Medication Management Skills of Nursing Students: Comparing the Students and Their Instructors' Evaluation in two Universities

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A B S T R A C T

Background: Nurses have critical roles in the process of medication. Evaluating the process of medication helps nursing educators and students to determine the present status and then, improve the quality of care.
Objective: The current study was conducted to compare the self-evaluation of nursing students in their own medication skills with the evaluation done by clinical instructors, in Qom's Azad University and Arak University of Medical Sciences, in 2011.
Materials and Methods: A descriptive study was conducted. Data gathered using a self-report questionnaire and an observation checklist. A total of 141 students and 10 instructors participated in the study. SPSS software (version 13) was employed to analyze the data. Descriptive statistics and Wilcoxon rank test were used.
Results: The mean scores for the domain of medication preparation were 2.51 ± 0.55 and 2.58 ± 0.57 based on the students' self-evaluation and the instructors' evaluation of the students, respectively. No significant difference was observed between the total mean scores of 'medication preparation' in the two evaluation methods ($P > 0.05$). The highest mean score was achieved in the domain of drug administration both in the self-evaluation and evaluation by the instructors. A significant difference was observed between the total mean scores of 'drug administration' in the two evaluation methods ($P < 0.05$). The domain 'post medication nursing care' has got the lowest mean score among the three domains both from the perspective of the students and that of the instructors. The mean scores of different domains of medication management were close in the two universities.
Conclusions: The present study showed that the nursing students are not quite competent in the process of medication therapy both from their own and their clinical instructors' perspectives. This finding shows the urgent need to implement some actions to strengthen the students' skills in medication therapy.

Keywords: Evaluation Studies; Medication Therapy Management; Students, Nursing

1. Background

Medication administration process is one of the critical aspects of professional nursing care (1, 2). Competence of nurses and nursing students in this area plays a highly important role in the safety of patients (3). The nursing education programs have the responsibility to prepare efficient and competent graduates to manage the patients' medication effectively (4). However, some studies have shown that these students are not competent in medication management (3, 5). Studies have reported that nursing curriculums couldn't provide sufficient experiences to develop students' knowledge and skills in pharmacology and medication management. Therefore, the quality of nurses and nursing students' performance in medication management is low (6-11). Several studies have also reported that nursing students have difficulties in understanding medication concepts (12, 13), medication calculations (5, 6, 11), and performing safe injection practices (14). Nursing students spend much of their training in clinical settings, therefore the process of clinical education and evaluating the students clinical practice have critical importance in ensuring their safe practice (15, 16). Usually the clinical nurse educators have the responsibility to evaluate the students' performances and judge their competence. However, it has been emphasized to use the students' self-evaluation in the last decade (17, 18). It has been reported that monitoring students behavior trough self-evaluation checklists can help educators to identify the strengths and weaknesses of curriculum (19) and also help the students enhance their learning strategies, and assist them to become independent, and can help them to select higher goals and to try harder to realize these goals (20, 21). Although several western and European studies have investigated the deficiencies of nursing students' medication skills, self-evaluation has rarely been used to assess the nursing student medication skills. On the other hand, this area has largely been neglected in Iran. Then again, two separate academic systems are currently active in nursing education, one in the Open University system called Islamic Azad University and another in the universities under governance of the ministry of health and medical education. However no studies have been conducted to compare the efficacy of these two educational systems in the field of nursing education.

2. Objectives

Because of the lack of studies on the medication skills of Iranian nursing students, and the need to elucidate the effectiveness of students' self-evaluation in this important area, and also to compare the outcome of the two educational systems in this regard, the current study was conducted to compare the nursing students self-evaluation of their own medication skills with evaluation of the same skills done by clinical instructors, in Qom Azad University and Arak University of Medical Science, in 2011.

3. Materials and Methods

This descriptive study was conducted on the fourth year nursing students and their instructors in Qom Islamic Azad University and Arak University of Medical Sciences in the second semester of 2011. All the nursing students who entered their 4th year of academic studying were selected. Therefore a total of 141 nursing students (78 students in Qom Azad University and 63 students in Arak University) and 10 instructors in medical–surgical departments (five in each university) participated in the study. Data collection instruments included a self-report self-evaluation questionnaire and an observation checklist.

