

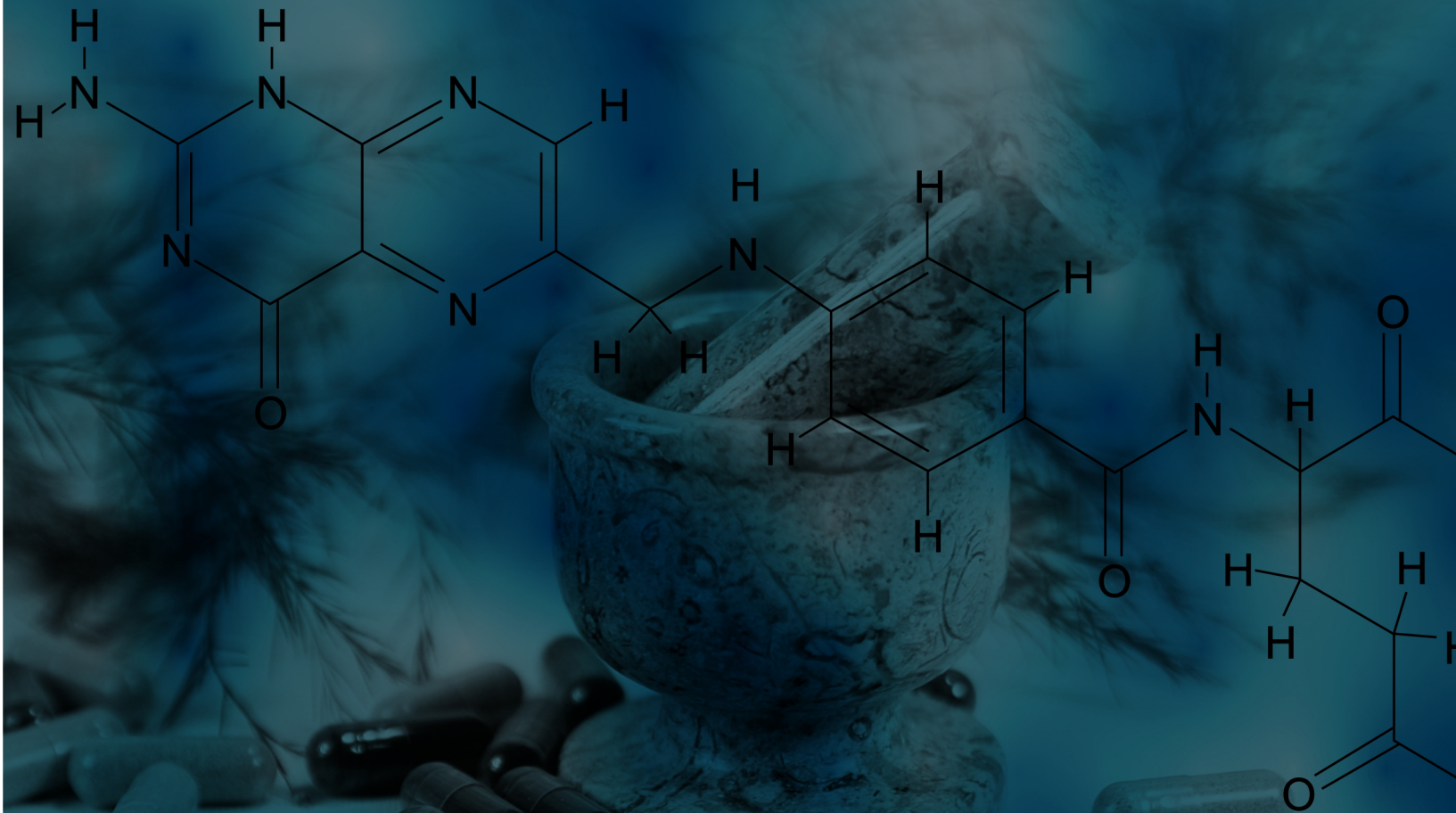
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# An Interprofessional Collaboration between Medicine and Pharmacy Schools: Designing and Evaluating a Teaching Program on Practical Prescribing

Mohammad Reza Javadi<sup>1</sup>, Mina Khezrian<sup>2</sup>, Anahita Sadeghi<sup>3</sup>, Seyed Hossein Hajimiri<sup>4</sup>, Kaveh Eslami<sup>2</sup>

<sup>1</sup>Research Centre for Rational Use of Drugs, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Department of Clinical Pharmacy, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>3</sup>Department of Internal Medicine, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran

<sup>4</sup>13 Aban Drug and Poison Information Centre, Tehran University of Medical Sciences, Tehran, Iran

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### ABSTRACT

**Objective:** Medical students need proper education in drug prescription. The aim of the present study is to introduce a course that improves the students' prescribing skills and also promotes an interprofessional collaboration between medicine and pharmacy schools. **Methods:** This study was done in a skill laboratory at the pharmacotherapy department of Tehran University of Medical Sciences, Tehran, Iran. The course was an 18-h interactive workshop in 3 days under the supervision of clinical pharmacists. A total of 18 medical students participated in these classes before their internship. Before and after each class, they were given tests and paired *t*-test was done to compare the marks. **Findings:** A total of 18 medical students participated in this study. The results showed that the knowledge of the students on pharmacotherapy, drug information, and prescribing skills has been significantly improved at the end of the course. **Conclusion:** Using clinical pharmacists to the present pharmacotherapy course could be an effective model for medical students to obtain better prescribing skills.

