

Curriculum-based Prescription Writing Among Undergraduate Medical and Dental Students

Nadya Ameen¹, Samia Perwaiz Khan², Fouzia Shaikh³, Zahida Memon⁴

ABSTRACT

Background: Prescription writing is highly intricate. It is a reflection of the prescriber's knowledge of clinical pharmacology and well-defined judgment. Weak prescribing skills are mostly exhibited by junior doctors. Contributory factors include improper training, integrated system, and weak skills of the prescriber. Research provides substantial evidence that these flaws can be minimized through structured educational interventions.

Objective: To evaluate medical and dental students on rational prescription writing, identification of elements and abbreviations of a prescription.

Methods: A cross sectional study was performed on second year medical and dental students of Ziauddin University. In three 3 sessions, the students were taught rationale prescription writing, abbreviations, and elements used in prescription writing consecutively. The elements were based on doctor's and patient's information, followed by the drug component written explicitly. Each session was followed by exercises on case scenarios, to assess their comprehension of the topic. The p value < 0.05 was considered significant.

Results: In the study 83% of the students completed components of rational prescription writing for a given case scenario, with 75% and 77% students identifying abbreviations and various elements in five tailor-made prescriptions respectively.

Conclusion: Rational prescription writing is a curriculum-based inherent skill acquired by medical and dental students during their training. When rational prescription writing is taught together with elements of a prescription and abbreviations, it equips students with sound knowledge of clinical pharmacology and refines their judgment in formulating prescriptions.

KEY WORDS: *Rational Prescription Writing, Elements, Medical Abbreviations.*

¹ **Nadya Ameen**

Lecturer, Department of Pharmacology, Ziauddin University and Hospitals, Karachi.

² **Samia Perwaiz Khan**

Professor, Department of Pharmacology, Ziauddin University and Hospitals, Karachi.

³ **Fouzia Shaikh**

Assistant Professor, Department of Pathology, Ziauddin University and Hospitals, Karachi.

⁴ **Zahida Memon**

Associate Dean & Chair, Department of Pharmacology, Ziauddin University and Hospitals, Karachi..

Corresponding Author

Nadya Ameen

INTRODUCTION

Formulating a simple and safe drug prescription is a difficult task faced by new graduating doctors. In the United Kingdom according to an Audit Commission Report by NHS (National Health Services) in 2001, 1100 deaths of hospital patients occurred due to errors in prescription writing. This modus operandi has become more tedious due to factors like drug resistance, polypharmacy, usage of complicated therapeutic regimens in geriatrics and vulnerable patients, an ever expanding drug formulary and awareness among patients.¹

Doctors are expected to write prescriptions soon after they graduate from medical schools. House-officers use their prescription writing skills during their training in writing physician orders for nurses and pharmacy, making discharge sheets, writing simple prescriptions during outpatient clinics etc. It is a general observation that although junior doctors perform a significant prescribing role they are more prone to make errors.^{2,3} In fact, a study from a London teaching hospital detected almost 135 prescribing errors each week, a quarter of which were made by junior doctors.¹ In 2008 Ross et al published a systematic review of twenty-four studies showing that irrational prescription writing, inappropriately filled elements and misuse of medical symbols were common errors made by junior doctors.⁴

WHO's six step model for rational prescription of a drug^{2,5} is similar to the steps of rational prescription writing given in medical textbooks.⁶ Once a student understands and follows these steps then writing a prescription is simply an extension of his knowledge of clinical pharmacology and skills on a tailor-made prescription format.^{6,7}

Research studies have pointed out a range of factors responsible for weak prescription skills among young doctors. These include improper training at undergraduate level, introduction of the integrated system and weak skills of the prescriber.⁴ Studies done in students and health

professionals to assess and improve their skills in prescription writing reflect that through proper teaching and evaluation there is marked improvement in prescribing skills.^{8,9}

Currently, in Pakistan no studies have been done to assess curriculum-based, skill enhancement of medical students in prescription writing. We therefore undertook this study to evaluate second year medical and dental students in rational prescription writing, elements and abbreviations used in a prescription.