3.1. The self-Evaluation Questionnaire

The self-evaluation questionnaire was prepared after a vast literature review (3, 6, 14, 22-25) and had two parts. The first part included four questions on demographic characteristics (including age, gender, educational term, having a history of part time nursing job) and the second part consisted of 26 items in three domains of medication preparation (10 items), medication administration (10 items) and post medication nursing care (six items). These items were in the first person singular verb sentences and the students answered them in a three choice Likert scale, with options ranging from 'always = 3' to 'never = 1'. The Questionnaires were distributed by the researcher or co-researcher (who had been briefed by the researcher to participate in data collection) on the day before each student finished his/her internship course. All observation checklists had been completed before the self-evaluation started.

3.2. The Observation Checklist

The observation checklist was consistent with the self-report questionnaire. However third person singular verbs had been used. The nurse instructors had been trained to observe each student secretly at least twice during the internship period. Each item in the observation checklist was scored from 'always = 3' to 'never = 1'. The instructors returned the checklists to the researcher at the end of course. Content validity of the data gathering tools were confirmed by several nursing faculty members in the two universities and a few nurses in a teaching hospital of the Qom city. Reliability of the checklist was assessed through inter-raters reliability. To do this, two faculty member nurse educators were asked to use the checklists to assess three students simultaneously (while the students were administering medications for their patients. Then results were compared with each other and were similar for all the three students. Reliability of the self-evaluation questionnaire was also assessed by calculating the Cronbach's alpha which was 0.77 for the whole questionnaire.

3.3. Ethical Considerations

The study was approved by institutional review board and the research ethics committee in Qom Islamic Azad University. Also all the student and nurse instructors who participated, signed an informed consent form for participating in the study. They were assured that all information will remain confidential and will not need to write the name.

3.4. Data Analysis

SPSS software (version 13) was employed to analyze the data. Mean score and standard deviation were calculated. Also Kolmogorov-Smirnov test and Wilcoxon rank test were used to compare subgroups. A P value less than 0.05 were selected to be significant. The total mean score in each domain was calculated by summing the scores of items and then dividing the product by the number of items in the domain.

4. Results

From the total of 141 nursing students who participated in this study 84.4% were female, 23.4% had a history of working part time in the field of nursing, and 49.6% were in the seventh semester. The mean age of the students was 23.06 ± 2.21 year. The mean scores for the domain of medication preparation were 2.51 ± 0.55 and 2.58 ± 0.57 based on the students' self-evaluation and the instructors' evaluation, respectively. 'Washing the hands before medication preparation' got the lowest mean score in

this domain and among items evaluated in all three domains. No significant difference was observed between the total mean scores of 'medication preparation' in the two evaluation methods (P > 0.05) (*Table 1*). The highest mean score was achieved in the domain of medication administration both in the self-evaluation (2.78) and the evaluation made by the instructors (2.72). All items in this domain have got a mean score higher than 2.5. "Using the right method of administration" and "determining the correct location of injection" gained the highest mean scores among the items in this domain. A significant difference was observed between the total mean scores of 'drug administration' in the two evaluation methods (P < 0.05) (*Table 2*). The domain 'post medication nursing care' has got the lowest mean score among the three domains both from the perspective of the students and that of the instructors. Also the item 'Follow-up of response to treatment' got the lowest mean score in this domain. No significant difference was observed between the total mean scores of 'post medication nursing care' in the two evaluation methods (P > 0.05) (*Table 3*). As presented in *Table 4*, the mean scores of different domains of medication management were close in the two universities, and the total self-evaluation mean scores of the two domains of medication management were not significantly different. However, statistically significant difference was observed in the students self-evaluation in the domain of drug preparation in the two universities (P = 0.01). Also *Table 4* shows that total instructors` evaluation mean scores were nearly the same and were significant in the domain of drug administration (P = 0.006).

