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The Six Right Principles of Drug Administration to Patients with Diabetes Mellitus in Hospitals: A Case Study

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Abstract

Background: About one-third of adverse events are drug-related medication administration errors (MAE). One method to improve drug administration safety is the application of the six rights of drug administration which include right patient, right drug, correct dose, right time, right route, and proper documentation. Nurses must apply it generously and nursing professional students must be able to use it well too. **Purpose:** The purpose of this case study is to compare the application of the six right medicine principles between nursing and nursing professional students to Mrs. E with Diabetes Mellitus in Hospital. **Methods:** This case study uses a quantitative study approach with a comparative descriptive design. Data were obtained through observation for seven days with an observation measuring instrument for applying the six correct drug administration are consist of 33 statements. Respondents were obtained from purposive sampling consisting of 7 Nursing Profession students at the Faculty of Nursing, University of Jember, and seven nurses at the Hospital. **Results:** The difference in applying the six right principles of drug administration to Mrs. E for seven days (14 shifts) by 11 students and nurses (4.8%). **Conclusion:** An indicator that still really needs to be improved by students and nurses is the true indicator of patients who are still below 50%. Meanwhile, the other indicators have achieved a total implementation of >70%.

Keywords: Six Rights of Drug Administration, Diabetes Mellitus, Hospital

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1. BACKGROUND

Currently, in which era*Universal Health Coverage* (UHC) patient safety is increasingly becoming a condition for health services that must be of high quality and safe to achieve the success of the service system (WHO, 2019). The implementation of patient safety has the goal of minimizing unwanted events that often occur in healthcare centers or

hospitals. Drug safety is one of the targets in achieving patient safety while receiving health services, but not a few adverse incidents are caused by errors in medication. Drug administration has caused a large number of adverse events in health care (Anderson, 2018). About a third of drug-related adverse events are medication errors, also known as medication errors in medication *administration error* (MAE) which can actually be prevented (WHO, 2016).

National Map of Indonesian Patient Safety Incidents in the 2019 PERSI Congress reported there was an increase in reports of patient safety incidents at Indonesian Hospitals from 2018 which were originally 5% to 12% in 2019. In addition, errors in drug administration ranked first, namely with a percentage of 24.8% of the top ten incidents reported (PERSI, 2020). Typing errors that tend to occur in drug administration are 40.9% wrong dose, 16% wrong drug, and 9.5% wrong route (Nuryani*et* al., 2022). A similar incident also occurred in the Cempaka Room at the Bali Mandara Hospital; from the results of interviews with the Head of the Room, it was found that there had been a near-miss incident (KNC) related to a drug administration error where patient A should have received drug B but in fact, received drug C.

Factors causing these incidents include the nurse's workload which is too high, the use of inappropriate tools, ineffective communication, and so on (Patricia, *et al*., 2022). In addition, the work saturation of nurses also contributed to this (Afandi & Ardiana, 2021). The impact of errors in the implementation of patient safety is not only harmful or causes physical illness, but the psychology of the patient is also affected. Not only that, patients may also experience suffering in the form of disabilities in bodily functions and daily limitations (KKPRS, 2015).

In an effort to minimize the incident medication *error* then the correct principles of drug administration are applied. According to Rini & Fadillah (2021), the majority of hospitals in Indonesia apply the six correct principles of drug administration and nurses have the biggest role in implementing them. Nurses have an important role in implementing the six right principles and nursing professional students also must be able to apply these principles. When viewed from work experience, a nurse should be more capable of applying the six right principles of administering medication appropriately without exception compared to nursing

professional students who are still in the learning stage (Anderson, 2018). Nurses' knowledge of nursing care can increase performance effectiveness and reduce the risk of negligence (Putri et al., 2022). So, the application of the initial steps in providing action is very important, such as in the initial assessment of patients (Putri et al., 2021). But even though they are still in the learning stage, students of the nursing profession must already master all nursing procedures including the application of the six right principles of drug administration because they have gained knowledge at the undergraduate level. This condition raises questions for researchers, is it true that both of them have implemented the six right principles of drug administration according to existing standards or are there differences in compliance between the two due to a condition.