METHODOLOGY

At Ziauddin University elements of a prescription and abbreviations used in prescription writing are taught by Pharmacology Department in the second year of MBBS and BDS. This cross-sectional study was carried out in 3, 2 hours session. The time period was from January to April 2014. An informed consent was taken from the participants. Only those students were included in the study who were in second year of their medical and dental training program at Ziauddin University, gave consent to participate and attended the teaching sessions. Students who were absent were excluded from the study. Initially the students were involved in rationale prescription writing by giving them a case scenario. Later they were asked to repeat the same practice on another scenario.

The other sessions were based on different elements which make up a prescription and medical symbols involved in writing the body of a prescription. A tailor-made outpatient prescription format consists of seventeen elements. These elements are based on doctor's and patient's information stated categorically. The body or the drug component of the prescription is based on medical abbreviations for dosage form, strength, route, quantity and directions for use. In the end there is information based on adverse effects. In these sessions the students were taught elements and abbreviations. They were later given 5 tailor-made prescriptions and their task

included to identify the elements and abbreviations used in the given prescriptions (Figure 1). The collected data was analyzed on SPSS Version 17.0 and P-value less than 0.05 was taken as significant.

RESULTS

In the first session based on rational prescription writing 158 students (MBBS n=103 and BDS n=55) were present, out of which 86 (83%) medical students and 45 (81%) dental students were able to correctly identify the steps involved

in this process through a given case scenario. Preliminary diagnosis was reached by 125 (95%) students, pathophysiology of the disease was explained by 110 (84%) students, therapeutic objectives were enlisted by 106 (81%) students, appropriate drugs were listed by 99 (75%) students, dosage regimen was identified by 112 (85%) students, duration of treatment and monitoring of drug action was identified by 120 (91%) students. The non-responders in rational prescription writing were 29 (18%) students (MBBS n=19 and BDS n=10).

Figure 1: Format for prescription writing used for undergraduate students

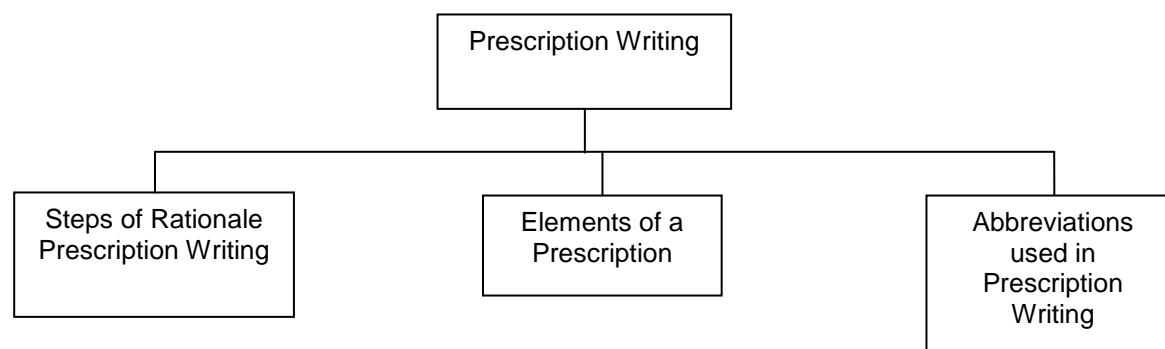


Table 1: Percentage of medical and dental respondents in rational prescription writing

Components of Rational Prescription Writing	Medical n (%)	Dental n (%)	Total n (%)	P value: 0.011
Preliminary diagnosis	85 (82.5)	40 (72.7)	125 (95)	
Patho-physiology	75 (72.8)	35 (63.6)	110 (84)	
Therapeutic objectives	76 (73.7)	30 (54.5)	106 (81)	
Appropriate drugs	70 (67.9)	29 (52.7)	99 (75)	
Dosage regimen	80 (77.6)	32 (58.1)	112 (85)	

There is a significant difference in mean percentage of medical and dental students in selecting an appropriate drug regimen after following the steps of rational prescription writing (Table 1). The medical students scored a higher mean percentage (75%) than dental students (62%) (P-Value=0.011).

