

# Effects of Clinical Pharmacology Training on Prescription Writing Skills of Interns

Hamid Noshad<sup>1\*</sup>, Parviz Saleh<sup>2</sup>

<sup>1</sup> Chronic kidney Disease Research Center, Imam Reza Hospital, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>2</sup> Infectious Disease Ward, Sina Hospital, Tabriz University of Medical Sciences, Tabriz, Iran

## ARTICLE INFO

### Article Type:

Original Research

### Article History:

Received: 25 Nov. 2012

Revised: 12 Jan. 2013

Accepted: 20 March 2013

ePublished: 30 May 2013

### Keywords:

Clinical pharmacology

Drug Prescription

Interns

Medical students

## ABSTRACT

**Introduction:** The skill of appropriate prescription writing is a corner stone of treatment. Due to this fact, we designed a study for evaluating interns prescription writing skills after clinical pharmacology training. **Methods:** One hundred medical students of Tabriz University of medical science and Tabriz Azad medical university (TAMU) were chosen as intervention group and other one hundred medical students were selected as controls. Clinical pharmacology training was the intervention when the students were in internal medicine ward. Their prescribing skills were evaluated using a questionnaire. **Results:** Twenty eight percent of TUMS non- trained students and 68% of trained students were interested in pharmacology classes ( $P<0.001$ ). Knowledge of pharmacology in non-trained TUMS students was 22% poor and 6% perfect, but in trained TUMS students it was 2% poor and 18 % perfect. In TUMS students, 80% and TAMU, 68% of the interns announced that clinical pharmacology training was essential ( $P= 0.25$ ). Most of the interns had problems in correct dictation, dosage, dose adjustment of the drugs and only 4% of them had minor problems. In trained group, most of their problems solved. **Conclusion:** Pharmacology classes which are a part of educational curriculum during the fourth year of medical training is not enough for future clinical rotations. Clinical pharmacology training is essential for improving the prescription writing skills.

## Introduction

In Iran, medical students have to pass two pharmacology Courses during 7- year period of medical education. This classes are almost always theoretical. Medical students have to learn a great amount of information and they remember less amount of this information in the future, because there is a period of five -year lag between these classes and the time of graduation.

There are no other pharmacology classes in medical education curriculum. Medical students have so many problems in prescription writing and it is mentioned in previous studies.<sup>1</sup> This is not only related to Iran but also some other countries involved in it.<sup>2,3</sup> In spite of many problems, this problem is seen in some Asian and African countries.<sup>4</sup> In traditional teaching of pharmacology, students have to learn a large burden of information.<sup>5,6</sup> There are so many remarkable problems in prescription writing of medical students.<sup>7</sup>

In some countries like United States, training of pharmacology is practically planned.<sup>8</sup> This type of education is done in some other countries like England,

Netherland, India and even Nepal.<sup>9</sup> In countries that education is “organ system based”, this type of training is performed.<sup>10</sup> In these countries, learning is practical not theoretical. It has been reported that mortality and morbidity of the patients have been increased due to the mistakes in prescription writing.<sup>11</sup>

So, training of the interns in the field of pharmacology should be improved.<sup>12</sup>

The effects of practical teaching of clinical pharmacology has not been evaluated in undergraduate medical education in Iran. Integrating the practical clinical pharmacology and drug prescription courses in internal medicine rotations for interns can fill this gap.

In spite of many problems in traditional pharmacology training, it has been currently performed in Iran. Theoretical pharmacology was taught intensively in two terms and there is no other continuous education of it. Since the students pass these classes in the first year of medical education whiteout having enough information about diseases and their therapies, the learned information can't last longer and finally they will be forgotten easily.

\*Corresponding authors: Hamid Noshad, E-mail:hamidnoshad1@yahoo.com

In some other countries like Nigeria they use similar method and their studies have proved the inefficiency of this method.<sup>4</sup> Some countries like United States, England and Netherland solved this problem with continuing education of pharmacology. Their new method is approved by WHO.<sup>13,14</sup> Interns are educated by residents and attends in clinical wards and one of their most important duties is prescription writing. It has been noted that they had many essential problems in prescribing of drug<sup>11</sup> which may lead to mortality and morbidity of the patients. In England, they planned some programs for solving these mistakes.<sup>12</sup>

In Iran, majority of the medical students involve in treating the patients in far small cities or villages after graduating; they are not supervised and their problems are usually hidden. It is clear that having good skill of prescription writing is needed. Thus, we decided to design a study for evaluating the prescription witting skill in internal medicine ward.