2. METHODS

This research is a quantitative study with a comparative descriptive design. Data were obtained through observation for 7 days starting April 24-30 2023 from the time of preparation to drug administration in 2 shifts in the Hospital Inpatient Room. Respondents were obtained from purposive *sampling* consisting of 7 Nursing Profession students at the Faculty of Nursing, University of Jember, and seven nurses in the Hospital Inpatient Room who were in charge of administering Mrs. E during the observation period. Observations were made using the observation sheet instrument for the implementation of the six right drug administration, which consists of 33 statements and is divided into six indicators which include correct patient, correct drug, correct dose, correct time, correct route, and correct documentation to find out the total and percentage of the application of the six correct principles. drug administration by respondents to Mrs. E for seven days of observation.

The observation sheet of the application of the six rights of drug administration is divided into 4 outcome categories where TD = never/ 0% done during the observation period, KD = sometimes/ ‹50% done during the observation period, S = often/ ›50% done during the observation period, SL = always/ 100% carried out during the observation period. In this study, the observation period was carried out for 7 days 7 shifts for student and nurse respondents so that a total of at least 33 and a maximum of 132 was obtained alpha = 0,889.

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3. RESULTS

Overall the application of the six right principles of drug administration to Mrs. E by students and nurses has reached a percentage of › 70% but there are still several indicators and actions that are rarely carried out by nurses and students. The following is the result of observing the application of the six right principles of drug administration by respondents for 7 days to Mrs. E.

Table 1. Distribution of the Application of the Six Right Principles of Drug Administration by Students and Nurses for seven days (n = 14). *(Continue to page 25)*

No	Statement	n (%)	
Right Patient		M	P
1.	The nurse checks the patient's identity based on the patient's identity bracelet	2 (28,6%)	1 (14,3%)
2.	The nurse asks the patient's full name directly before giving the drug	7 (100%)	6(85,7%)
3.	The nurse asks the patient/family to state the patient's date of birth	0	0
	Total	9(42,9%)	7(33,3%)
Correct Medicine			
4.	The nurse checks the drug label three times (when looking at the packaging) before giving the drug to the patient	7 (100%)	7 (100%)
5.	The nurse checks the drug label three times (before pouring the drug) before giving the drug to the patient	6 (85,7%)	5 (71,4%)
6.	The nurse checks the medicine label three times (after pouring the medicine) before giving the medicine to the patient	6 (85,7%)	5 (71,4%)
7.	The nurse ensures that the drugs prescribed are following the patient's indications	6 (85,7%)	5 (71,4%)
8.	The nurse asks the patient whether there is an allergy to the drug	3 (42,9%)	1 (14,3%)
9.	If the patient has doubts about the drug being given, the nurse informs that the drug has been prescribed correctly.	7 (100%)	7 (100%)
10.	The nurse explains the function of the drug given to the patient	6 (85,7%)	6 (85,7%)
11.	The nurse explains the side effects of the drugs given to the patient	2 (28,6%)	0
	Total	44(78,6%)	38(67,9%)
Correct Dosage			
12.	The nurse ensures the dose of the drug prescribed is following the patient's needs	7 (100%)	6 (85,7%)
13.	The nurse gives the drug to the patient without changing the prescribed dose	7 (100%)	7 (100%)
14.	The nurse checks the prescribed dose of medication	7 (100%)	7 (100%)
15.	The nurse recalculates the prescribed drug dose	3 (42,9%)	2 (28,6%)
16.	The nurse asks the prescriber if in doubt about the prescribed dose	7 (100%)	6 (85,7%)
	Total	30(85,7%)	29(82,9%)

