

Original Research

Impact of Pharmacist-Led Prescription Writing Intervention on Undergraduate Medical Students

Bashayer M. AlShehail, Zainab A. Al Jamea, Nouf Alotaibi, Ali H. Sumayli, Abdulsalam Alasseri, Khalid Eljaaly, Ahmed Alenazi, Mohammed M. Alsultan, Sawsan M. Kurdi, Dhafer M. Alshayban, Marwan Alwazze, Sara Al-Warthan, Mashael Alhajri, Wafa Alzlaq, Muna Islami, Mohammed K. Alkhathlan, Mashael Almusta, Zainab Al-Dararah, Ibrahim Asiri, Rania AlJaizani

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Abstract

Background: Prescribing errors present a critical concern in practice where junior doctors initiate the majority of prescriptions. Objective: The study aimed to evaluate the impact of pharmacist-led educational intervention provided to undergraduate medical students on the appropriateness and self-perceived readiness to prescribe medications. Methods: This pharmacist-led pre-and-post-intervention study included female undergraduate medical students enrolled in the prescription practice course between Oct 19 and Nov 15 2022, at King Fahad University Hospital in the eastern region of Saudi Arabia. The course involved three main domains: a pre-module assessment, formal training in the principles of prescription writing, and a post-module assessment. The pre-module assessment was designed to assess the students' ability to write a prescription for a given patient scenario. After that, formal training in the principles of prescription writing was conducted, which highlighted the elements of prescription writing based on World Health Organization (WHO) guidelines for good prescription. Finally, the post-module assessment was utilized to evaluate the knowledge the students gained during the session, asking them to re-write a prescription for the same patient scenario. Results: This study assessed one hundred twenty-four students before and after writing the prescription course. The mean score and standard deviation before the course were 8.65 ± 2.362 , and they significantly improved after the course. Their mean score after the course was 14.2 ± 0.988 (P-value < 0.001). Conclusion: The pharmacist-led prescription writing intervention for undergraduate medical students has improved their skills, knowledge, and confidence. Thus, this supports incorporating prescription writing into undergraduate medical students' education with pharmacist involvement.

Keywords: pharmacist-led education; interprofessional education; prescription; medical students

Bashayer M. ALSHEHAIL. PharmD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. bmalshehail@iau.edu.sa
Zainab A. AL JAMEA.** PharmD, Pharmaceutical Care Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. zajamea@iaa.edu.sa
Nouf ALOTAIBI. PharmD, Clinical Pharmacy Department, College of Pharmacy, Umm Al Qura University, Makkah, 21955, Kingdom of Saudi Arabia. nealotaibi@uqu.edu.sa
Ali H. SUMAYLI. PharmD, Pharmacy Department, Armed Forces Medical Services, Dhahran, 31932, Kingdom of Saudi Arabia. alihassan0020@gmail.com
Abdulsalam ALASSERI. PharmD, Pharmaceutical Care Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. aaasseri@iau.edu.sa
Khalid ELJAALY. Pharmacy Practice Department, Faculty of Pharmacy, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia. keltaaly@kau.edu.sa
Ahmed ALENAZI. PharmD, Imam Abdulrahman bin Faisal Hospital – National Guard Health Affairs, Dammam, 31412, Kingdom of Saudi Arabia. rph.ahmed.alenazi@gmail.com
Mohammed M. ALSULTAN. PhD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. mmaalsultan@iau.edu.sa

Sawsan M. Kurdi. PharmD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. smkurdi@iau.edu.sa
Dhafer M. ALSHAYBAN. PhD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. dmalshayban@iau.edu.sa
Marwan ALWAZZEH. M.D., Internal Medicine Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. mjalwazze@iau.edu.sa
Sara AL-WARTHAN. M.D., Internal Medicine Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. smalwarthan@iau.edu.sa
Mashael ALHAJRI. M.D., Internal Medicine Department, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. mhajri@iau.edu.sa
Wafa ALZLAIQ. PharmD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. waalzlaq@iau.edu.sa
Muna ISLAMI. PharmD, Pharmaceutical Care Division, King Faisal Specialist Hospital and Research Center, Jeddah, 23433, Kingdom of Saudi Arabia. munaislami@hotmail.com
Mohammed K. ALKHATHLAN. International Programs



