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Assessment of medication administration of nurses in medical cardiac wards and its relationship with some demographic characteristics: An observational study

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Abstract:

BACKGROUND: Unsafe medication administration and medication errors pose a threat to medication safety. Safe medication is one of the most important nursing practices that plays an important role in preventing medication errors. The aim of this study was to assess the medication administration of nurses in cardiac wards and its relationship with some demographic characteristics.

MATERIALS AND METHODS: The present study was conducted as an observational study in 2021 with the 60 nurses who working in the medical cardiac wards of one selected hospital affiliated with the Isfahan University of Medical Sciences. Data were collected using three-part tools (demographic information, medication checklist (55 items), and documentation checklist (8 items). The checklist was completed by the observer after observing the nurses' medication administration. Data analysis was conducted using descriptive and inferential statistics in the SPSS software (version 16, SPSS Inc., Chicago, IL, USA). A $P < 0.05$ was considered statistically significant.

RESULTS: The mean total score of the principles of injection and oral medication administration were 82.53 ± 10.75 and 75.76 ± 9.62 , respectively. The mean score of the principles of injection and oral medication administration in the morning shift was significantly higher than the evening and night shifts ($P < 0.001$). The relationship between the mean score of the principles of injection medication ($r = 0.234$, $P = 0.067$), oral medication ($r = 0.222$, $P = 0.083$), and the nurses' work experience no significant. The rate of adherence to the principles of medication administration in the premedication administration stage was higher than during and after drug administration.

CONCLUSION: Although the mean score of medication administration of nurses in the medical cardiac wards was at the desired level, it is necessary to monitor and plan by nursing managers to improve medication administration. Reducing the number of night shifts, adhering to accreditation programs in the hospital, continuous monitoring of nurses in terms of compliance with the principles of medication are among the proposed solutions to improve the safe medication in nurses.

Keywords:

Medication administration, medication errors, medication safety, nurses, patient safety

Introduction

Medication safety as an indicator of the quality of health care is the activities that are used to prevent, or correct adverse drug events when using

medication by members of the health team, including nurses.^[1] Since March 2017, the World Health Organization has focused on error-free drugs with a medication safety theme.^[2] The unsafe medication performance and medication errors pose a threat to medication safety. In a study

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that was done in Iran, 91.2% of samples reported the occurrence of at least one medication error per month.^[3] Medication error is the main cause of disability, 6.5% of the patient mortality,^[4] and increased hospital stay.^[5] In addition, medication error has cost the United States \$ 42 billion a year.^[2]

Adverse events due to medication errors are one of the main challenges in the medical cardiac wards^[6] because medication errors and their consequences in patients with heart problems due to the number of drugs used, patients' age, and dangerous side effects, 2.4 times more dangerous than other patients.^[7] In addition, high work stress and harsh and emergency conditions increase the possibility of error, so that 30% of the patients die due to the error or become disabled for more than 6 months.^[6] Therefore, paying attention to the principles of medication and prevention of errors in the cardiac wards is important. According to the results of studies, most of the medication errors occur in medication administration, which is related to the performance of nurses.^[2]

Nurses' medication administration is to give the right medication to the patient, at the right time with the right dose and route, evaluate and support its desired effects, correct the undesirable consequences, right documentation, and educate the patient; but some nurses ignore these important principles.^[8] In an observational study in Australia, nurses' medication administration was evaluated and the results showed that most nurses do not follow the five rights and acknowledged that the medication principles as a way to increase patient safety require more five rights.^[9] It is necessary to observe the principles of medication to the patient before medication administration, determine appropriate and scientific care goals, prescribe safe and effective medications, and evaluate the effectiveness of medications during and after medication administration by the nurse.^[10] To improve medication safety, continuous monitoring of nurses is essential in terms of adherence to the principles of medication administration.^[3] In addition, studies show that factors such as shift work of nurses can lead to medication errors.^[11-14] Therefore, the aim of this study was to assess the medication administration of nurses in medical cardiac wards and its relationship with some demographic characteristics.

Materials and Methods

Study design and setting

This observational study was conducted in the one selected hospital affiliated to Isfahan University of Medical Sciences, Isfahan, Iran, from January to March 2021.

Study participants and sampling

The participants were 60 nurses working in 4 medical cardiac wards. Inclusion criteria were: Having the consent to participate in the study, having a work experience of at least 1 year, a permanent nurse in the ward, and having a bachelor's degree or higher. Exclusion criteria included transfer from the cardiac ward to another ward or hospital. Sampling was done by convenience. First, estimating the number of medication rounds for observation according to the formula $N = \frac{Z2 \times S2}{D2}$, at least 732 medication rounds of injection and oral medication were obtained. Then, each ward was considered a category and the number of medication rounds of each ward (based on the number of nurses in each ward) was determined using the quota method. Considering that the number of qualified nurses was 60 nurses and the number of medication rounds was calculated 732 (366 rounds of injection medication and 366 rounds of oral medication), so each nurse in six shifts and two rounds in each shift (one injection round and one oral round) were observed.