No	Statement	n (%)	
Right Time			
17.	The nurse checks the medication administration time	7 (100%)	7(100%)
18.	The nurse gives the drug according to the predetermined drug administration time	5 (71,4%)	4 (57,1%)
19.	The nurse checks the expiration date of the medicine	2 (28,6%)	2 (28,6%)
20.	The nurse does not change the time of drug administration without confirming with the prescriber	7 (100%)	5 (71,4%)
	Total	21 (75,0%)	18(64,3%)
Right Route			
21.	The nurse checks the route of drug administration	7(100%)	6(85,7%)
22.	The nurse gives the drug by a predetermined route	7 (100%)	7 (100%)
23.	The nurse ensures that the route of drug administration is safe and suitable for the patient without any contraindications	6 (85,7%)	6 (85,7%)
24.	The nurse checks the drug administration route on the drug label/packaging	4 (57,1%)	3 (42,9%)
	Total	24 (85,7%)	24 (85,7%)
Correct Documentation			
25.	The nurse documents the action of administering the drug immediately after giving the drug to the patient	3 (42,9%)	3 (42,9%)
26.	The nurse records the patient's name in the documentation	7 (100%)	7(100%)
27.	The nurse records the medication given to the patient in the documentation	7 (100%)	7 (100%)
28.	The nurse records the drug dose given to the patient in the documentation book	6 (85,7%)	6 (85,7%)
29.	The nurse records the time of drug administration to the patient in the documentation book	6 (85,7%)	5 (71,4%)
30.	The nurse records the route of drug administration to the patient in the documentation book	4 (57,1%)	6 (85,7%)
31.	The nurse put my name/initials in the documentation	6 (85,7%)	5 (71,4%)
32.	The nurse put my initials in the documentation	5 (71,4%)	5 (71,4%)
33.	The nurse records the patient's response to treatment in the documentation	4 (57,1%)	3 (42,9%)
	Total	47(74,6%)	48(76,2%)
	Amount	**175 (75,8%)**	**164 (71,0%)**

4. DISCUSSION

Analysis of Applying the Six Right Principles of Drug Administration to Mrs. E

The. E (34 years) with Type 2 DM, CKD stage 5, renal anemia, heart failure, hypertension was admitted to the Hospital Inpatient Room on April 24 2023 with complaints of weakness and nausea after his first hemodialysis. The patient said he had diabetes since he was 19 years old, had a history of seizures for about 2 years ago, and CKD 1 year ago. Mrs. E stated that he had no history of allergies to drugs or other ingredients. During the treatment period, Mrs. E obtained drugs including 3% NaCl

infusion (500cc/24 hours), Cefoperazone 1g/12 hours, Omeprazole 40mg/12 hours, Ondansetron 8. hours, folic acid 5mg/24 hours, sodium bicarbonate and calcium bicarbonate 1g/8hours, gliclazide 30 mg/24 hours, and candesartan 8 mg/24 hours. Medicines Mrs. E is prepared and dispensed according to the recipe. The process of preparing and administering medicine for each shift is carried out at a certain hour after handover and pre-conference is completed. In the morning shift, the drug preparation process is carried out at around 08.00 and the drug administration is given around 09.00; in the evening shift, the drug preparation is carried out at around 15.00 and drug administration is around 17.00, while in the night shift the drug preparation is carried out at 21.00 and there are two drug administrations, namely there are at 01.00 and 05.00.

Drug preparation by nurse-associate starts with copying the drug prescription from the drug administration record sheet (CPO) onto a small piece of paper. After the patient's entire prescription is copied, the nurse-associate immediately prepared the medicine in the medicine room by checking the preparations in locker. If there is a medicine that is not available, the nurse will try to check in another patient's locker whether there is a drug preparation, if there is not, then she will prescribe it again to the pharmacy. Basically, the drug system provided by the pharmacy is one *dose* which means that drugs are available only for one-time consumption, but sometimes there are still accumulations of drugs that are not used and end up as reserves. After all of Mrs. E has been prepared and is at the time of administration, so the nurse immediately gives the drug.