**KEYWORDS:** *Clinical pharmacists, interprofessional collaboration, medical students, prescribing skills*

## INTRODUCTION

Appropriate drug prescription is among the most important tasks and responsibilities of general practitioners, physicians, and specialists; therefore, teaching prescribing skills and essentials should be a part of medical training.<sup>[1,2]</sup> To prevent prescribing errors (and thus reducing patients' morbidity and mortality), it is important for medical students to meet the prescribing standards before their graduation. In various medical schools in Iran, students take a basic pharmacology course during their first 4 years of studies on drugs' mechanisms of action, anticipated adverse effects, possible drug interactions, etc. However, this course is mainly pure pharmacology science and it appears that the students are inadequately prepared for their future responsibility for good prescribing practice.

Learning only from physicians may result in overlooking of some of the knowledge and skills needed for proper practice. Alternatively, having clinical pharmacists to teach medical students is a way of introducing new aspects of applied drug therapy to the students and provides them with practical knowledge on drug-related issues.<sup>[3]</sup> Clinical pharmacists are trained as interprofessional, having knowledge on pharmacotherapy and applied drug information as well as clinical practice in the wards, working as a member of the health-care team. They can guide the students through the transition from studying pure pharmacology to writing well-structured prescriptions.<sup>[4]</sup>

### Address for correspondence:

Dr. Kaveh Eslami, E-mail: drkaveheslami@gmail.com

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Nowadays, health professionals are familiar with the advantages of interprofessional collaboration to improve the efficacy of education.<sup>[5]</sup> Therefore, in the present study, a course was designed by clinical pharmacists of School of Pharmacy, Tehran University of Medical Sciences (TUMS), Iran, for preclinical medical students with the following objectives: to train students on various dosage forms and necessary drug information, to teach students to recognize the important differences between prescription medications within various drug classes, to educate students about the principles of prescribing medicine, and to improve interprofessional collaboration between medical and pharmacy schools.

## METHODS

We conducted this study in a skill laboratory at the Pharmacotherapy Department, School of Pharmacy, TUMS, Iran. The first step was the assessment of the medical students' needs and the necessity of the course through an online questionnaire. Two authors as experts in the field (MRJ and KE) developed this questionnaire, and all authors evaluated its reliability and validity during the process. The students' current knowledge on drug therapy source was also evaluated using this questionnaire. Another questionnaire was designed for medicine professors to collect their points of view and their previous experience on this subject. Evaluating the results of both questionnaires led us to the actual design of the program.

The course consisted of two parts. The first part, the introductory workshop, provided the students with basic prescribing essentials, introduction to insurance policies, and available drug dosage forms. The second part, the general internal medication workshop, consisted of six case-based didactic lectures and practical skill building training on the pharmacotherapy of gastrointestinal, cardiovascular, analgesic, antibiotic, endocrine, and respiratory disorders. For each session, the students took pretest and posttest and paired *t*-test was done to compare the marks. The course was presented by clinical pharmacists. At the end of the program, the level of students' satisfaction and their viewpoints on the quality of the course was assessed through a questionnaire. The students were also asked to rate their level of satisfaction at the end of the program.

## RESULTS

A total of 18 medical students at TUMS participated in this study. The demographic data of the participants are shown in Table 1. The students were assigned to three groups, each attending 18 h workshops for 3 days. Table 2 shows the results of the precourse online questionnaires.

A total of 93.75% of the students ( $n = 18$ ) believed that they need to learn proper drug therapy. Analyzing the questionnaire showed that 67% of the students learned their prescribing skills by self-practicing and 23% of them learned it from other senior students in the hospital. Only 10% of the students have had a course on this subject. The students graded their learning aspects before the program [Items 8–14 are shown in Table 2] from very low to high, and the results are shown in Table 2.

The results indicated a high level of satisfaction among the students with the highest satisfaction rate of 9.72 out of 10 for the clinical pharmacist involved with the course. Figure 1 shows the comparison of the pretest and posttest results. The students performed significantly better in posttests.

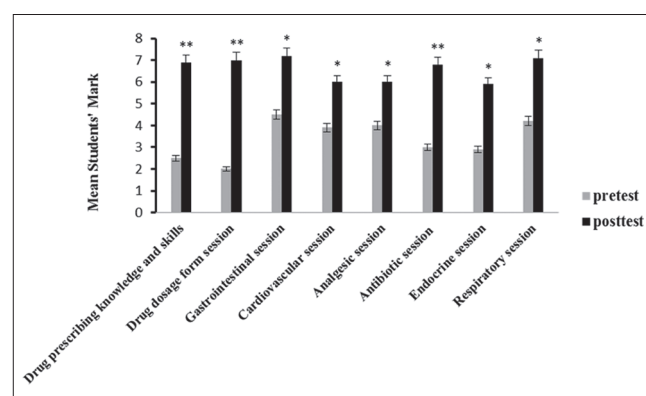
## DISCUSSION

Our results showed that the preclinical medical students believed that they need more practical clinical pharmacology knowledge, and at the end of the program, they reported a high level of satisfaction with the course. The results of the final evaluation of the course showed that the majority of the participants (91.6%) would recommend this course to other medical students.