For the selection of medication administration rounds, the monthly schedule of the nurses was obtained and the morning, evening, and night shifts of each nurse were recorded on small identical cards. Then, the cards for each shift were placed inside a box, and each time one card was randomly taken out of the box after shaking it and the shift date was recorded. After the shift was determined, the medication administration rounds of the shift were recorded by mentioning the nurse's name on small identical cards, then, the cards were placed inside a box, and each time a card using simple random was taken out of the box after shaking it and the observed medication administration round was identified and recorded.^[15]

Data collection tool and technique

The collection tool has three parts: The first part was a demographic questionnaire and the second and third parts were checklists. The checklist was a researcher-made based on the fundamental of nursing and literature review.^[4,16] The demographic characteristics including (age, gender, level of education, work experience, and shift work). The first part of the checklist consisted of 55 items with "yes" (Score: 1), "no" (Score: 0), and "not applicable" as response options. Of these, 30 items (with a minimum score of 0 and a maximum of 30) were related to the right principles of injection medications and 25 items (with a minimum score of 0 and a maximum of 25) were related to the right principles of oral medications. In the injection medication items, of 30 items, 12 items were related to premedication, 11 items were related to during medication, and 7 items were related to after medication administration.

In the section of oral medication, of 25 items, 10 items were related to premedication, 8 items were related to during medication, and 7 items were related to after medication administration. The second part also included the documentation checklist, which measured the items related to the right documentation with 8 items (with a minimum score of 0 and a maximum of 8).

These items evaluated the nurse’s medication administration in three stages before, during, and after the medication administration. The total score of the checklist ranged from 0 to 100 and a score higher than 60 was considered a good performance.^[4] Content validity of the tool was assessed by content validity ratio and content validity index. The Kuder-Richardson 21 was used to determine the reliability of the checklist; it was approved with a coefficient of 0.87.

After coordinating with the nursing manager and head nurses of wards, the researcher obtained permission from the research units. The nurses were aware of the purpose of the study and were assured of confidentiality and anonymity and that the observations would be unrelated to their evaluation. The observer was a nursing student who was undergoing a training course in the medical cardiac wards. Therefore, due to the long-term presence of the observer in the wards, the effect of the observer’s presence on the behavior of the nurses was somewhat reduced. The nurses were observed while preparing and administering medication during a medication administration round (2 rounds) by the observer (during different shifts and working days). However, the medication administration was not observed in patients with decreased levels of consciousness or hospitalized patients for <24 h.^[4]

The observer did not intervene unless a potential error was occurring. In this case, the observer notified the nurse and the case was recorded as an error.^[17] Data analysis was conducted using descriptive (mean, standard deviation, and frequency) and inferential statistics including independent-sample *t*, repeated-measures ANOVA, and Pearson Correlation Coefficient in the SPSS software (version 16, SPSS Inc., Chicago, IL, USA). A *P* < 0.05 was considered statistically significant.

Ethical consideration

Informed consent was obtained from the nurse managers and samples. The authors used numeric codes in place of personal names to secure confidentiality. The participants were free to withdraw from the study anytime.

Results

The mean age of nurses was 32.37 ± 5.63 years with a range of (24–48) years. Sixteen (25.8%) were male and

46 (74.2%) were female. Their average work experience was 8.32 ± 4.64 years with a range of (1–21) years. Fifty-four people (87.1%) had a bachelor’s degree and six people (12.9%) had a master’s degree.

The mean total score of the principles of injection and oral medication administration were 82.53 and 75.76, respectively. The mean score of the principles of injection medication (based on 100 points) was 85 before, 66 during, and 72 after the medication administration. The mean score of the principles of oral medication (based on 100 points) was 85 before, 83 during, and 74 after the medication administration.

The mean score of the principles of injection and oral medication administration in the morning shift was significantly higher than the evening and night shifts (*P* < 0.001) [Table 1]. The relationship between the mean score of the principles of injection medication (*r* = 0.234, *P* = 0.067), oral medication (*r* = 0.222, *P* = 0.083), and the nurses’ work experience no significant [Table 2]. The rate of adherence to the principles of medication administration in the premedication administration stage was higher than during and after drug administration.

Discussion

The aim of this study was to assess the medication administration of nurses in medical cardiac wards and its relationship with some demographics in an observational manner to provide the possibility of observing the medication administration of nurses. The mean total score of the principles of injection and oral medication administration were 82.53 and 75.76, respectively. The mean overall score of nurses’ compliance with the principles of medication administration was at an appropriate level.