School, Ministry of Education, 34236, Dammam, Kingdom of Saudi Arabi. mr.mk1121@gmail.com
Mashael ALMUSTAFA. BPharm, Pharmaceutical Care Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. mmustafa@iau.edu.sa
Zainab AL-DARORAH. BPharm, Pharmaceutical Care Department, King Fahd University Hospital – Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. zaldarorah@iau.edu.sa
Ibrahim ASIRI. PharmD, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. imasiri@iau.edu.sa
Rania AlJaizani. MSc, Pharmacy Practice Department, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University, Dammam, 31441, Kingdom of Saudi Arabia. raaljaizani@iau.edu.sa

INTRODUCTION

Medications construct a vital intervention in daily patient care practice. At the same time, they could potentially lead to patient harm if used in error.^{1,2} Medication errors cost approximately forty-two billion dollars annually, representing up to 1% of global health expenditure.¹ A systematic review has shown that among the medication error categories, prescribing errors have been reported between two and ninety-four percent.³ Furthermore, nearly ten percent of prescribing errors arise from junior physicians' prescriptions.⁴ This is particularly concerning as most of the prescriptions are initiated by junior physicians and interns, especially during weekends and night shifts where limited guidance by senior physicians is usually available.^{5,6} A study found that around fifty-five percent of prescribing errors occurred during these times.⁷

The prescribing process presents a challenge of paramount importance for junior physicians upon transition from students to licensed prescribers.⁸ Although safe and effective prescribing is a central competency that each prescriber must acquire, evidence has shown that it is inadequate among junior physicians.^{9,10} Moreover, the insufficient readiness to prescribe confidently continues to be raised by these physicians.^{4,5,8} Thus, various strategies have been implemented to enhance the prescribing skills among junior physicians with a positive impact.⁸

As evidenced in the literature, pharmacist-led prescribing educational interventions have greatly augmented the prescribing competency and confidence among junior physicians.⁴ A randomized controlled trial has shown a significant decrease in errors from 0.58 to 0.37 error/total orders prescribed by junior physicians after a pharmacist-led educational intervention.¹¹ Although numerous interventions were targeted toward interns and junior physicians,^{8,10,11} limited structured interventions have been implemented on an undergraduate level.^{4,6,12} Hence, this study aimed to evaluate the impact of pharmacist-led educational intervention

provided to undergraduate female medical students on the appropriateness and self-perceived readiness to prescribe medications.

METHODS

Study Design and Population

This pre-and-post-intervention study included female undergraduate medical students enrolled in the prescription practice course between Oct 19 and Nov 15 2022, at King Fahad University Hospital in the eastern region of Saudi Arabia.

Program Structure

The course was divided into three main domains: Pre-Module Assessment, Formal Training of the Principles of Prescription Writing," and Post-Module Assessment. In the Pre-Module Assessment domain, we assessed the student's ability to write a proper prescription for a given case scenario. Then, we asked them to write a prescription for the given patient. Formal Training on the Principles of Prescription included a hands-on prescription writing skills session, which consisted of the different aspects and concepts of prescription writing along with rules and regulations. Elements of prescription writing were based on WHO guidelines for the good prescription.¹³ The training session also included prescription history and definition, prescription formatting, prescription accepted abbreviations, and narcotic and controlled medications prescription roles and regulations. In the Post-Module Assessment, they were required to apply the knowledge learned by re-writing the prescription for the scenario provided in the pre-module assessment. Additionally, they were requested to complete the post-course evaluation.

Description of The Program

A case scenario was provided to the students where they were asked to write a prescription for the patient. This was followed by a hands-on prescription writing skills session. After the session, the students were asked to write the prescription again for the same scenario. The prescriptions that the students wrote were collected separately before and after conducting the formal session. The pre-and post-module assessments were evaluated and graded by two blinded clinical pharmacists who assessed the prescriptions according to the WHO guidelines for good prescription.