Drug administration in the Inpatient Room of the Hospital uses the six right principles of drug administration. When going to give medicine the nurse checked again whether every drug was available, after that the nurse visited Mrs. E to give the drug. The nurse identified Mrs. E by mentioning the patient's full name as listed on the copy of the drug prescription according to the room number, then explaining what drugs would be given and their functions. Before injecting the drug, the nurse gives a warning to the patient that the drug will be put in and feels a little pain, especially for oral medication the patient consumes it independently and the nurse explains when to take it (before or after eating). After that, the nurse will continue to administer the drug to other patients until it is finished and immediately document the action if there is no other action.

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Comparison of the Application of Each Indicator of the Six Right Principles of Drug Administration by Students and Nurses to Mrs. E

1) Patient Correct Indicator

The application of the right patient principle by students in the room can be interpreted as lacking because of the low percentage which is far from 100%, namely for students at 42.9% while by nurses at 33.3%. During the observation period, 85.7% of the students tended to ask the full name of Mrs. E often when he was about to give medicine while checking his identity bracelet was only carried out 28.6% during seven supervisory shifts. Lower results were obtained from nurse respondents where identification of patients with full names was carried out in 85.7% while checking patient identity bracelets was only carried out in 14.3% of the 7 supervision shifts. Meanwhile, clarification of the patient's date of birth by both students and nurses has never been done 100% of the time. The results in this study also do not match the results of the research presented by Utama. *et al* (2021) where 81.3% of nurses have implemented patient care properly. Likewise with the results of Setianingsih & Ria's research (2019) which showed 77.4% of nurses carried out the patient's correct indicators on the six right principles of drug administration properly.

The correct patient principle is not applied in administering the drug completely every time due to a policy or standard operating procedure in the room, which states that a complete check of the patient's identity is only carried out on the first day the patient is treated. Other reasons could be caused by the fact that between the two parties, both nurses and patients and families, an excellent relationship of mutual trust has been formed, so it is felt that there is no need always to ask for the patient's identity every time they meet (Nuryani, 2020). The same thing was conveyed by nurse respondents when Mrs. E was repeatedly treated in the hospital's inpatient room so that the nurse and Mrs. E and his family already knew each other.

2) Medication True Indicator

Based on the results of the analysis, it was found that the percentage value between students and nurses on the correct drug indicator also showed a significant difference in implementation, namely 6 (10.7%), but with a higher percentage than the patient's correct indicator, namely 44 (78.6%) by students and by nurses by 38 (67.9%). Even though the percentage of the two respondents was

more than 50%, it was found that both students and nurses rarely asked whether there was a history of allergies in patients, only 42.9% of students ever used it, while only 14.3% of nurses. Explanation regarding drug side effects is also very rarely done with the percentage of implementation by students only 28.6% and never by nurses. Meanwhile, the procedures for checking drug labels when looking at the packaging, ensuring the drugs are according to indications, and informing the correctness of prescriptions to patients have always been 100% carried out by both respondents. Still, the checking procedures before and after dispensing drugs tend to be categorized often by both respondents with an application percentage of 71, 4% to 85.7%.

The lack of optimal implementation of the principle of correct medicine, especially related to the explanation of the side effects of drugs by both nurses and students, can be caused by insufficient time and many other actions that must be taken immediately (Diongana, 2021). But even so, nurses should explain what drugs are received by patients and how the effects are, through effective communication; of course, this is not a difficult thing to do (Afandi, 2023). In checking the drug labels before and after pouring the medicine, the percentage of students was slightly higher because they had a habit of removing the drug label and affixing it to the syringe so that it was almost always done. Whereas confirmation of the patient's allergy history was not carried out because nurses and students had read the patient's medical record beforehand and were sure that the patient did not have allergies, so they did not re-confirm when giving medicine.