In the second session based on medical abbreviations involved in prescription writing 164 students (MBBS n=114 and BDS n=50) participated. Abbreviations were identified by 85 (74.5%) medical and 42 (84%) dental students. Non responders in the session were 36 (22%) students (MBBS n=30 and BDS n=6).

Table 2: Percentage of medical and dental respondents in three sessions

Sessions	Medical n (%)	Dental n (%)	Total n (%)	P-value: 0.756
Rational prescription writing	86 (83.4)	45 (81.8)	131 (82.9)	
Abbreviations	85 (74.5)	42 (84)	127 (76.8)	
Elements of prescription writing	80 (76.2)	40 (72.7)	120 (75)	

In the third session based on elements of prescription writing 160 students (MBBS n=105 and BDS n=55) were present. Elements in a prescription format were identified by 80 (76%) medical and 40 (72.7%) dental students. Non

responders in this session were 40 (25%) students (MBBS n=30 and BDS n=10). By the end of the three sessions no statistical significant difference was observed between medical and dental students (Table 2).

DISCUSSION

In this study the students were taken through steps of rational prescription writing through a case on rheumatoid arthritis. They repeated the same exercise on a patient with lower respiratory tract infection. In a multi-centre trial De Vries et al used sixteen case based scenarios on four topics namely hypertension, osteoarthritis, bronchitis and gastroenteritis to perform a similar exercise.¹⁰

In the study a significant number of students enlisted at-least three therapeutic objectives according to the pathophysiology of the disease namely infection leading to fever and cough. The objectives were then targeted through appropriate drugs which included an antibiotic, an antipyretic and a bronchodilator. The drugs were selected on basis of age of the patient, presence of other co-morbidities, history of drug allergies and cost-effectiveness. This is a reflection of J.K Arsonson's Hedgehoge Principle. According to this principle a prescriber should be capable of relating everything to a central vision i.e. relate the patho-physiology of the disease to the mechanism of action of the drugs.¹¹ This concept should form the fundamental core and other steps of rational prescription writing should aid in formulating a sound prescription. The knowledge of elements and medical abbreviations used in a prescription format then help the prescriber in putting this information on paper.

We further extended our study to include sessions based on medical abbreviations and elements of a standard prescription. Five tailor made prescriptions were used namely cases on hypertension, diabetes, meningitis, typhoid, and dental cavitations involving the gums. In our study 76.8% and 75% students were able to identify the abbreviations and different elements of a prescription respectively.

A similar study was conducted by Oshikoya et al on knowledge of components of rational prescription writing in final year students. Their knowledge of rational prescription writing was tested on a prepared questionnaire and

prescription writing skills were examined by making a prescription of malaria and upper respiratory tract infections. Pathophysiology was identified by 70% students, appropriate medicine with special reference to route, frequency and duration of treatment was identified by 67% students, and dosage regimen was identified by 91% students as important components of rational prescription writing.¹²

Garbutt et al performed a KAP study on safe prescription writing at Barnes Jewish Hospital. The study population included interns, residents and medical students. Drug allergies were checked by 75% respondents, dosage calculations were double checked by 59% respondents, renal impairment was checked by 56% and drug-drug interaction was checked by 53% students. The study identified a poor prescription writing practice among house staff and medical students. Contributory factors could be inadequate training.¹³

The implication of faults and errors in prescription writing in any health care system are harmful for patients. These errors include irrational prescribing, ineffective prescribing, under prescribing, overprescribing, misuse of abbreviations inappropriately filled elements and technical errors. Such errors may lead to unwanted polypharmacy, emergence of multi drug resistant pathogens, drug dependence and addiction, drug- drug interactions, adverse drug reactions or loss of drug effect and an unnecessary economic burden on the patient and the family.^{11,14}

In order to reduce the burden of errors in prescription writing it is highly pertinent that by the end of their professional education medical and dental students should be well equipped with the diverse skills required for good and sound prescribing. Structured education interventions should be carried out in house-officers, residents and general physicians not only to assess but also to improve and correct their prescription writing skills. Such studies should also be replicated in non medical health care professional such as nurses and clinical pharmacists. A national prescription form should be adopted by all hospitals and used as training tool at undergraduate level.

