



Impact of Workshop Training on Prescription Writing Skills of Senior Midwifery Students

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Abstract

Background: Prescription writing is one of the most important stages of medical treatment, and following its principles improves efficiency and effectiveness of treatment. Midwifery students are the group of a medical team who are authorized to prescribe medications. However, clinical evidence suggests that their skills are inadequate in the area.

Objectives: Therefore, this study was designed to investigate the effect of a workshop on the prescription writing skills of midwifery students.

Methods: This was a quasi-experimental study conducted among 32 senior undergraduate midwifery students. The students were divided into two groups. A two-day workshop was held for each group. Each group was divided into three sub-groups for practical work. The training was provided based on the general principles of prescribing in four parts including superscription, general principles of prescription, standard principles of prescription, and instruction of using medications. Adherence to the principles of prescribing by students was evaluated through a checklist before and after training and four weeks later. Data were analyzed with a general linear model and repeated measures analysis.

Results: Patient's name was the most common record in the prescriptions. The mean number of drug items was 3.7 ± 0.04 , which decreased to 2 ± 0.03 after the intervention. The name and signature of the prescribed drugs were in less than 15% of the prescriptions, with 85% improvement after the intervention. Moreover, 40.6% of the prescriptions were readable, but in none of them, the reason for visit and diagnosis were mentioned (over 50% increases after training). Form of drug, dose and medication number were listed in 45% of the prescriptions that rose to more than 70% in all the three cases. The most responses on the instruction of using the medication were related to the method of use and drug use intervals. Repeated measures ANOVA showed a significant difference in the mean scores of students' prescriptions after education and four weeks after the workshops in all the four parts of prescription principles ($P < 0.001$). This significant difference was also observed in all four common diseases in gynecology ($P < 0.001$).

Conclusions: The prescription workshop had a significant positive effect on the knowledge and skills of midwifery students in the field of prescription writing. Therefore, this strategy can be used as a useful approach for the rational use of medicines by midwives. Because of the importance of prescription writing, we suggest including it in the curriculum of midwifery students.

Keywords: Prescription, Midwifery Student, Workshop

1. Background

The drug is a strategic commodity and has a direct relationship with people's health. Therefore, it is very important to pay more attention to how it is administered and consumed in any field. Drug therapy is one of the most cost-effective medical interventions. The frequency of drug intake in each country is one of the important indicators of its health system (1). The World Health Organization (WHO) estimated that more than 40% of health costs are spent on medications (2). Therefore, prescription writing is one of the most important stages of drug use, and ad-

herence to its rules will result in greater efficacy and effectiveness of treatment (3), and the WHO describes the lack of compliance with the principles of prescription writing as a serious problem (2).

A good prescription should be logical, evidence-based, clear and complete to help improve the patient (4). The prescription method is an essential element in the process of rational treatment, and it is important as an accurate and timely diagnosis of the disease. All the energy and time spent on the diagnosis and appropriate treatment will be wasted if enough attention is not paid to the principles of proper prescription. Besides, failure to strictly observe

the principles of prescription and mistakes in writing the name of the drug, the form of the drug, the dosage, the route of administration and the duration of the treatment can result in ineffective or dangerous treatment and prolong or worsen the illness, and ultimately, cause harms to the patient and increase the cost of treatment (5).

Some students believe that their prescription skills will improve after graduation, but studies have shown that prescription skills will not increase after starting a clinical practice, because it is difficult to change the wrong habits of prescription (6). Therefore, training during education can be very effective. The use of various educational tools, the combination of training with the right technologies, the use of multiple media, training, and adequate repetition and evaluation on a timely basis can contribute to the provision of information and knowledge that is effective in memorizing content (7).

The study of Marvanova and Henkel revealed that nurses had to have the knowledge and skills to manage drugs before they were hired for primary care or any medical services to prevent the mistakes of drug administration (8). Also, Darvishpour et al. showed that the most important barriers for nurses in prescription were educational and human barriers as well as socio-cultural and organizational factors (9).

2. Objectives

Studies on the improvement of prescribing by midwives are very limited and educational interventions are often limited to providing educational pamphlets that have not had a significant effect on learners' skills (10). Therefore, the present study investigates the impact of a workshop on the prescription performance of midwifery students. It is hoped that the results of the study will lead to a solution to reduce common mistakes in prescribing and promote community health.

3. Methods

This was a quasi-experimental study conducted among 32 senior undergraduate midwifery students from December to February 2018. Sampling was performed using the census method, and all the senior midwifery students were enrolled. The students had completed all the clinical and theoretical units in obstetrics and gynecology areas and were willing to participate in the study. Guest students, students with previous clinical experience, working in midwifery or clinical centers, and those who had previously received training on prescription were excluded from the study. The study was approved by the Ethics Committee of Babol University of Medical Sciences (IR.MUBABOL.REC.1398.016).

