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# Evaluation of last-year dental students' skill at the Tabriz Faculty of Dentistry about principles of writing prescriptions

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## Abstract

**Background:** Inattention to the principles of writing prescriptions might give rise to ineffective or hazardous treatment and inflict injuries to the patient. The aim of this study was to evaluate the last-year dental students' skill in writing prescription at the Tabriz Faculty of Dentistry in 2016-2017.

**Methods:** In this cross-sectional study, all last-year dental students (92 students) at the Tabriz Faculty of Dentistry were asked to write separate prescription for 3 patients. The level of compliance with the principles of writing prescriptions was evaluated based on the WHO checklist, which consists of the following items: patient's name, gender and age; date of prescription; Rx symbol; the form and name of the drug; the dose of the medication; the number of the drugs to be filled; administration interval; the strength of the drug; route of administration; the signature and seal of the physician; and the refill order. Each correct item was given a positive score and each incorrect item received no score (score range: 0-45).

**Results:** 10.9%, 43.5% and 45.6% of the students exhibited high, moderate and low skill. The mean score was 27.75 (SD 8.75) of a total possible score of 45. There were no significant differences between male and female students ( $P = 0.7$ , CI = -4.5 to 3.2, effect size = -0.035).

**Conclusion:** Overall, final-year dental students' skill in writing prescriptions was at a moderate level and no student fully observed all the principles for the correct method of writing prescriptions.

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## Introduction

Writing prescriptions is one of the key skills acquired by dental students during their studies.<sup>1,2</sup> This process has principles and guidelines that should be followed to improve the efficacy of treatment. In order to be able to write effective prescriptions, adequate knowledge of these guidelines is necessary. A proper education and practice will lead to better observation of these principles and guidelines.<sup>1-3</sup>

When writing a prescription, the patient's personal data and the data on the prescribed medication, including medication name, dosage and route of administration, are written. At the end of the prescription, the personal data of the physician writing the prescription is also included. Errors in interpretation and medical errors can result if any of this information is missing.<sup>2,4</sup> Inattention to these

principles can include mistakes in the name of the drug or the abbreviations, dosage, route of drug administration, the drug form and the duration of its use. These errors might give rise to ineffective or hazardous treatment. Furthermore, this might also exacerbate or lengthen the medical condition involved, induce side effects and inflict injuries to the patient and may increase the treatment cost.<sup>4,5</sup>

Medical errors are broadly divided into two categories: errors in the diagnosis and decision-making process and errors in the prescription stage, including a lack of important and necessary data (dose, route of administration, frequency of use, etc).

Errors in writing out prescriptions are some of the most common but avoidable errors in medicine. This comprises 39%-74% of all medical errors.<sup>4-6</sup>

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In a previous study, only 20 (30.3%) last-year dental students followed the WHO Guide to Good Prescribing<sup>7</sup> and the most common error in writing a prescription was a mistake in the dose of medication and lack of necessary information on the prescription.<sup>2,4,5</sup> In a study of Nigerian medical students, 44% of the prescriptions lacked patient data, including name, age and gender.<sup>8</sup> Since dentists need to write prescription as a part of their clinical dental practice, absence of sufficient education for students is an important matter that influences the quality of rational medical prescribing.<sup>9</sup> A previous analysis of prescriptions in public health units in Brazil showed that prescriptions usually contained abbreviations and/or illegible letters and often lacked information about mode of administration, the total quantity of the drug being prescribed, dosage/posology, duration, and/or guidance about the proposed treatment.<sup>10</sup> Therefore, proper education in writing prescriptions during university courses and regular assessment of students on prescription writing skills seem to be necessary for minimizing related errors and enhancing prescribing skills in their future practice. On the other hand, prescriptions may be known as an indicator of the quality of dental and medical education and observance of laws and rules.<sup>6,11</sup> A scientific search of electronic resources and databases of PubMed, EBSCO, and Google Scholar found no study on the determination of last-year dental students' knowledge about the principles of writing prescriptions at the Tabriz Faculty of Dentistry and only a limited number of studies has evaluated the skills of dental students in writing prescriptions at other universities and in other countries. The present study was undertaken to evaluate last-year dental students' skill in writing out prescription and their awareness of the principles and guidelines involved at the Tabriz Faculty of Dentistry.

## Materials and Methods

### Study design

This cross-sectional study was carried out on the students studying in the 11th or 12th semester at the Tabriz Faculty of Dentistry in 2016-17. A total population sampling technique was used: all 92 last year dental students were included in the study.

### Data collection

To evaluate students' skills in writing out prescriptions, data on three patients were submitted to them and they were asked to write out separate prescription for each patient.

Once content validity of the questionnaire was approved by specialists, the students answered it. Cronbach's alpha coefficient (0.84) was used to evaluate reliability of the questionnaire.

