untuk mencapai keselamatan pasien adalah mengidentifikasi *medication error* dan penyebabnya. Sebagian besar *medication error* dilakukan oleh perawat, karena perawat merupakan tim terapeutik. Tujuan dari penelitian ini adalah mengetahui faktor yang mempengaruhi kejadian *medication error* oleh perawat dalam pemberian terapi parenteral di bangsal rawat inap RS Pemerintah di Magelang. Penelitian ini merupakan penelitian analitik dengan desain *cross sectional* dan pengambilan data dilakukan menggunakan kuesioner yang diisi oleh respondent untuk melihat *medication error* dalam 3 bulan. Respondent penelitian adalah perawat di RS Pemerintah di Magelang berjumlah 67 respondent. Dari penelitian ini didapatkan 91 kejadian *medication error* dalam 3 bulan, dengan rincian kesalahan waktu pemberian terapi sebanyak 47 kejadian (51,7%), kesalahan dosis sebanyak 13 kejadian (14,2%), kesalahan dokumen dan kesalahan jenis obat masing-masing sebanyak 9 kejadian (9,9%), kesalahan teknik atau prosedur sebanyak 8 kejadian (8,8%), dan salah pasien sebanyak 5 kejadian (5%). Meskipun kejadian *medication error* yang terjadi tidak mencapai kejadian sentinel dan tidak berpengaruh pada kriteria SNARs, tetapi tetap mempengaruhi kualitas pelayanan kesehatan di rumah sakit. Faktor penentu yang signifikan pada *medication error* adalah lama kerja di RS Pemerintah di Magelang (p 0,001), sedangkan faktor penentu lainnya didapatkan hasil yang tidak signifikan. Kesimpulan pada penelitian ini adalah ada hubungan signifikan antara lama kerja di RS Pemerintah di Magelang dengan *medication error*, dimana perawat dengan lama kerja kurang dari 5 tahun lebih berisiko melakukan *medication error* lebih besar dibandingkan perawat dengan lama kerja 5 tahun atau lebih.

Kata-Kata Kunci: *Medication Error*, Perawat, Terapi Parenteral.

INTRODUCTION

Medical science and technology have rapidly developed in this globalization era. This condition certainly have an effect on quality of health services, nowdays health services are becoming more complex and more careful in managing patients to improve patient safety and reduce adverse events (1). Patient safety is turning to the foremost position in health services since WHO has declared World Alliance for Patient Safety, a program to improve patient safety in hospitals (2), meanwhile in our country The Ministry of Health has issued Permenkes No. 11/2017 regarding patient safety, which became the main guideline for patient safety procedures in all Indonesian hospitals (3).

Identify medication errors and its causes is one of the most important things to achieve patient safety (4). Some observational studies mentioned that most medication error is administering parenteral therapy by nurses. Study in European hospitals mention that the incidence varying from 26.9% to 49%. Parenteral therapy is the most common procedure in hospital admissions, in fact almost all patients in a hospital ward receive parenteral therapy such as infusion or drug injection (6).

Some studies on medication errors showed that the incidence of medication errors in parenteral therapy is caused by multivariate factors, such as nurse's poor working performance, fatigue, lack of sleep and heavy workloads, especially during the night shifts or shift during weekends (7,8,9). The highest mistakes were on night shift, weekends, and in elderly patients. Besides medication error related to shifts and patients, it is also related to nurse's factors such as age, sex, education, work experience both as nurse and in the hospital (6).

The objective of this study is to identify factors that affect medication error by nurse in giving parenteral therapy at Government Hospital in Magelang. Government Hospital in Magelang is a type B hospital of 289 beds and a one of referral hospital in Magelang.

The hospital was choosen because the hospital doesn't have any data about medication error, but from preliminary study that was held from October 19th until 26th 2018, there were 6 medication error incidences from 7 respondents. Thus, it was important to investigate medication error incidences generally in the hospital.

In this study, independent variables are nurse's age, sex, education, work experience as nurse and work experience in hospital based on previous study in Ain Shams Hospital (10), and dependent variable is medication error that defined as 6 points based on 6 r's medication administration. The first was wrong document as a deviation from doctor's valid prescription, including failure to document the administration of a medication correctly. Second was wrong route as the failure route in giving parenteral therapy from doctor's ordered route. Next was wrong time as the failure time to administer parenteral therapy from doctor's ordered. Fourth was wrong dose as the failure to administer an ordered parenteral therapy dose. Then wrong drug as the failure to administer parenteral therapy drug from doctor's ordered. The last was wrong patient as the failure to administer parenteral therapy on patient that ordered by doctor.