Table 1. The Mean Score and Standard Deviation for Self-Evaluation and Evaluation by Instructors in the Domain of Medication Preparation

Items	Student, Mean ± SD	Instructor, Mean ± SD	P value
Washing the hands before medication preparation	1.87 ± 0.61	1.80 ± 0.57	0.15
Cleaning the tray before putting the drug	2.04 ± 0.74	1.90 ± 70	0.01
Taking right drug from medicine box and checking again with drug card	2.93 ± 0.27	2.86 ± 0.38	0.008
Checking the drug expiry date	1.98 ± 0.75	1.98 ± 0.74	0.81
Checking the time of drug administration with drug card	2.91 ± 0.32	2.90 ± 0.32	0.52
Checking the required dose of drug with the dosage listed on the packaging of tablets, oral medication box, and the vial or ampoule	2.87 ± 0.36	2.85 ± 0.35	0.44
Using a piece of alcoholic cotton to breaking the ampoule	2.82 ± 0.44	2.83 ± 0.40	0.82
Disinfecting head of serum or vial before use	2.51 ± 0.56	2.63 ± 0.51	0.009
Monitoring the patient's vital signs and laboratory tests before giving some medications	2.37 ± 0.59	2.24 ± 0.64	0.01
Reviewing drugs prepared with the instructor and drug card	2.82 ± 0.41	2.79 ± 0.43	0.39
Total	2.51 ± 0.24	2.48 ± 0.26	0.058

Table 2. The Mean Score and Standard Deviation for Self-Evaluation and Evaluation by Instructors in the Domain of Medication Administration

Items	Student, Mean ± SD	Instructor, Mean ± SD	P value
Wearing gloves beforeinjections	2.65 ± 0.50	2.53 ± 0.54	0.002
Checking the patient's IV lines and micro-set for its expiration date and sterility	2.87 ± 0.32	2.72 ± 0.49	0.001
Giving drug to the right patient (by asking the patient's full name from the patient orthe care givers.	2.87 ± 0.32	2.90 ± 0.30	0.4
Replacing IV tubing, non-sterile needles and syringes	2.90 ± 0.32	2.78 ± 0.47	0.001
Cleaning the injection site with rotating outward movement of alcohol cotton.	2.63 ± 0.61	2.63 ± 0.64	0.86
Correct locating of the injection site	2.95 ± 0.21	2.91 ± 0.28	0.09
Using the right method for administering injective drugs administration (IV, infusion, IM)	2.96 ± 0.18	2.91 ± 0.28	0.008
Ensuring the intactness of vein before IV injections	2.80 ± 0.40	2.71 ± 0.49	0.02
Correct medication calculations (including adjusting the rate of intravenous fluids).	2.58 ± 0.57	2.56 ± 0.55	0.71
Communicating with patients during drug administration.	2.63 ± 0.51	2.58 ± 0.53	0.25
Total	2.78 ± 0.19	2.72 ± 0.25	0.005

Table 3. The Mean Score and Standard Deviation for Self-Evaluation and Evaluation by Instructors in the Domain of Post Medication Nursing Care

Items	Student, Mean ± SD	Instructor, Mean ± SD	P value
Do not re-cap the used needles	2.0 ± 0.74	2.02 ± 0.75	0.63
Cutting needles with cutter or dispose them into the safety box	2.93 ± 0.24	2.92 ± 0.29	0.59
Disposing vials, serum and blood sets into the infectious bins	2.91 ± 0.28	2.87 ± 0.32	0.09
Giving necessary education related to medications to patients	2.48 ± 0.55	2.42 ± 0.64	0.22
Follow-up the patient's response to the treatment	1.92 ± 0.63	1.97 ± 0.59	0.44
Ensuring of eating oral drugs by the patient	2.39 ± 0.55	2.30 ± 0.62	0.06
Total	2.44 ± 0.25	2.42 ± 0.29	0.47

Table 4. Comparison of the Students Self Evaluation and Instructors Evaluation in the two Universities

Type of evaluation	Domain of evaluation	Governmental university (Arak), Mean ± SD	Azad university (Qom), Mean ± SD	P value
Self-evaluation	Medication Preparation	2.4 ± 0.25	2.6 ± 0.18	0.01
	Drug administration	2.76 ± 0.21	2.81 ± 0.15	0.42
	Post medication nursing care	2.41 ± 0.22	2.47 ± 0.26	0.2
Instructor evaluation	Medication Preparation	2.51 ± 0.25	2.45 ± 0.27	0.18
	Drug administration	2.78 ± 0.21	2.67 ± 0.27	0.006
	Post medication nursing care	2.45 ± 0.28	2.39 ± 0.3	0.17