The data collection tools included a demographic information form (including marital status, age, residential location, and grade point average) and OSCE test and checklist scoring. The OSCE test included four stations in four common domains in gynecology including treatment of trichomoniasis vaginitis, cervicitis, pelvic inflammatory disease, and abnormal uterine bleeding. The duration of the OSCE was 20 minutes. First, the students took a history from a simulated patient, and then they prescribed a prescription within 5 minutes to fit each case of the disease. The answer to each question was entered in a separate rating form. Adherence to the principles of prescribing by the students was evaluated using a checklist before and after training and four weeks later. The checklist was prepared based on the principles of rational treatment of the WHO (11, 12), the National Committee on Rational Drug Administration and Consumption, and the Department of Food and Drug of Iran's health ministry (13).

The validity and internal consistency of the OSCE tests were assessed using face and content validity and Cronbach's alpha coefficient, respectively. A qualitative method was used to assess face validity, and quantitative and qualitative methods were used to assess content validity. To assess the face validity, experts and 10 students were separately asked to comment on difficulty level, inadequacy, phrase ambiguity and deficiencies in the meanings of the words, and then the necessary changes were made to the questionnaire. For the purpose of qualitative content validity, experts were asked to provide feedback on grammar, the use of appropriate words and the importance of questions. After collecting expert opinions, the necessary changes to the tool were considered. For the quantitative assessment of content validity, content validity ratio (CVR), and content validity index (CVI) were measured. To calculate the CVR, the questionnaire was sent to 11 specialists in midwifery and medical education and were asked to answer each of the tool questions as "necessary", "not necessary but useful" and "not necessary". Responses were calculated based on the formula. The numbers above 0.59 were accepted. To calculate the CVI, the questionnaire was given to the previous experts and their opinions were collected for each question on the relevance, clarity, and simplicity based on a 4-point Likert scale from 0 to 3 (such as irrelevant, somewhat relevant, relevant, completely relevant). CVI score was higher than 0.79. To establish the reliability, a pilot study was carried out and the questionnaire was completed by 30 university students other than the actual study participants. Two weeks later, they were asked to complete the questionnaires again. The standardized Cronbach's alpha reliability coefficient was 0.82. After confirmation of the initial reliability, the study was conducted.

The checklist was prepared in four parts including superscription (patient profile, name, age, phone number

and address), general principles of prescription (header symbol, date, cause of visit, diagnosis, readability of the prescription, number of prescription drugs, name and signature of the writer of the prescription), standard principles of prescription (using the generic name of the drug, writing the full name of the drug, right spelling of drug name, correct drug, form of the drug, dose, and number of medications), and instructions for using the medication (how to use, drug use intervals, route of administration, use of abbreviated symbols or use of the phrase "as ordered or as needed", and drug side effects training). Each correct answer had one point and lack of an answer or an incorrect answer was given zero point. In this way, four scores were considered for the superscription, seven scores for general principles of prescription, eight scores for standard principles of prescription, and six scores for instructions for using the medication. The total score was 25. Since each participant provided four prescriptions in the four common domains of gynecology, 128 prescriptions were obtained from 32 participants.

To conduct the educational program, the students were divided into two equal groups. For each group, a two-day workshop was held, with each session taking 5 hours a day. Each group was divided into three subgroups for practical work. First, the researcher provided a description of the prescription and its importance. Then, the stages of rational treatment, personalized medicines, general principles of prescribing and how to write a prescription, drug forms, monitoring treatment and medication errors were described. The contents were organized using lectures and slideshows, whiteboard, question and answer, and review of the samples of existing medications. The educational content was derived from the principles of rational treatment of the WHO, the National Committee on Rational Drug Administration and Consumption, and the Department of Food and Drug of Ministry of Health (11-13). The educational program was then continued in the subgroups with practical training on 15 cases from prescription guideline (13) and eight questions about gynecological diseases developed as a description of the disease by the researcher.

The data were analyzed using SPSS version 23. The normality of the variables was assessed by the Kolmogorov-Smirnov test. For descriptive statistics, frequency, percentage, mean \pm standard deviation and percentage change were used. The percentage change was calculated for each of the four parts of the prescription principles (i.e., superscription, general principles of prescription, standard principles of prescription and instructions of using the medication) by the formula $([E - B] / B) \times 100$, where E is the end of intervention value and B is the baseline value.