CONCLUSION

Rational prescription writing is an important mental-exercise based tool which equips students to apply their theoretical knowledge of clinical pharmacology on case-based scenarios. Adequate teaching ensured that a significant number of students were able to identify steps of rational prescription writing, elements and medical abbreviations of a prescription. Furthermore, the performance of medical students was better than dental students in rational prescription writing. This difference was probably because medical students study these topics more profoundly than dental students. However, there was no significant difference in between the two groups when all the three sessions were compared in tandem. i.e. rational prescription writing, medical abbreviations and elements used in a prescription.

Presently, there is a growing need to examine and evaluate the objectives of undergraduate programs in imparting prescribing skills to trainees. It is recommended that an integrated system with the objective of rational prescription writing, medical abbreviations and elements of prescription should be introduced from the first year of medical education with focus on important diseases of that particular module. Prescription writing should be conducted in each consecutive module. This will help students mature into rational and sound prescribers.

Acknowledgement: This is to acknowledge Dr. Shehla Shaheen, Ms. Tooba Arfeen and Imran Ali for guidance, statistical and technical support.

REFERENCES

- ¹ Heaton A, Webb DJ, Maxwell SR. Undergraduate preparation for prescribing: the views of 2413 UK medical students and recent graduates *Br J Clin Pharmacol* 2008;66(1):128-134.
- ² Kamarudin G, Penm J, Chaar B, Moles R. Educational interventions to improve prescribing competency: a systematic review. *BMJ Open* 2013;3(8):1-18.
- ³ McLellan L, Tully MP, Dornan T. How could undergraduate education prepare new graduates to be safer prescribers? *Br J Clin Pharmacol* 2012;74(4):605-613.
- ⁴ Ross S, Loke YK. Do educational interventions improve prescribing by medical students and junior doctors? A systematic review. *Br J Clin Pharmacol* 2009;67(6):662-670.
- ⁵ Milan CR, Tichelaar J, Eric CTG, Theo PGM. Teaching clinical pharmacology and therapeutics with an emphasis on the therapeutic reasoning of undergraduate medical students. *Eur J Clin Pharmacol* 2008;64:217-224.
- ⁶ Lofholm W. Paul KGB. Basic and Clinical Pharmacology. 11 ed. Katzung BG, editor 2009. 1127-1132.
- ⁷ APA, NACDSF. Medication Therapy Management in Pharmacy Practice. Core Elements of an MTM Service Model. *J Am Pharm Assoc.* 2008;48(3):341-353.
- ⁸ Conroy S, North C, Fox T, Haines L, Planner C. Wong ICK, Sammons H. Educational interventions to reduce prescribing errors. *Arch Dis Child.* 2008;93:313.
- ⁹ Hogerzeil VH. Promoting rational prescribing: an international perspective. *Br J clin Pharmacol.* 1995;39:1-6.
- ¹⁰ De Vries TP, Daniels JM, Mulder CW, Groot OA, Wewerinke L, Barnes KI, et al. Should medical students learn to develop a personal formulary? An international, multicentre, randomised controlled study. *Eur J Clin Pharmacol.* 2008;64(6):641-646.
- ¹¹ Anson JK. Medication errors: what they are, how they happen, and how to avoid them *Q J Med.* 2009;102(8):513-521.
- ¹² Oshikoya KA, Bello JA, Ayorinde EO. Prescribing knowledge and skills of final year medical students in Nigeria. *Indian J Pharmacol.* 2008;40(6):251-255.
- ¹³ 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(6):594-599.
- ¹⁴ Zafar SN, Syed R, Waqar S, Irani FA, Saleem S. Prescription of medicines by medical students of Karachi, Pakistan: A cross-sectional study. *BMC Public Health.* 2008;8(162):1-7.