The of severity of medication errors in this study was classified based on the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) taxonomy. NCCMERP classifies medication error based on the outcome severity into 9 categories. The categories varies from A (potentially error), B (an error but didn't reach patient), C (an error reached patient but resulted in no harm), D (an error resulted in no harm, but need monitoring), E (an error resulted in temporary harm and need intervention), F (an error resulted in temporary harm and need prolonged hospitalization), G (an error resulted in permanent harm), H (an error that need intervention necessary to sustain life) and I (an error that resulted in patient's death). Harm is defined as temporary or permanent impairment of the physical,

Table 1. Demographic characteristics of the respondents

Respondents' characteristics	Frequency	Percentage (%)
Age (y)		
< 25	3	4,5
≥ 25	64	95,5
Sex		
Male	12	18
Female	55	82
Education		
DIII	65	97
SI	2	3
Work experience as a nurse (y)		
< 5	16	23,8
≥ 5	51	76,2
Work experience in hospital (y)		
< 5	25	37,4
≥ 5	42	62,6

emotional, or psychological function or structure of the body and/or pain resulting there from requiring intervention (11). The impact of the study is expected to improve on the overall patient safety terms of the hospital.

METHOD

This study was conducted in the inpatient ward of Government Hospital in Magelang from November 5th until November 24th 2018. The population of this study is all nurses working in inpatient wards of Government Hospital in Magelang amount to 197 nurses. To collect the data, the researchers applies incidental sampling, by choosing nurses who meet with the researcher during this study and fulfill both inclusion and exclusion criteria. This study using the Slovin formula to get 67 respondents who fulfill inclusion and exclusion criteria. The inclusion criteria of this study is all working nurses in inpatient wards of Government Hospital in Magelang. Meanwhile the exclusion criteria of this study are non cooperative respondents, and respondents who weren't in hospital when the study was conducted like leave, on duty outside or didn't have shift. The data of this study is acquired from the questionnaire filled directly by respondents about medication error incidence in the last 3 months. The

questionnaire in this study is a new questionnaire that has been tested for the validity and the reliability in the same hospital before, with the result is valid for the validity test and the result of reliability test is 0.786 (>0.6), means that there are similarities of data at different time tests with accurate result (12). The analyses used in this research are univariate, bivariate namely *Chi-Square, Fisher Test, Kruskal Wallis*, and *Mann Whitney*, and multivariate namely L*ogistic Regression.*

RESULT AND DISCUSSION

From this study, most nurses were female respondents (82%), and 95.5% of them were more than 25 years old. Most nurses (97%) achieved diploma degree III education, and most of them have more than 5 years of working experience as a nurse (76.2%) and work experience at Government Hospital in Magelang(62.6%) (Table 1). This study revealed that there were 91 medication error incidences in the last 3 months and the most frequent error was the wrong time as 47 incidences (51.7%), and the least error factor was the wrong patient as in 5 incidences (5%) (Figure 1).
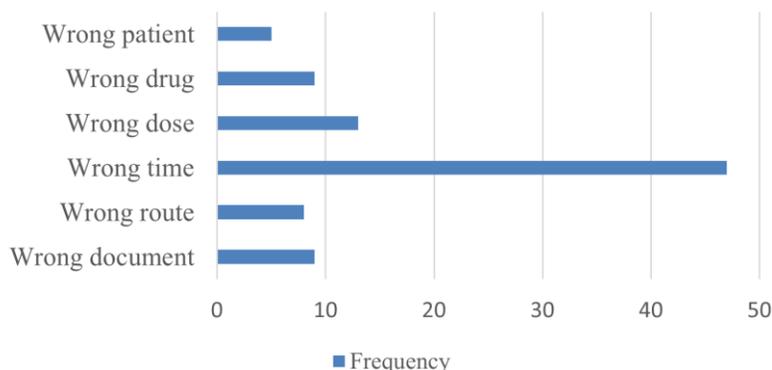
Figure 1. Types of medication errors

Medication error and respondent's age

Respondent's age was divided into two groups, based on previous study in Ain Shams University Hospital, Egypt which also divided respondent's age into two groups (10). In this study, respondents were less than 25 years as 3 respondents, and all respondents did medication errors, the second group respondents were more than 25 years as 64 respondents, and 44 respondents did medication errors in the last 3 months.

Age can influence on individual intelligence, then intelligence will affect on behavior. So age can be an indicator for taking decisions based on an individual's experience. As more as an individual's age, responsible for receiving instructions and carrying out procedures will be better. If age been more mature, the ability to think and act will be more mature too (13). But this study revealed that there is no significant association between medication error and respondent's age in the inpatient ward Government Hospital in Magelang (p 0.549) (Table 2).