In the repetitive measure analysis, the sphericity assumption must first be examined. The implication of the sphericity assumption is that the variance of the difference

in observations in the study stages is the same. This assumption is tested in SPSS software with Mouchly test. Due to the P value of this test, which was less than 0.05, the sphericity assumption is not established. In other words, the variance of the differences between the different stages is not equal. Therefore, the Greenhouse-Geisser test was used in this study.

In all the tests, the confidence coefficient was 95%, and the significance level was 0.05.

4. Results

Most students were single (78%), native Persian speakers (75.3%) and within the age range of 20 to 25 years old with a mean age of 22.5 ± 2.5 years. The mean GPA was 15.6 ± 1.72 . A total number of 128 prescriptions were analyzed before, immediately after training and four weeks after training to determine the level of compliance with the principles of prescription writing. Table 1 shows the frequency of responses in the superscription part. Patient's name was the most commonly recorded data. Other specifications of superscription were considered in less than 10% of the prescriptions (11 prescriptions).

The mean number of prescription drugs was 3.7 ± 0.04 . The name and signature of the writer of prescription were considered in less than 15% of the prescriptions (19 prescriptions), and 40.6% of prescriptions (52 prescriptions) were readable, but in none of the prescriptions, the reason of visit and diagnosis were mentioned. The results of evaluating the general principles of prescription are presented in Table 2.

Regarding the standard principles of prescription, all the medicines were written with generic name. Form of drug and medication dose and number were the most common findings in the prescriptions (more than 45% or 58 prescriptions). The remaining items were mentioned in less than 23% of the prescriptions or 30 prescriptions (Table 3).

In the case of instructions for using the medication, the most relevant information was related to the method of use and drug use intervals (Table 4).

Adherence to the principles of prescribing in the four common domains of gynecology is presented in Table 5. Use of repeated measures ANOVA showed a significant difference in the three measurements ($P < 0.001$).

Pair-wise comparisons with post-hoc multiparisons indicated that there was a significant difference after training and 4 weeks later than before training in the scores all the four parts of the prescription principles in all the four domains in gynecology ($P < 0.001$) (Table 5).

Table 1. Frequency of Responses in the Superscription Part Before and After Training^a

Variables	Before Training		After Training	
	Correct Answer	Incorrect/No Answer	Correct Answer	Incorrect/No Answer
Patient's name	70 (54.7)	58 (45.3)	110 (85.9)	18 (14.1)
Patient's age	7 (5.5)	121 (94.5)	95 (74.2)	32 (25.8)
Patient's phone number	11 (8.6)	117 (91.4)	100 (78.1)	28 (21.9)
Patient's address	4 (3.1)	124 (96.9)	89 (69.5)	39 (29.5)
Average total score	1.2 ± 0.02		3.4 ± 0.03	
Percentage change	183.3			

^aValues are expressed as mean ± SD or No. (%).

Table 2. Frequency of Responses in the General Principles of Prescription Part Before and After Training^a

Variables	Before Training		After Training	
	Correct Answer	Incorrect/No Answer	Correct Answer	Incorrect/No Answer
Header symbol	25 (19.5)	103 (80.5)	85 (66.4)	43 (33.6)
Date of prescription	40 (31.2)	88 (68.8)	115 (89.8)	13 (10.2)
Cause of visit	-	128 (100)	78 (60.9)	50 (39.1)
Diagnosis	-	128 (100)	85 (66.4)	43 (33.6)
Readability of the prescription	52 (40.6)	76 (59.4)	120 (93.7)	8 (6.3)
Name and signature of writer of prescription	19 (14.8)	109 (85.2)	128 (100)	-
Number of drug items	3.7 ± 0.04		2 ± 0.03	
Average total score	2.6 ± 0.03		5.8 ± 0.02	
Percentage change	123.1			

^aValues are expressed as mean ± SD or No. (%).

Table 3. Frequency of Responses in the Standard Principles of Prescription Part Before and After Training^a

Variables	Before Training		After Training	
	Correct Answer	Incorrect/No Answer	Correct Answer	Incorrect/No Answer
Using the generic name of drug	128 (100)	-	128 (100)	-
Full name of drug	18 (14.1)	110 (85.9)	58 (45.3)	70 (54.7)
Right spelling of drug name	26 (20.3)	102 (79.7)	43 (33.7)	85 (66.4)
Correct drug	29 (22.6)	99 (77.4)	48 (37.5)	80 (62.5)
Form of drug	60 (46.9)	68 (53.1)	90 (70.3)	38 (29.7)
Medication Power	28 (21.8)	100 (78.2)	56 (43.7)	72 (56.3)
Drug dose	63 (49.2)	65 (50.8)	110 (85.9)	18 (14.1)
Medications number	61 (47.7)	67 (52.3)	105 (82.0)	23 (18.0)
Average total score	3.9 ± 0.05		6.5 ± 0.07	
Percentage change	66.7			

^aValues are expressed as mean ± SD or No. (%).