Table 1: Mean score of medication administration principles of nurses based on shift

Shift	Injection medication	Oral medication
Morning	87.33±8.83	80.12±9.12
Evening	81±12.66	74.80±11.60
Night	79.23±12.96	72.36±12.40
Total	82.53±10.75	75.76±9.62
<i>P</i> *	<0.001	<0.001

*The result of repeated measures ANOVA

Table 2: Pearson correlation coefficient between the mean score of the principles of injection, oral medication, and the nurses’ work experience

Type of medication	Nurses’ work experience	
	<i>r</i>	<i>P</i> *
Injection	0.234	0.067
Oral	0.222	0.083

*The result of Pearson correlation coefficient

Nurses use the 5 or 10 rights to prevent medication errors, and following these rules will prevent medication errors. In addition, the establishment of clinical governance and accreditation programs in the hospital, the focus of the World Health Organization on increasing patient safety and medication safety, continuous and blended education of nurses,^[17] holding medication conferences and the presence of clinical pharmacologists, reporting medication errors and availability the existence of new educational solutions (computers, Internet lines, and some software)^[18] has increased the awareness and improved the performance of nurses regarding medication and the observance of the principles of medication administration. In this regard, Ashtiani *et al.*, (2019) also reported that the level of knowledge of nurses was at a good level and participation in training classes was significantly associated with nurses' pharmacological knowledge.^[19] The results of the Khajeali and Baghaei study showed that the knowledge of general and special ward nurses in the areas of the mechanism of drug effect, medication category, and familiarity with medication calculations was acceptable.^[20]

The result revealed that the mean score of the principles of injection medication was 85 before, 66 during, and 72 after the medication administration stages. The mean score of the principles of oral medication was 85 before, 83 during, and 74 after the medication administration stages. According to the study of al Tehewy *et al.*, failure to comply with principles of medication administration in the pre, during, and after stage of medication administration can lead to medication errors, which according to the National Coordinating Council for Medication Error Reporting and Prevention index can be classified as C and D, where the error occurred but the patient was not harmed. In al Tehewy's study, the highest amount of errors observed was in categories C and D. Therefore, by observing the principles of medication administration at each stage and more monitoring, this type of error can be reduced.^[4]

The results showed that the mean score of adherence to the principles of injection and oral medication administration in the morning shift was significantly higher than the evening and night shifts and was in line with the study of Hesari *et al.*,^[21] The night shift causes sleep disturbances, fatigue, inaccuracy and concentration, and irritability. Therefore, night work can reduce the efficiency of nurses compared to morning and evening shifts and lead to an increase in medication errors.^[13] al Tehewy *et al.*, also considered the night shift as the determining and significant cause of medication errors.^[4] Zeraatchi *et al.*,^[12] Izadpanah *et al.*,^[14] Farsani and Farokhpour,^[13] and Baghery and Nagemeh^[22] also had higher number of evening and night shift medication errors compared to the morning. In the studies of Afra *et al.*,^[23] Ramazani *et al.*,^[24] no significant difference

was observed in terms of the incidence of medication errors with shift work. The use of different methods and tools for data collection can be one of the reasons for the differences in the results of the present study with other studies. There was no significant relationship between oral and injection medication errors with circulating shifts. This finding was similar to the results of the research and Zadeh *et al.*,^[25] and Farsani and Farokhpour.^[13]

Limitations and recommendation

This study had two limitations. The first limitation was that the data collection method was the observation, and thus, the Hawthorne effect could have occurred. We tried to minimize this effect through the long-term presence of a nursing student who was undergoing training in the cardiac medical wards as the observer. The second limitation of the study was that it was only performed in medical cardiac wards, and thus, its generalizability to other wards needs further investigation. It is recommended more studies be done in critical and other wards.

Conclusion

Although the mean score of nurse's medication administration in the medical cardiac wards was at the desired level, it is necessary to monitor and plan by nursing managers to improve nurses' medication, especially during and after medication administration stages. Reducing the number of night shifts, adhering to accreditation programs in the hospital, continuous monitoring of nurses in terms of compliance with the principles of medication are among the proposed solutions to improve the safe medication of nurses.

Acknowledgment and ethical-moral code

This paper presents the results of a study in the form of a nursing MSc thesis. This study has been approved by the ethics committee of Isfahan University of Medical Sciences (IR.MUI.RESEARCH.REC.1399.356). We express a deep sense of gratitude to the participants in the study, and we also like to thank the vice chancellor for research and technology of Isfahan University of Medical Sciences, Iran, for the financial support of this research (project No. 399329).

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Conflicts of interest

There are no conflicts of interest.

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