### Methods

One hundred medical students of Tabriz University of medical sciences (TUMS) and Tabriz Azad medical University (TAMU) were randomly enrolled in this study. These students had been trained only by traditional method. They filled a questionnaire and answered questions about dictation of drugs, generic and non-generic names, dosage, complications, interactions and dose adjustment of drugs. Descriptive and analytic studies were done in both of the universities separately using chi-square test and  $P < 0.05$  considered significant.

Also non-trained medical students were compared with ones trained with suggested (continuing education of clinical pharmacology) method. Both groups filled similar questionnaire. Students who were not interested in the intervention were excluded. The study tool was a designed questionnaire including questions about the demographic characteristics and pharmacology knowledge of the students. We tried to compare problems in both of the universities. The names of the students were kept confidential. They were informed about the objectives of the study. This study was approved by ethical committee of research deputy. Data were analyzed using SPSS version 16.0. Chi-square and student t-test were used for qualitative and quantitative data analysis.

### Results

In this study, 200 questionnaires were filled. Demographic characteristics of the students, trained with traditional and suggested method were shown in table 1. It demonstrated that students of universities were almost similar regarding the demographic characteristics.

Twenty eight percent of non-trained TUMS group was interested in pharmacology classes and it was 64 % ( $P < 0.001$ ) after training.

Thirty two percent of non-trained TAMU group was interested in pharmacology classes and it was 74% ( $P < 0.001$ ) after training.

Four percent of trained TUMS group was good in pharmacology knowledge and after training 20% was good ( $P < 0.001$ ). Knowledge of pharmacology in non-trained TAMU group in 1% of students was good but it was good in 18% of trained group ( $P < 0.001$ ). There was no significant difference in knowledge of pharmacology between the students of both universities ( $p = 0.21$ ).

Eight percent of non-trained TUMS group and 88% were satisfied with pharmacology classes (traditional) and current classes respectively ( $P < 0.001$ ). Only 14% of non-trained TAMU group was satisfied with traditional classes and 94% of the trained group was satisfied with current classes ( $P < 0.001$ ). There was no significant statistical difference between the universities ( $p = 0.31$ ). In non-trained TUMS group, 76% had problem in prescription writing but in trained group only 36% had the problem ( $P < 0.001$ ). In non-trained TAMU group 64% of the students had prescription writing problems but in trained group it was 28% ( $P < 0.001$ ). There was no significant difference between two universities in prescription writing problems ( $p = 0.63$ ).

We studied some usual and important drugs which interns had problem in writing. They were listed in table 2.

The drugs which interns were afraid of prescribing for pregnant women, patients with chronic renal failure, hepatic failure, diabetes mellitus, heart failure and children were shown in table 3.

Interns paid attention to less side effects and effectiveness of the drugs in prescribing, rather than the willingness of the patients and price of drugs (Figure 1,2). Most of the interns believed that pharmacology education was not enough before graduation and a need was felt for a clinical

**Table 1. Demographic characteristics of studied students**

Variable	<sup>(1)</sup> TUMS	<sup>(2)</sup> TUMS	<sup>(1)</sup> TAMU	<sup>(2)</sup> TAMU	(TUMS) P	(TAMU) P
Age(years)	24.94± 1.24	25.34±1.78	25.04±1.47	25.38±1.88	0.21	0.31
Sex male/female	29-21	23-27	22-28	20-30	0.42	0.68
Score of basic science examination	111.30±13.36	111.54±13.19	113.82±12.79	112.68±12.94	0.92	0.65
Score of pharmacology examination	14.50±2.24	14.14±2.20	15.36±2.13	14.58±2.15	0.42	0.07
Score of pre-internship examination	115.58±13.07	114.46±12.73	120.32±11.39	119.62±11.22	0.66	0.75

<sup>(1)</sup> Non- trained

<sup>(2)</sup> Trained

educations (Figure 3). Both of the TUMS and TAMU students had problems in prescription writing. It is seen in detail in Figure 4,5.

**Discussion**

Majority of non- trained interns believed that their knowledge of pharmacology was not enough after graduating to work as a general practitioner. Similar study

**Table 2. The drugs which students had difficulties in prescribing**

Drugs	% Non trained		% Trained	
	TUMS	TAMS	TUMS	TAMS
NSAID	12	24	2	4
Antibiotics	19	38	5	10
Anti HTN	11	22	4	8
Insulin	20	40	8	16
OHA <sup>1</sup>	10	20	2	4
Anti PUD <sup>2</sup>	15	30	7	14
Antiarrhythmias	26	52	11	22
Digoxin	10	20	3	6
Sedatives	11	22	4	8
Anticonvulsant	18	36	9	18
Steroids	11	22	5	10
Cytotoxics	29	58	21	42
Antiasthmas	13	26	6	12
Diuretics	17	34	5	10
Serum therapy	28	56	10	20
Heparin	9	18	4	8
Warfarin	9	18	3	6