The first prescription was written for a 6-year-old child with a diagnosis of an odontogenic infection; the second prescription was written for an 18-year-old male patient

complaining of recurrent apthous stomatitis; and the third prescription was written for a 32-year-old male patient with an abscess in the left buccal aspect of the mandibular first molar tooth on the same side. Thereafter, the level of compliance with the principles of writing prescriptions was evaluated based on the WHO checklist,<sup>1</sup> which consists of the following items: (1) patient's name; (2) patient's gender; (3) patient's age; (4) date of prescription; (5) Rx symbol; (6) form of the drug; (7) name of the drug; (8) dose of the medication; (9) number to be dispensed; (10) administration interval; (11) strength of the drug; (12) route of administration; (13) signature of the physician prescribing the medication; (14) seal/particulars of the physician; and (15) refill order.<sup>1</sup> The questionnaires were evaluated by a pediatrician who was a member of the Education Development Organization.

### Scoring method

For each prescription, each correct item was given one point and each incorrect item received zero points. Since there were 15 items on each prescription and 3 prescriptions were evaluated for each subject, the maximum possible score was 45 and the minimum score was zero.

The following scale was used to determine skill level of the students:

0-15: low skill

16-30: moderate skill

31-45: high skill

### Statistical analysis

Data were reported using descriptive statistics (frequencies, means and standard deviations). An independent *t* test was used for the analysis of data with SPSS 17. Statistical significance was set at 0.05.

### Results

Out of 92 distributed questionnaires, all were returned and were completely filled out. Regarding sex, 48 students (52.2%) were female and 28 (30.4%) were male, while 16 students (17.4%) did not specify their gender.

#### *Determination of students' skills in terms of the guidelines for recording patients' particulars on the prescription*

Evaluation of the prescription in this context showed a mean skill score of 5.97 (SD 4.04) out of a possible 9 points, with a range of 0-9 (Table 1). Results showed that 29 subjects (31.5%) had low skill, 4 (4.3%) exhibited moderate skill and 59 (64.2%) had high skill. In addition, 26 students (28.3%) did not record any of the personal data of the patients on the prescriptions and achieved a score of zero. In contrast, 54 students (58.7%) recorded the patients' personal data completely and had a score of 9.

#### *Determination of students' skill in terms of the guidelines for recording the drug orders*

Evaluation of the prescriptions showed a mean skill score

**Table 1.** The mean scores in terms of the guidelines to record the patients' particulars

Guidelines to write personal data	Mean ± SD	Minimum	Maximum
Patient's name	2.07±1.6	0	3
Patient's age	1.86±1.4	0	3
Patient's gender	2.03±1.36	0	3
Total	5.97±1.36	0	9

of 20.43 (SD 4.67) out of a possible 30 points in this section, with a score range of 5–28 (Table 2). Three subjects (3.3%) had low skill, 37 (40.2%) exhibited moderate skill and 52 (56.5%) had high skill. No student achieved the maximum skill score in this section and only 3 (3.3%) achieved a score of 28.

#### **Determination of students' skill in term of the guidelines for recording the particulars of the physician writing out the prescription**

Evaluation of the prescriptions showed a mean skill score of 2.38 (SD 1.13) out of a possible 6 points, with a range of 0–6 in this section (Table 3). 71 students (77.2%) had low skill, 4 (4.3%) exhibited moderate skill and 17 (18.5%) had high skill. In addition, 68 students (73.9%) did not record any of the particulars of the physician writing out the prescription and had a score of zero. In contrast, 17 students (18.5%) recorded the particulars of the physician completely and had a score of 6.

#### **Determination of students' skill in terms of the general guidelines for writing out prescriptions**

Evaluation of the prescriptions showed a mean skill score of 27.75 (SD 8.75), with a range of 7–43. 10 students (10.9%) had low skill, 40 (43.5%) had moderate skill and 42 (45.6%) exhibited high skill.

**Table 2.** The mean scores in terms of the guidelines for registration of drug orders

Guidelines to write drug orders	Mean ± SD	Minimum	Maximum
Date of prescription	1.93±1.39	0	3
Rx symbol	2.19±1.6	0	3
Drug form	2.61±0.64	0	3
Drug name	2.7±0.44	1	3
Drug dose	1.63±0.79	0	3
Drug strength	2.25±0.62	1	3
Number of drug	2.45±0.76	0	3
Interval of use	2.43±0.87	0	3
Route of administration	1.41±1.19	0	3
Refill order	0.71±1.14	0	3
Total	20.43±4.67	5	28

**Table 3.** The mean scores in terms of the guidelines for registration of the particulars of the physician writing out the prescription

Guidelines to write the physician's data	Mean ± SD	Minimum	Maximum
Signature of the physician	1.21 ± 0.68	0	3
Seal/particulars of the physician	1.19 ± 0.65	0	3
Total	2.38 ± 1.13	0	6

#### **Determination of the effect of sex on students' skill in observing the general guidelines for writing out prescriptions**

Table 4 presents the results of evaluations of the prescriptions in terms of sex. From 92 students, 16 subjects (17.4%) had not specified their sex. Questionnaires in which students' sex was not mentioned were excluded and the remaining 76 questionnaires were evaluated based on the students' gender. The lowest skill scores achieved by male and female students were 8 and 12, respectively and the highest scores were 43 and 42, respectively. However, an independent t-test did not reveal significant differences between male and female students ( $P = 0.7$ ,  $CI = -4.5$  to  $3.2$ , effect size =  $-0.035$ ).