Medication error and respondent's sex

Based on the results, it can be seen that female respondents are more than male respondents, as 54 female respondents and 13 male respondents. From 54 female respondents, 36 respondents did medication error and 18 respondents didn't do medication error in the last 3 months. While from 13 male respondents, there were 11 respondents did medication error and the remaining 2 respondents didn't do medication error in the last 3 months. It is generally accepted that men and women have been treated differently since birth. Several studies have shown that males and females have the same ability in learning, reasoning ability, memory, intelligence and creativity. But some people believe that there are different gender roles in the same job (14).

There are no studies comparing the work performance of male nurses and female nurses. A study by Wren is consistent with the previous study showed that female nurses have uncertain feeling and lower self-confidence in various work compared to male

Table 2. Medication error and respondent's age

Age (y)	Medication error		Frequency		P
	Yes	No	Total	%	
< 25	3	0	3	4,47	0,549
≥ 25	44	20	64	95,53	
Total	47	20	67	100	

Table 3. Medication Error and respondent's sex

Sex	Medication error		Frequency		P
	Yes	No	Total	%	
Male	11	2	13	19,4	0,315
Female	36	18	54	80,6	
Total	47	20	67	100	

nurses (15). However, this study showed that there is no relationship between the medication error and respondent's sex in inpatient ward of Government Hospital in Magelang (p 0.315), means that female respondents and male respondents have the same opportunities doing medication error. (Table 3).

Medication error and respondent's education

This study found that there was no respondent with bachelor education did medication error, meanwhile from 65 respondents with diploma degree, 47 respondents did medication error and 18 respondents didn't do medication error in the last 3 months. This study also found that there is no significant association between medication errors with respondent's education (p 0.86) (Table 4). The higher level of respondent's education is expected to be directly proportional to the quality of health services to patients, which is one indicator of standard quality service and patient safety in hospital (16). However, in this study respondents with diploma and bachelor education have the same opportunities doing medication error. This result was similar to a study in the inpatient ward of the University of Egypt Hospital, which states that there is no correlation between medication errors with respondent's age, sex, education, and work experience (10).

Medication error and respondent's work experience as nurse and in hospital

In this study, can be seen that most respondents have both ≥5 years work experience as nurse (83.6%) and in hospital (70%). A hypothesis declared that senior nurses have more experience in working hours than junior nurses, this can cause senior nurses to have perceptions, attitudes and personalities that have been ingrained in them so it becomes a habit, therefore junior nurses have bigger opportunities to do medication error (17).

The analysis result towards work experience as a nurse and medication errors shows the value of p is 0.153 (Table 5). It means that there is no relationship between the medication errors with work experience as a nurse. This study has a similar result with a study conducted in the inpatient ward in Egypt University Hospital which showed that there is no relationship between medication errors event age, sex, education background, and work experience (10). However, the analysis result towards the respondent's work experience at Government Hospital in Magelang and medication errors shows the value of p is 0.01 (Table 6). It means that there is a relationship between medication errors with respondent's work experience at

Table 4. Medication Error and respondent's education

Education	Medication error		Frequency		P
	Yes	No	Total	%	
D3	47	18	65	97	0,86
S1	0	2	2	3	
Total	47	20	67	100	

Table 5. Medication error and work experience as a nurse

Work experience (y)	Medication error		Frequency		P
	Yes	No	Total	%	
<5	10	1	11	16,4	0,153
≥5	37	19	56	83,6	
Total	47	20	67	100	

Government Hospital in Magelang.

The Multivariate Analysis

Based on the multivariate analysis, from 5 suspected variables that affecting medication error, there only 2 variables fulfill the requirements to conduct logistic regression which is work experience as a nurse and work experience in the hospital. After doing logistic regression, the researcher found that work experience in hospital has a lower value (p 0.92 with OR 3.0) than work experience as a nurse (p 0.99 with OR 1.2) (Table 7). It means that the risk factor of the medication error is mainly caused by the variable of work experience in the hospital. It also means that those nurses who having worked less than 5 years at Government Hospital in Magelang will have 3 times higher risk doing medication error compared to those who having worked more than or equivalent to 5 years. The next risk factor is work experience as a nurse. It means that those nurses who having worked as nurses less than 5 years will tend to more risk 1.2 higher at the medication errors compared to those nurses who having worked as nurses more or equivalent to 5 years.

Medication error and other factors

From the results, it can be seen that medication error incidences varies based on

daily shifts. In this study, there were 91 medication error incidences, with the highest number in the night shift as 46 incidences, 20 incidences in the noon shift and 25 incidences in the morning shift. The average of medication error incidences on weekday shift is more than in weekend shift. A hypothesis states that management programs of patients is mostly done by physicians and nurses in the morning shift, nurses in morning shift have more information dealing with the patients. However, it may not be generalized (18).