5. Discussion

Despite the large number of studies conducted on the principles of prescribing by medical students, few similar studies have been conducted among midwifery students. Knowledge of prescription principles by midwives is very important in terms of its relationship with reproductive health in women. This study aims to improve the skill of prescription writing among midwifery students. The re-

sults of this study showed that the training of prescription writing in the form of a workshop has increased the skills of students in all the four areas of the principles of rational treatment.

The effect of training on the reduction of prescription errors was shown among dentistry students (14, 15), medical students (10, 16) and general practitioners (17, 18). Prescription opportunities for midwifery students are less

Table 4. Frequency of Responses in the Instructions of Using the Medication Part Before and After Training^a

Variables	Before Training		After Training	
	Correct Answer	Incorrect/No Answer	Correct Answer	Incorrect/No Answer
How to use	55 (42.9)	73 (57.1)	85 (66.4)	43 (33.6)
Route of administration	30 (23.4)	98 (76.6)	97 (75.8)	31 (24.2)
Drug use intervals	60 (46.9)	68 (53.1)	110 (85.9)	18 (14.1)
Use of abbreviated symbols	25 (19.5)	103 (80.5)	20 (15.6)	126 (98.4)
Use of ordered or as needed	20 (15.6)	108 (84.4)	-	128 (100)
Drug side effects training	15 (11.7)	113 (88.3)	38 (29.7)	90 (70.3)
Average total score	2.3 ± 0.02		4.8 ± 0.03	
Percentage change	108.7			

^aValues are expressed as mean ± SD or No. (%).

than medical students. Also, the presence of different students (residents, medical and midwifery students) in gynecological clinics, lack of prescription writing by midwifery students as independent prescribers, students' lack of experience in clinical settings, and finally, ignoring the standard components of prescription structure result in improper prescription writing by students (19).

The study of Valizadeh et al. regarding the knowledge and attitudes of midwifery students showed that 70.8% of students knew the correct principles of prescription at low levels, and 62.6% of them had limited awareness of authorized medications existing in midwifery and medicine forms. Also, 95.9% of the students had poor information about drug use method and its related warnings, and 95.5% had very little familiarity with drug interactions. Also, 95.9% of the students did not know the educational and nursing points of the drug and the patient's monitoring during the treatment (20). Prescription writing is a challenge for graduated midwives; therefore, a separate course/unit for teaching the principles of prescription writing is necessary (21). Navabi Rigi and Moody demonstrated that holding a training workshop led to the improvement of students' ability in prescription writing; it also increased the efficiency and satisfaction of graduated students employed in midwifery clinics (22). Among the main prescription problems in the present study were a lot of drug items, lack of readability of the prescription, and the absence of one of the main components such as the dosage or form of the drug. After training, the number of drug items dropped from 3.7 ± 0.4 to 2 ± 0.3. Also, the score of the standard principles of prescription increased from 3.9 ± 0.5 to 6.5 ± 0.7. Safaeian et al. showed that the most common problems of prescribing by medical students were a lot of drug items, non-readability of the major part of prescription and the lack of drug form (7). A study conducted by Dyasanoor

and Urooge investigated the effect of a one-day training workshop on the quality of prescription of general practitioners. A trend was observed toward increasing the rational administration of medicines in most components of prescriptions, and over-prescription of injectable and non-steroidal anti-inflammatory drugs (NSAIDs) showed a significant decrease (16). In the present, we provided four common gynecological cases to assess the ability of midwifery students in the rational administration of medications and writing prescriptions within the framework of OSCE, according to the WHO prescription guidelines.

The mean prescription scores for all the four diseases were within the range of 1.45 - 2.5 before the training, which significantly increased to 3.25 - 5.4 after training. This increase remained even after four weeks (3.4 - 5.5). In this way, students also learned how to make a rational choice for medicines at the clinic, although the scores in controlling abnormal uterine bleeding were less than the others. This finding is consistent with the results of Parang et al. study (21). Darvishpour et al. conducted a qualitative study to examine the views of health policy makers in Iran on the barriers and facilitators of nurses' prescription writing in their work. They found that one of the barriers to prescription writing of nurses was the organizational barriers and culture including lack of understanding and use of personnel's skill and physician superiority and lack of opportunity for nurses to write prescriptions. Educational barriers were also introduced as an important category. These barriers include educational curriculum deficit and non-prescriptive approach of student' teaching (9). Given the role of midwives in women's health, the reformation of the educational curriculum is a basic necessity for midwifery prescribing. The current approach of midwifery education neither gives prescription authority to students, nor does it provide them proper knowledge. This matter gradually causes the feeling that taking orders and exe-