When medical students are finally authorized to work as physicians, they will face challenging situations, which require practical prescribing knowledge and skill.

**Table 1: Demographic data of the students ( $n=18$ )**

Variables	<i>n</i> (%)
Gender	
Female	11 (61.11)
Male	7 (38.88)
Education level	
Sophomore	10 (66)
Junior	4 (22)
Senior	4 (22)



**Figure 1: Results of pretests and posttests ( $n = 18$ ). Results are presented as mean  $\pm$  standard deviation**



**Table 2: Results of the online precourse questionnaires and student's self-assessment questionnaire (n=18)**

Needs and previous knowledge	Data reported as percentage			
	Strongly agree	Agree	Neutral	Disagree
Prescribing training course is essential for medical students	88.8	0	0	0
Medical students should know about drug dosage forms and applied drug information	68.7	25	6.2	0
Medical students should know about medical insurance policies	88.8	11.1	0	0
It is necessary for a medical student to know cost-related drug issues	68.7	25	6.2	0
Medical students should learn proper administration of drugs and appropriate approach to prescribing	93.7	6.2	0	0
Medical students should learn to use drug information resources	75	18.75	0	6.2
Medical students should improve their pharmacotherapy knowledge	88.8	11.1	0	0
Learning aspects/level of self-assessment	Data reported as percentage			
	High	Intermediate	Low	Very low or zero
Principles of appropriate prescribing	0	12.5	68.7	18.75
Drug dosage forms	12.5	50	31.25	6.25
Introduction to insurance policies	43.75	37.5	18.75	0
Cost-related drug issues	56.25	37.5	6.25	0
Rational use of drugs	25	37.5	12.5	12.5
Using drug information references	6.25	56.25	18.75	12.5
Essential pharmacotherapy knowledge	6.25	43.75	37.5	12.5

This knowledge should be obtained in their internship and postgraduation years, but unfortunately, different studies have shown that medical graduates have less than expected prescribing skills.<sup>[6,7]</sup> A report by the General Medical Council in 2009 showed that among the prescriptions of hospitals, 8.9% had errors and 8.4% of these errors were made by doctors who were in their 1<sup>st</sup> year of practice. This brings major concerns on the quality of the medical students' drug therapy training. Furthermore, the report revealed that drug classes with highest prescribing errors were analgesics, antibiotics, bronchodilators, and anti-angina drugs. The authors recommended special programs for medical students before to graduation and interprofessional education to solve this problem.<sup>[8]</sup>

A program designed in 2013 evaluated the improvement in medical students' pharmacotherapy knowledge following training by clinical pharmacists. Two groups of students participated in this study. One group attended 4-weekly 1-h workshops that covered topics on pharmacokinetics, pharmacodynamics, drug interactions, and drug toxicity. The results revealed that pharmacist-led workshops on pharmacotherapy were well received by senior medical students but did not improve the performance on a pharmacotherapy knowledge test and that further studies are needed to define optimal strategies for improving medical students' pharmacotherapy knowledge.<sup>[9]</sup> The findings of the present study showed that the students' mean marks of posttests improved [Figure 1]. Similar results were reported in a study conducted at Marmara University School of Medicine, Turkey, which

demonstrated the benefits of a clinical pharmacology program by focusing on rational pharmacotherapy during the clinical years of medical education.<sup>[10]</sup>

Furthermore, a previous study performed at the University of Leeds, UK, was designed to evaluate the impact of pharmacist-led therapeutic tutorials on 3<sup>rd</sup>-year medical students' knowledge and understanding of drugs used in the clinical practice. In that study, three cohorts of 3<sup>rd</sup>-year medical students on clinical placements were compared ( $n = 48$ ). The study group attended a series of therapeutic tutorials led by a pharmacist, whereas the control group did not attend any tutorials. The results showed that the study group performed significantly better than the control group. In addition, the students' responses to the questionnaires indicated that all of them welcomed the opportunity for structured teaching of therapeutics during their clinical placements. Similarly, in the present study, the students believed that there is a need for more courses on therapeutics in the undergraduate medical curriculum. All the students agreed that pharmacists can lead these tutorials very well.<sup>[11]</sup>

The present study can be a good example of interprofessional collaboration between pharmacy and medicine schools and a primary model for similar programs.

## AUTHORS' CONTRIBUTION

Mohammad Reza Javadi-principal investigator; reviewed manuscript. Mina Khezrian- data analysis, wrote manuscript. Anahita Sadeghi-; research design; reviewed manuscript. Seyed Hossein Hajimiri-research design;

collected data; reviewed manuscript. Kaveh Eslami-investigator; research design; reviewed manuscript.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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