3) Correct Dose Indicator

The application of correct dose indicators carried out by students and nurses on Mrs. E has not much difference, namely 1 (2.8%) with each total implementation of 30 (85.7%) by students and 29 (82.9%) by nurses. On the correct dose indicator, students have a slightly higher percentage value than nurses. This is because 42.9% of students have taken action to recalculate drug doses, while 28.6% of nurses have only ever carried it out. In the act of clarifying doses to prescribers for students, this is not possible because they do not have this right, but instead, 100% always clarify the doubtful dose to the nurse first. Whereas for nurses this action was only carried out by 6 nurses (85.7%) who clarified it to the prescriber.

According to (Nuryani, 2020) in ensuring drug safety, it is not only the type of drug that must be considered, but also the dosage that must be according to the

patient's condition, such as age, weight, and also the severity of the patient. Diongana (2021) in his research also stated that the majority of nurses (52.95%) were disobedient in applying the correct dosage principle. According to researchers, drug doses were not always recalculated because nurses felt that doctors had written them down accordingly. There are still very few nurses who confirm prescriptions from doctors, it tends not to be due to nurse factors. However, sometimes prescribers are difficult to contact, so the nurse's first step is to confirm with the team leader or shift manager.

4) True Time Indicator

In implementing the true time indicator, the difference obtained between students and nurses had significantly different values, namely 3 (10.7%) with 21 (75.0%) for students and 18 (64.3%) for nurses. Drug-checking actions could not be fully carried out by both students and nurses, where only 28.6% of the two had been carried out. For students, the action of not changing the time of drug administration without confirmation cannot be fully carried out because there is no authority to contact a doctor. Still, during seven shifts, students 100% always confirm if the time of drug administration changes to the nurse *first*, while from nurses, the action was carried out as much as 71.4%. Of the two respondents, both students and nurses, 100% always checked the time of drug administration, even though the timeliness in giving it was only implemented by 71.4% of students and 57.1% of nurses.

Setianingsih & Ria, (2019) also explained results that were not much different in their research where 28.8% of nurses did not properly apply the correct time indicator. Delay in administering medication to Mrs. E tends to be due to the condition of Mrs. E himself where on the day of Mrs. The 1st E in the afternoon shift and the 5th day in the night shift, Mrs. E felt nauseous, so the oral medication was not taken on time. It was delayed until the end of the shift, but no clarification was made afterward. Also, when the nurse will inject IV drugs line experienced swelling or detached so that it needed to be reinstalled as a result of the drug being put in too late as experienced by Mrs. E on the 3rd treatment day. But even so, the nurse did not confirm with the DPJP on the grounds that the patient's condition was still stable.

5) Correct Route Indicator

On applying the correct route toward Mrs. E for seven days (14 shifts) by students and nurses had the same total

implementation of 24 times (85.7%). In the administration procedure, according to the route, students and nurses have implemented it 100% for seven shifts. However, when checking the routes on the drug labels from nurses, only 85.7% were implemented, and 100% for students. Whereas in the route safety check procedure for patients, 85.7% had been implemented by students and nurses, such as reconfirming area IV*line* in good condition (without phlebitis or obstruction), while for oral medication, students always informed the drug to be taken. In the procedure for checking drug labels, the majority of respondents only did it occasionally; 57.1% of students had only done it, and 42.9% by nurses during seven observation shifts.

Almost the same results were also described by Utama, *et al*., (2021) where 80% of nurses are in a good category in applying the correct route of drug administration. In Rukmin's study, (2022) also had almost the same results where 86.7% of nurses had implemented the correct route of drug administration. According to the researchers, the lack of correct application of the route was because the respondents, mainly nurses, tended to have memorized the routes of drugs that had been used frequently. Even if they found a drug that had just been used, the nurse again read a copy of the prescription and asked the team leader. E initially received nine drugs with two types of routes, namely IV and oral, from nurses and students who stated that they had often given these drugs to patients before. Still, on the 3rd day of treatment Mrs. E received additional medication in the form of insulin injections and from students, even though they did not read the drug labels, they knew that the insulin was injected SC (subcutaneously) as well as the nurses. the same drug but a different way of administration.