Post Course Evaluation

At the end of the module, the students were requested to complete a survey of a post-course evaluation. It included three open-ended questions, one multiple-choice question, and ten questions on the Likert scale (table 1).

Statistical Analysis

A paired t-test was used to test for association between the score before and after the prescription writing course, while mean and standard deviation were used to describe continuous variables. The level of significance was set at 0.05. Data analysis was performed using Statistical Package for the Social Sciences,



SPSS 26th version.

some suggestions for improvement.

Ethical Approval:

Ethical approval was obtained from the IRB committee at Imam Abdulrahman bin Faisal University (No: IRB-PGS-2023-11-190).

RESULTS

A total of 129 female medical students were enrolled in the course. Five were excluded due to their absence from the module, and 124 were assessed in this study before and after writing the prescription course. The mean score and standard deviation before the course were 8.65±2.362, and it significantly improved after the course. Their mean score after the course was 14.2±0.988 (P-value <0.001) (table 2).

Post-course Evaluation

One hundred and twenty-four medical students completed the course satisfaction survey. 98% of the students were satisfied with the overall quality of the session (Table 3).

Only 57% preferred the session to be delivered online, and 80% suggested that similar sessions be conducted regularly for all undergraduate medical students and junior doctors or residents.

Most of the students (63%) chose to determine the dose and frequency as the component they faced difficulty with when writing the prescription. Choosing medication and providing instruction were the second most difficult components of prescription writing (Figure 2). A sample of students’ answers to the post-session open-ended questions is presented in (Table 4).

Furthermore, the program received overall positive feedback from undergraduate students. Their comments mentioned the importance of this program to their future practice, complemented the presenters and the course, and shared

DISCUSSION

Our study confirmed the impact of a pharmacist-led prescription writing course for undergraduate medical students in improving their knowledge and skills in writing proper prescriptions. This has been demonstrated by the significant difference between the study participants’ prescription writing scores pre- and post-course. Our findings are consistent with a systematic review published in 2009 that aimed to identify studies of educational interventions to improve prescribing by medical students or junior physicians. Four ‘before-and-after’ studies reported significant improvements in written tests or clinical stations. One of the important limitations of these studies is the small number of participants (ranging from 21 to 79 medical students).¹⁴ The improvement in prescribing skills was also reported by Mokrzecki *et al.* as the study randomized 33 final-year medical students into two groups; one received a prescribing skill education session, and the other group did not.¹² The group that received the education significantly improved their prescribing skills over a short time frame. Our study demonstrated that around 95% of the students reported an enhanced confidence level in prescribing after the course. This is of significant importance as a cohort study of three medical schools graduates in the UK reported that prescribing was the area they were not prepared for and not confident with as junior doctors.⁵ Having pharmacists lead the session on prescription writing has a positive impact, given that this is their area of expertise, and we found that 95% of the students reported that the pharmacist-led prescription writing session had minimized the variation in prescribing perspectives. Around 99% have agreed that the session has promoted their understanding of the relationship between pharmacists and physicians. This was addressed in a pilot study of 16 final-year medical students who underwent an eight-week prescribing

Table 1. Post-course Evaluation
Likert scale questions Kindly rate the following statements based on your experience in (writing prescription) session (1: strongly disagree – 5: strongly agree):ss 1. The session was useful for improving my prescribing skills. 2. The session has enhanced my confidence in writing prescriptions. 3. The session has helped support my preparedness to write prescriptions in practice. 4. A pharmacist-led (prescription writing) session has minimized the variation in prescribing perspectives. 5. The session has promoted my understanding of the relationship between pharmacists and physicians. 6. The session has expanded my knowledge and skills on the different aspects of prescription writing. 7. The delivery method has promoted achieving the aim of the session. 8. I would like to have more sessions/courses on writing prescriptions in my pre-clinical years. 9. I would suggest that similar sessions are conducted on a regular basis for all undergraduate medical students and junior doctors or residents. 10. Overall, I am satisfied with the quality of the session.
Multiple Choice Question: Which component of writing a prescription you have faced difficulty with: ○ Reporting of diagnosis (indication) ○ Choosing a medication ○ Determining dosage (dose and frequency) ○ Providing instruction for patient
Open-ended Questions: 1. What are the potential advantages of the session? 2. Would you please provide us with suggestions for improvements? 3. Would you tell us please about your overall experience in the session?