cuting them is better than having prescriptive authority. Educational context and training during midwifery education is the main factor for the implementation of midwifery prescribing. Training is essential in order to protect midwifery practice and, ultimately, patient care. Appropriate training to extend nurses' skills is considered in leading countries (23). Although the majority of nurses and midwives' decisions are clinically appropriate, continuing education and evaluating prescriptive performance, especially in relation to drugs and interactions, are needed to achieve the most appropriate and safe administration (24). Small et al. study also showed that high-quality education, combined with professional support, personal motivation and trusted midwives to overcome common barriers at the beginning of the prescription, was helpful for improving the prescribing skills of midwives in Australia (25). Midwifery's enhanced prescribing skills have benefits in individual, patient, and organizational dimensions. At the individual level, it enhances professional independence and empowerment as well as job satisfaction, which, in turn, is linked to organizational commitment. The patient dimension includes satisfaction with care, appropriate quality of care, increased adherence to medication and continuity of follow-up, and its organizational benefits are to reduce the workload of physicians and to enhance the cost-effectiveness and coverage adequacy of patients. Therefore, in order to improve midwives' prescribing skills, education should move toward enabling midwifery students and personnel through educational courses and continuous staff training. It might be helpful to include prescribing instruction in the undergraduate midwifery students' curriculum.

Finally, it should be noticed that the small sample size of this study may limit the generalizability of the present results. Good implementation and quality of the training program are the strengths of this research. Repeating the same study in other universities with larger samples is suggested.

5.1. Conclusions

The training of prescription principles can be effective in enhancing the prescription skills of midwifery students, even after four weeks. Therefore, the WHO guidelines can be considered as one of the strategies for promoting and changing the attitudes towards prescribing and rational use of medicines among students, as part of the contents of pharmacology courses.

5.2. Limitations

One of the limitations of this study was not controlling for variables such as individual differences in intelligence, motivation, mental status, reading habits and learning styles.

Table 5. Mean Prescription Scores on the Principles of Rational Treatment of Common Gynecological Diseases^{a, b}

Variables	Trichomoniasis Vaginitis			Cervicitis			Pelvic Inflammatory Disease			Abnormal Uterine Bleeding		
	Before Training	After Training	4 Weeks Later	Before Training	After Training	4 Weeks Later	Before Training	After Training	4 Weeks Later	Before Training	After Training	4 Weeks Later
Superscription	1.8 ± 0.02	3.2 ± 0.2	3.4 ± 0.2	1.6 ± 0.03	3.1 ± 0.04	3 ± 0.2	1.5 ± 0.01	3.4 ± 0.7	3.2 ± 0.5	1.5 ± 0.02	3.2 ± 0.1	3 ± 0.2
General principles of prescription	3.5 ± 0.4	6.7 ± 0.5	6.9 ± 0.04	2.9 ± 0.05	5.8 ± 0.5	6 ± 0.4	2.5 ± 0.03	5.6 ± 0.5	6.2 ± 0.4	2 ± 0.03	4.3 ± 0.3	4.5 ± 0.03
Standard Principles of Prescription	2.9 ± 0.02	6.4 ± 0.7	6.1 ± 0.05	2.4 ± 0.02	5.4 ± 0.4	5.8 ± 0.4	2.6 ± 0.04	5 ± 0.3	5.2 ± 0.5	1.5 ± 0.01	3 ± 0.2	3.3 ± 0.4
Instructions of using the drug	1.8 ± 0.03	5.2 ± 0.5	5.7 ± 0.04	1.6 ± 0.02	4 ± 0.3	4.4 ± 0.3	1.3 ± 0.02	3.7 ± 0.2	3.6 ± 0.4	0.8 ± 0.01	2.6 ± 0.04	2.9 ± 0.02

^aValues are expressed as mean ± SD.

^bPair-wise comparisons indicated that there was a significant difference after training and 4 weeks later with before training (Post-Hoc Repeated Measure).

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Footnotes

Authors' Contribution: Study concept, design and data collection: Afsaneh Bakhtiari; analysis and interpretation of the data: Afsaneh Bakhtiari and Seyed Jalil Seyed-Andi; drafting of the manuscript: Afsaneh Bakhtiari and Monireh Parvaneh.

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