<sup>1</sup>OHA: oral hypoglycemic agent  
<sup>2</sup>Anti PUD: Anti peptic ulcer disease

**Table 3. Patients that intern have problems in prescribing drugs for**

	Non- trained(number)		Trained		P
	Number	%	Number	%	
Pregnant	26	52	11	22	<0.01
Chronic renal failure	22	44	9	18	<0.001
Liver failure	20	40	8	16	<0.01
Diabetes mellitus	25	50	10	20	<0.01
Children*	29	58	-	-	-
CHF	18	36	6	12	<0.001

There was not enough training about pediatrics drugs\*



Figure 1. Students prescribing consideration (TUMS)

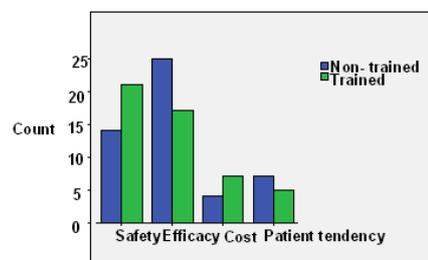


Figure 2. Students prescribing consideration (TAMU)

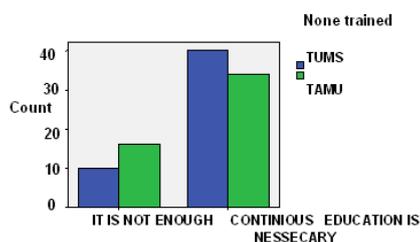


Figure 3. Did you need continuous pharmacology training?

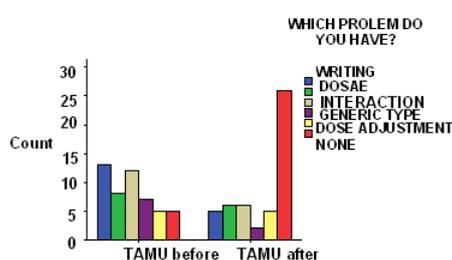


Figure 4. prescribing problems in trained TAMU group

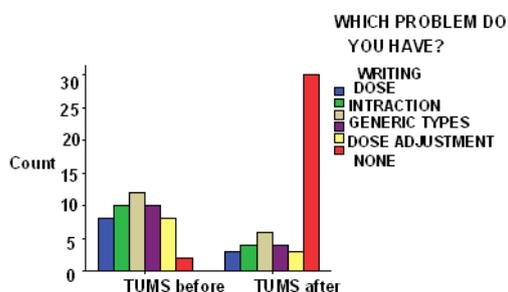


Figure 5. prescribing problems in trained TUMS group

in Nigeria also showed that there was not any significant relationship between pharmacology knowledge and skill of prescription writing because their training was also similar to ours.<sup>4</sup>

Ability of prescription writing was seldom evaluated continuously during the studying period. Medical students usually have not enough information about the dosage, interactions, dose adjustment and complications of the drugs.<sup>15</sup>

The claim of some students on having good pharmacological knowledge was not approved when they were evaluated.<sup>11</sup>

A lot of studies in Ireland showed that general practitioners had so many problems in prescription writing and further special continuing pharmacology training was

suggested.<sup>15-18</sup>

During internship period, interns are supervised by residents and attending. After finishing this period and education, interns work as general practitioners without any remarkable supervision. Problems in prescription writing can lead to important mistakes and consequently to mortality and morbidity from time to time. A need for a planned pharmacology education is felt.<sup>5</sup>

Most of the interns tend to prescribe drugs with less side effects and dose adjustments. This type of prescription will have so many problems and most of the useful drugs are neglected.<sup>3</sup>

Continuous training of pharmacology could solve this problem and students could easily prescribe useful drug for their patients without making a mistake. An extreme need for supervising during prescribing is due to lack of enough information which may affect the therapeutic schedule of the patients.<sup>6</sup>

Most of the interns do not like prescribing drugs for pregnant women, patients with heart failure, liver failure, children and diabetics, so that their prescriptions are sometimes limited to common cold. The above mentioned diseases need more attention than other medical cases. Most of the patients live in far villages and when the doctor could not prescribe essential drugs for them, some irreversible problems may happen and the doctor have to refer them to other medical centers and these centers located in far big cities are more and more crowded and as a result, the efficacy of therapies can be diminished.

Interns can prescribe effectively when they got enough training under direct or indirect supervision of consultants.<sup>14</sup> Most of the students complained about their previous traditional pharmacology education. They declared that the quality of training was good but without continuing education, it is not quantity enough.