Table 2. Comparison of Medical Students Prescription Score Pre-Course and Post-Course						
	N	Mean	Std. Deviation	95% Confidence Interval of the Difference		P value
				Lower	Upper	
Pre-course	124	8.65	2.362	-5.979-	-5.134-	< 0.001 *
Post-course	124	14.20	0.988			

Table 3. Post-session Survey [Likert scale]	
Kindly rate the following statements based on your experience in (writing prescription) session:	
Statement	Mean (%)
The session was useful for improving my prescribing skills.	98
The session has enhanced my confidence in writing prescriptions.	95
The session has helped support my preparedness to write prescriptions in practice.	96
A pharmacist-led (prescription writing) session has minimized the variation in prescribing perspectives.	95
The session has promoted my understanding of the relationship between pharmacist and physicians.	98
The session has expanded my knowledge and skills on the different aspects of the prescription writing.	97
The delivery method has promoted achieving the aim of the session.	97
I would like to have more sessions/courses on writing prescriptions in my pre-clinical years.	80
I would suggest that similar sessions are conducted on regular basis for all undergraduate medical students and junior doctors or residents.	93
I would prefer to take this course online instead of the hospital.	57
Overall, I am satisfied with the quality of the session.	98

Figure 1. Patient Case Scenario		
Age	3 Years-old	The patient presented to the general pediatric clinic with her parents who stated that their daughter had been pulling her right ear for the previous two days and has decreased oral intake and activity . Her temperature was measured at home, and it was 39.7°C .
Gender	Female	
Weight	14 Kg	
Examination		
You have examined the patient and you noticed that she has a bulging, erythematous tympanic membrane and otorrhea . The temperature at the clinic is 40°C.		
Diagnosis	Allergies	Immunization
The patient was diagnosed with severe acute otitis media (AOM).	The patient has no known drug allergies.	The immunization schedule is up to date .
Therapeutic management	Available Product	
According to the guidelines, you decided to prescribe an antibiotic (Amoxicillin).	The available product at your institution is: Amoxicillin suspension 250 mg/5 mL .	

Figure 2: Percentage of Difficulty Encountered by Medical Students When Writing Components of Prescription

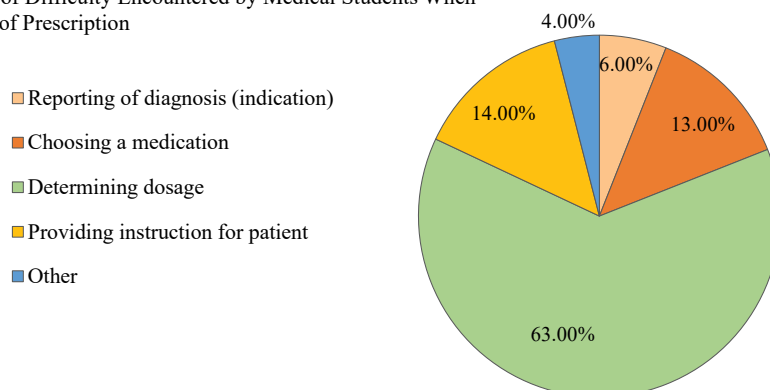


Table 4. Post-session Survey [Open-ended Questions]

Question 1: What are the potential advantages of the session?

Knowing the components of prescription and the way to write it.

- "Give a strong base to know how to prescribe". (P-Med-2)
- "It made the prescription writing easier". (P-Med-14)
- "How to write a clear and correct prescription". (P-Med-52)
- "It really gave u knowledge about how important it is to write the prescriptions details". (P-Med-59)
- "Knowing the right way for writing prescription avoiding abbreviation". (P-Med-73)
- "Learning the right way to write prescriptions with practical experience". (P-Med-91)
- "Benefit and highly recommended. Help learning how to write prescriptions". (P-Med-113)

Cooperation and effective communication between doctors and pharmacists optimize patient outcomes.