A literature review states that there is a significant association between medication errors with shifts. Fatigue and lack of sleep that occur in nurses during the night shift and early morning have a higher contribution to cause the medication error (19). Meanwhile, according to other studies, there is no significant association between medication errors with nurses' daily shifts (20).

In the night shift and at the weekend, there are more patients who came from the emergency department caused the unavailability of other health facilities. A hypothesis claims that patients coming to hospital out of working hours, such as in the night or a the weekend, are those who need emergency treatment. To prove the hypothesis, there have been some studies that found out that association. Some

Table 6. Medication error and work experience in hospital

Work experience (y)	Medication error		Frequency		P
	Yes	No	Total	%	
<5	20	0	20	30	0,01
≥5	27	20	47	70	
Total	47	20	67	100	

Table 7. Multivariate analysis of medication error with determinant factors

Variable	Sig	OR
Work experience as a nurse	0,99	1,21
Work experience in hospital	0,92	3,01
Constant	0,00	0,20

studies have varied results. Some show strong evidence about the association between night shift and weekend shift with medication errors to certain diseases (21). Hospital care is maybe worse at the weekend than on weekday. It might be caused by the presence of fewer nurses at the weekend and then make them easily fatigue (10).

In the night shift there was an increasing medication error than morning shift with a significant association, and there was an increase in weekend shift than weekday shift but did not show a significant association (21). In this study, there are no significant association between medication errors with nurse's daily shift (p 0.342) (Table 8) and nurse's weekly shifts at Government Hospital in Magelang (p 0.12) (Table 9).

In this study, patient's age divided into 2 groups according to WHO elderly clasiffication, which were non elderly group (≤ 60 y) and elderly group (>60) (22). The average of medication error incidences on non elderly is more than on elderly patient. Illiterate and elderly patients are at high risk for medication error and there is a significant association between these two. The understanding of patients is considered as one of the important protecting factors towards the medication errors. Old patients who usually refuse medication tend to be more risky having medication errors (10). In this study, there was no significant association between medication errors with patient's age at Government Hospital in Magelang (p 0.187) (Table 9).

LIMITATION

This study has been attempted to be carried out in accordance with scientific procedures, but this study still has the limitations, that were determinant factors of medication error incidence in this study only consisted of 5 variables, such as age, sex, education, work experience as a nurse and work experience in hospital. Other factors were daily shift, weekly shift and patient's age. While there are many other determinant factors that can affect medication error incidence. This study using a questionnaire that filled directly by the respondent, so sometimes the answers that given by the respondent did not indicate the actual situation.

ETHICAL CONSIDERATION

This study has been submitted to the Health Research Ethics Commission of the Faculty of Medicine, Yogyakarta Muhammadiyah University and obtained permission from Government Hospital in Magelang with number 510/EP-FKIK-UMY/X/2018 and obtained permission from Government Hospital in Magelang. This study had received respondent's approval. The informed consent form that were signed by respondents, and then the filled questionnaires were marked with anonymous code. The collected data has

Table 8. Medication error on nurse's daily shift

		N	Median (min-max)	P
Daily-shift	Morning	25	1 (0-1)	0,342
	Noon	20	1 (0-1)	
	Night	46	1 (0-1)	

Table 9. Medication Error on weekly shift and patient's age

Medication Error	Mean Rank	P
Weekly shift		
Weekday	1,53	0,12
Weekend	1.00	
Patient's age (y)		
≤ 60	1,38	0,187
> 60	1.25	

been guaranteed confidentiality by the researchers, and will not be given to others or published without the respondent's permission.

CONFLICT OF INTEREST

The researchers declare that they don't have any conflict of interest.

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CONCLUSION

The characteristics of respondents cover ages, sex, education, work experience as a nurse, work experience in hospital and other factors out of the respondents' characteristics such as daily shift, weekly shift, and the patients' ages have no significant association with medication errors in inpatients ward of at Government Hospital in Magelang. However, the variable of work experience at Government Hospital in Magelang has a significant association with medication errors. From various characteristics of the respondents, the work experience at Government Hospital in Magelang is the most affecting factor in medication error, nurse who having worked at Government Hospital in Magelang less than 5 years will tend to be at higher risk doing medications errors than those who having worked at Government Hospital in Magelang more or equivalent to 5 years.

Based on the conclusions above, the suggestions that can be conveyed from this study are conduct training or refreshing for nurses about 6 R's, and all nurses must receive education about hospital's policies and Standard Operational Procedures, grow no blaming culture so nurses dare to report any incidents that occur, then near miss and adverse event can be documented, so they can increase awareness both nurse and hospital. The last is make a continue scheduled agenda for internal and external audits. And followed by periodic monitoring and evaluation by the hospital management.

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