Without suitable information, medical students cannot choose the less expensive drug and according to WHO, everybody must choose cheaper drugs when it is possible.<sup>13</sup> In our study students were not thinking about the price of the drugs as well. Basic information of drugs and lack of enough skills are responsible for so many problems in prescription writing.<sup>2,9</sup>

One of the limitations of our study was the small sample size. Since we have thousands of medical students in our country, It is suggested to conduct similar study with greater sample size to confirm the results of the present study to generalize them. It must be emphasized that our study was a pilot one. These types of pilot studies were conducted in other countries like Nigeria, England, United States and some other Asian countries. All of them emphasized on the necessity of continuous pharmacology education.<sup>1-2,5</sup>

The number of our classes and the time were so limited. The results may be more remarkable if the numbers and time of classes increase.

**Conclusion**

In spite of some methodological limitations, this pilot

study showed that continuing clinical pharmacology education in Iran can solve most of the prescription writing problems.

If this type of education is included in the educational curriculum of the medical students, especially interns, it will be an effective and problem solving schedule.

### Acknowledgment

The authors would like to thank Dr. Mahasti Alizadeh for her support and the staff of medical education department and internal medicine office for their help in doing the study.

### Competing interests

None to be declared

### References

- Dehghani M, Pourafzali M, Ebrahimzadeh A. Teaching Minimum Learning Essentials to Orthopedic Interns in Isfahan University of Medical Sciences. *Iranian Journal of Medical Education* 2008;7: 437-42.
- Kazeem AO, Idowu OS, Olufemi OA. Interns' knowledge of clinical pharmacology and therapeutics after undergraduate and on-going internship training in Nigeria: a pilot study. *BMC Medical Education* 2009;9:50.
- Garbutt JM, Highstein G, Jeffe DB, Dunagan WC, Fraser VJ. Safe medication prescribing: training and experience of medical students and housestaff at a large teaching hospital. *Acad Med* 2005;80:594-9.
- Oshikoya KA, Bello JA, Ayorinde EO. Medical students' view on the methods of teaching pharmacology at the Lagos State University College of Medicine, Nigeria: a need for a change in programme. *Nig Q J Hosp Med* 2007; 17:101-7.
- Dean B, Schachter M, Vincent C, Barber N. Causes of prescribing errors in hospital inpatients: a prospective study. *Lancet* 2002;359:1373-8.
- Queneau P, Bouvenot G, Grandmottet P. [Initial and continuous education. entreaty for better education of physicians in therapeutics]. *Bull Acad Natl Med* 1998;182:1369-81.
- Dean B, Schachter M, Vincent C, Barber N. Prescribing errors in hospital inpatients: their incidence and clinical significance. *Qual Saf Health Care* 2002;11: 340-4.
- Aronson JK, Henderson G, Webb DJ, Rawlins MD. A prescription for better prescribing. *BMJ* 2006; 333: 459.
- Medical Council of India regulation on graduate medical education. New Delhi: Medical Council of India;1997.
- Michel MC, Bischoff A, Zu Heringdorf M, Neumann D, Jakobs KH. Problem- vs. lecture-based pharmacology teaching in a German medical school. *Naunyn Schmiedebergs Arch Pharmacol* 2002;366:64-8.
- Motamed N, Kashani Z, Safar MJ, Âlian SH, Khademloo M, Êslamiyan R. [Prescription writing ability of interns for common illnesses-Sari Medical School-Summer 2004]. *Journal of Mazandaran University of Medical Sciences* 2006;16:102-11.
- Walley T, Bligh J, Orme M, Breckenridge A. Clinical Pharmacology and therapeutics in undergraduate medical education in the UK. *Br J Cli Pharmacol* 1994;37:137-43.
- World Health Organization. WHO Policy Perspectives on Medicines. Promoting rational use of medicines: core components. Geneva: WHO;2002.
- Laing R, Hogerzeil H, Ross-Degnan D. Ten recommendations to improve use of medicines in developing countries. *Health Policy Plan* 2001;16:13-20.
- Moghadam Nia AA, ZahedPasha Y, Mir Blooki MR, Baradaran Aghili M. [An analysis of prescription indices of Babol general practitioners prescriptions, 1999]. *Journal of Babol University of Medical Sciences* 2000;2:21-6.
- Zare N, Razm Jou MM, Ghaemi Nia M, Zeighami B, Agha Maleki Z. Effectiveness of the Feedback and Recalling Education on Quality of Prescription by General Practitioners in Shiraz. *Zahedan Journal of Research in Medical Sciences* 2007; 9: 255-61.
- Nabavizadeh SH, Khoshnevisan F. [Drug interactions in prescriptions of general practitioners in Yasuj city]. *Armaghan-danesh* 2003;7:53-9.
- Sepehri Gh.R, Haj Akbari N, Mousavi A. Prescribing patterns of general practitioners in Kerman province of Iran (2003). *Journal of Babol University of Medical Sciences* 2005;7:76-82.