6) Correct Indicator Documentation

On the application of the correct indicators of documentation of the drug administration actions that have been carried out on Ny. E for seven shifts between students and nurses obtained a difference value that was not much different, namely 1 (1.6%) with nurses who were more superior. It was found that the total implementation of the correct documentation principles for each respondent was 47 (74.6%) by students and 48 (76.2%) by nurses. Overall the indicators of correct documentation have been well implemented by students and nurses. However, in the rush to write nursing documentation, the two

respondents were categorized as rarely done with an implementation percentage of only 42.9%, the two respondents tended to do documentation when they were free, which was usually at the end of the shift. However, of the two respondents, 100% always recorded the name Mrs. E and the drugs received, as well as 85.7% of the recording of drug doses Ny. Students and nurses have applied e. In the inclusion of drug time and initials, it was often done by students, namely as much as 85.7%, while from nurses, the recording was carried out as much as 71.4% during their seven shifts. On recording the drug route, Mrs. E is also applied by students only 57.1% while from nurses 85.7% so it is categorized as frequent. The lowest application is recording the response of Mrs. E after being given the drug, which was only implemented by 42.9% of students and 57.1% of nurses.

Several previous studies also showed the same results, such as in the Simamarta study (2022), where 97.3% of nurses had properly documented medication administration, Main Research, *et al.* (2021), which had 80% results in a good category in documenting the act of administering medication to patients, and Rukmini's study (in figures) which showed 93.3% of nurses had applied the principles of proper documentation. Even though nursing documentation is a very important part not only for patients but for the nurses themselves, because these leaflets can be a weapon or a boomerang for nurses when under law (Setiawan, *et al.*,2023).

Comparative Analysis of the Application of the Six Right Principles of Drug Administration by Students and Nurses

Based on the results of the observation analysis related to the application of the six right principles of drug administration to Mrs. E for seven days (14 shifts), both by students and by room nurses showed not too much difference in the total application of 11 (4.8%) with respective values of 175 (75.8%) from students and 164 (71 .0%) by nurses. However, these results can also be interpreted that the application of the six right principles of drug administration is not fully optimal because, when compared to the results of previous studies, this value tends to be lower. In Simarmata's study (2019) the results showed that the percentage of applying the six correct principles by nurses was 91.9% and in Mahfudhah's (2018) also showed the same results, namely that as many as 92.5% of nurses applied the six correct principles of drug administration properly.

Respondents have not optimally applied the six correct principles of drug administration due to a lack of awareness of responsibilities and obligations because basically both professional students and room nurses have understood the six correct principles of drug administration, and even nurses almost always remind students about these principles, but both are still not implemented properly. In addition, the room management system related to the management of nursing care that is applied in the room also greatly influences the application of the six correct principles because it is related to the management of the duties and functions of each individual nurse, which might lead to excessive workload if not appropriate (Afandi, 2022).

5. CONCLUSION

The difference in applying the six correct principles of drug administration to Mrs. E for seven days (14 shifts) between students and nurses was as many as 11 (4.8%). An indicator that still really needs to be improved by students and nurses is the accurate indicator of patients who are still below 50%. Meanwhile, the other hand has achieved a total implementation of >70%. This condition was caused by various factors ranging from nurses and students, room management to Mrs. E himself as a patient.

AUTHOR CONTRIBUTIONS

Substantial contributions to conceptualization, data curation, analysis: Alfid Tri Afandi, Muthiatul Maula, Nurfika Asmaningrum, and Gede Darmawan Puthra. Supervision Writing-review & editing: Alfid Tri Afandi, and Muthiatul Maula. Manuscript revisions: Alfid Tri Afandi.

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CONFLICT OF INTEREST

The authors declare no conflict of interest for this publication.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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