5. Discussion

In the present study the highest mean score was achieved in the domain of drug administration both in the students' self-evaluation and the evaluation made by the instructors. It seems that both the students and their instructors are aware of the critical importance of this domain. It is not known why the students frequently ignore some important steps (such as wearing gloves) in drug administration. While Workman reported that although gloves do not protect nurses from needle stick injuries, but it helps preventing cross-infections and drug-induced allergies in care givers (26). However, several points in this area such as 'wearing gloves during injections', 'medication calculations' and 'communication with patients while drug administration' need to be paid more attention so that the nursing student be completely competent in this area at the time of graduation. Several previous studies have reported that nurses and nursing students have deficiencies in their medication competence in several areas such as medication calculation skills and nurse patient communication during medication administration (5, 11, 27-31) while they are expected to be able to administer medications competently and safely immediately after graduation. A previous study has attributed the problems in this domain to unsupervised medication administration by nursing students (32). Then nursing clinical instructors should choose appropriate strategies to strengthen their direct and indirect supervision in this area. The present study showed that the domain of 'medication preparation' got the second rank between the three domains both based on the student self-evaluation and instructors evaluation. Previous studies on nurse students' medication competence have largely addressed nurse students' errors in medication calculation (5). Although calculation errors are important to be noticed, however, several other important items should be noticed while preparing medications. The current study findings suggest that the students pay attention to the two important principles in medication preparation (i.e. the right medication and the right time for medication). However, the two items 'hand washing before the procedure and checking the expiry date of the drugs got the lowest scores in this domain both from the students and the instructors' viewpoints. Perhaps, lack of a good clinical role model and shortcomings in the process of supervision by the instructors, made students follow what they see in the routine performances of the staff nurses. Overall, the domain of medication needs more attention from the side of nurse instructors. Findings of the present study are consistent with previous studies. Cohen has reported that most medication errors occur when the nurse is careless in implementing standard rules of medication administration (33). Some of the studies have also reported that a small number of nurses wash their hands before intravenous injection (34,

35). Perhaps, deficiencies in content of the pharmacology course and weaknesses of clinical nurse instructors in supervising nursing students have influenced the situation (13, 36). Results of the present study showed that both the students and the instructors gave the lowest scores to the domain of 'post medication nursing care'. Evaluating the outcome of nursing care is a basic step in nursing process. Medication administration is one of the most important nursing interventions and should be done with excellence. Monitoring and evaluating the drug effects is also a component of safe and effective medication administration (13). However, it seems that the domain of post medication needs to be emphasized more in the theoretical and clinical course related to the pharmacology and medical surgical nursing courses. Also the problems in the post medication nursing care may be attributed to lake of time and the time of medication administration by the nursing students. The researcher's observation shows that the medication orders of hospitalized patients (when administered by the junior nursing students) are usually administered at the end of time, when the students are being ready to leave the ward. Then they have no time for post medication evaluations. Such a behavior is then internalized by the students in their future performance. An important finding of this study was that the students and instructors reported a wrong function in needle recapping. Such finding shows that nursing students do not follow the guidelines for their own security which is consistent with some of the previous studies. There are studies which show a high percentage of the staff have used the two hand dangerous methods (13, 14, 37, 38). This finding shows the need for accurate supervision by the instructor, and the need for evidence based guideline to be prepared and instructed to all nurses and nursing students. Although the present study showed that the self-evaluation of nursing students was close to the evaluation made by their instructors. However, the students' self-evaluation scores were somehow higher than the scores of instructors. This may be due to the lack of informative and corrective feedback from the side of instructors, and then the students assume that all their performances are correct. The present study showed that the total student self-evaluation and the instructors' evaluation mean scores were nearly the same in the two universities. This finding shows that the content and manner of education do not significantly differ in the two types of universities. In conclusion, the present study showed that the nursing students are not completely competent in the process of medication therapy both from their own and their clinical instructors' perspective. This finding shows the urgent need to implement some actions to strengthen the students' skills in medication therapy. Finally, it should be noticed that the small sample size of this study may limit the generalization of the present study. Repeating the same study in other universities and with larger samples can be suggested.

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Authors' Contribution

Zohre Ghamari-Zare was responsible for the study conception and design, prepared the first draft of manuscript and data collected from the Islamic Azad University of Qom and supervised the study. Zahra Purfarzad performed the data collection of Arak University of Medical Science and the data analysis. Mohsen Adib-Hajbaghery made critical revisions to the paper and prepared the last revision of the manuscript.

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