- "Good communication between health care providers and reaching the optimum health service". (P-Med-37)
- "Understanding doctor- pharmacist relationship help us to avoid errors for the patient benefit". (P-Med-51)
- "Writing proper prescription and the relation between pharmacist and physician". (P-Med-93)

Good early preparedness to write prescriptions help minimizing errors.

- "Limit medication errors faced in prescription". (P-Med-46)
- "Advancing prescriptions writing and reducing medical errors". (P-Med-100)

Organizing thoughts and setting guidance to write prescription.

- "Help in writing organized prescription". (P-Med-68)
- "Setting clear guidelines to follow". (P-Med-77)
- "Very helpful session and has insights me with valuable knowledge regarding pharmacy and the right way to write prescriptions". (P-Med-124)

Generally, great session.

- "Everything; Clear points, story from real life, kind pharmacists' Integrative session". (P-Med-86)
- "Important topic and attractive session". (P-Med-110)

Question 2: Would you please provide us with suggestions for improvements?

Provision of more practice.

- "More examples to practice". (P-Med-2)
- "More practice with real cases". (P-Med-111)
- "Have more of clinical and inpatient practice". (P-Med-117)

More training on calculating doses and using different dosage forms and units.

- "Go into details about how to use different units in writing doses". (P-Med-57)
- "Explain dose, dosage and strength in more detail". (P-Med-93)
- "Details about calculating dosage". (P-Med-105)

Provision of similar sessions to internship students.

- "More sessions for interns". (P-Med-96)

Enhancement of time management.

- "Nothing, it was perfectly done, but maybe allocating a specific time for activities". (P-Med-120)
- "Time management". (P-Med-47)

Providing individual feedback.

- "Correct each student's activity paper and provide feedback". (P-Med-6)

Adding online sessions with games.

- "Make it online". (P-Med-56)
- "Kahoot". (P-Med-62)

Question 3: Would you please tell us about your overall experience in the session?

- "Excellent, I was worried about this skill but now I am feeling satisfied". (P-Med-51)
- "Very nice session that enhanced my knowledge and directed me to notice many points, I used to have zero idea about prescription forms, and never thought about it. Thank you very much". (P-Med-58)
- "It was comprehensive and interesting; I enjoyed the session". (P-Med-73)
- "The presenters were clear, concise, and charismatic. It set a clear guideline for my future prescriptions and cleared any ambiguous". (P-Med-77)
- "Very excellent! Even the lecturers were very humble and cooperative!". (P-Med-14)
- "It was a great experience, and I learned a lot". (P-Med-91)
- "Very good experience! The most important that I understand the structure of writing prescription". (P-Med-104)
- "Very useful session". (P-Med-28)
- "I have really benefited from this session and it was my first prescription writing". (P-Med-40)
- "I loved it. Very interesting and educational!". (P-Med-42)

program led by a pharmacist.⁶ They reported that the program gave them a better understanding of the role of pharmacists and how they can support them as junior prescribers. A qualitative interview study in a tertiary hospital in Australia reported that Junior physicians co-working with pharmacists is essential for improving prescribing skills, and they recommended implementing strategies to change the common practice of pharmacist relation to junior physicians in just detecting errors

in their prescription to having an active role in their level of learning.⁸ Furthermore, around 63% of the students in our study chose to determine the dose and frequency as the component they faced difficulty with when writing the prescription. This is consistent with their suggestion to conduct similar sessions regularly for all undergraduate medical students and junior physicians or residents. The feedback from the students was mostly positive and supportive of the course, with 98 % of



the students being satisfied with the overall session quality. Similarly, the comments provided by the open-ended questions demonstrated excellent feedback. Our study supports those of others who have shown a positive impact of pharmacist-led programs for junior physicians and medical students.¹¹ Lastly, as our study and the available literature assessed the short-term impact of pharmacist-led prescription sessions, a prospective cohort study is recommended to evaluate the long-term influence.

CONCLUSION

We have recognized the positive impact of a pharmacist-

led prescription writing intervention for undergraduate medical students on improving their skills, knowledge, and confidence. The findings of this study might add to the current body of literature to include prescription writing as early as undergraduate medical students and involving pharmacists in its delivery.

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