#### **Discussion**

Writing a good quality prescription indicates a good quality of healthcare system. Properly completed prescriptions and rational drug prescribing are important factors in the quality of pharmacotherapy delivery.<sup>9</sup>

The results of the present study showed that only 45.6% of last-year dental students at the Tabriz Faculty of Dentistry had high skill in terms of writing prescriptions. In a similar study, Rauniar et al<sup>12</sup> reported a moderate level of skill in writing prescriptions in 258 medical and dental students in Nepal. In another study in Nigeria, the skills of 33 last-year medical students in writing prescriptions was not at a favorable level. The authors recommended theoretical and practical education in prescribing guidelines to improve students' prescribing knowledge and skills.<sup>8</sup> Talebzadeh et al<sup>13</sup> evaluated 152 last-year dental students in Isfahan and Kerman and found that the students' awareness about principles of prescription writing was at moderate level (70.8%).

The majority (64.2%) of participants in this study had high skills in writing prescriptions in terms of the principles and guidelines in registering the personal data of the patients on prescriptions. In this context, more than half of the students recorded the patients' particulars completely. However, in approximately one-third of the cases, the prescriptions had no patient information. The students' mean score in relation to recording the date on the prescription was 1.93 (SD 1.39) of a total possible score of 3; some prescriptions lacked dates. In a study by Oshikoya et al,<sup>8</sup> approximately 44% of prescriptions lacked patient data, including name, age and gender. Rauniar et

**Table 4.** The mean scores in relation to the observation of guidelines for writing out prescriptions in terms of sex

Students' gender	Mean $\pm$ SD	Minimum	Maximum	P value*	95 % CI of the difference	Effect size
Male	28.5 $\pm$ 9.7	8	43	0.7	-4.5 to 3.2	-0.035
Female	29.1 $\pm$ 7.06	12	42			
Total	27.75 $\pm$ 8.75	7	43			

SD: standard deviation.

\* Statistical test: independent *t* test.

al<sup>12</sup> reported that the most prevalent errors were related to the date of prescription and the patient's address. In a study by Akram et al,<sup>1</sup> 29% of students did not include a date on the prescription. Recording the patient's particulars on the prescriptions helps the pharmacist make sure that prescription held by the patient really belongs to him/her. Indication of patient's name and the date of the prescription are of vital importance of prevent misappropriation and loss.<sup>6,14</sup>

Despite the fact that the skills of almost half of the students in writing out the drug orders on the prescriptions was deemed high, none of the students completely observed the principles for recording the drug orders. In a similar study, Guzmán-Álvarez et al evaluated a total of 66 last-year dental students at Universidad Nacional Autónoma de México and reported that only 20 students (30.3%) followed the WHO Guide to Good Prescribing.<sup>7</sup>

The mean scores of students' skills in relation to writing the form and name of medications were 2.61 (SD 0.64) and 2.7 (SD 0.44), respectively, of a total possible score of 3, indicating a high level of skill in students in this field.

The students' skill in writing the particulars of the physician prescribing the medications was at a low level, with only 20% of students completely inscribing a signature and using a seal with the particulars of the physician. However, since the participating students had no seals, the conclusion that their skill in this context was at a low level is questionable; it should be noted that almost two-thirds of the students did not even sign the prescription. In a study by Oshikoya et al,<sup>8</sup> the particulars and signature of the physician were included in only 51.6% and 58.6% of prescriptions, respectively. Signing a prescription is necessary for its formality and validity and is legally valuable: a prescription without a signature cannot be filled.<sup>6</sup>

It appears that medical and dental students do not receive proper education in writing correct and complete prescriptions during their studies. The current educational programs are mainly based on basic principles of pharmacology, classification of drugs, side effects and toxicosis by drugs, with less time and attention devoted to the clinical administration of drugs. The tests given to students are mainly based on theoretical principles rather than on testing practical skills.

In the old curriculum at the Tabriz Faculty of Dentistry, there was no specific course on the principles of drug administration and writing prescriptions and students were instructed on an individual basis as needed in the clinic.

The results of the present study emphasize the inadequacy and inefficacy of such education in the old educational curriculum. However, in the new curriculum which is administered to dental students entering the university in 2013 and up, a new course has been included, 'Pain and Pharmacology', in which the instruction of principles for writing prescriptions and administration of medications are some of the important aims and are included in the teaching materials. It is hoped that administration of the new educational curriculum and greater attention in this field will improve students' knowledge and skills in observing the principles involved in writing prescriptions. However, for students and clinicians who graduated based on previous curriculum, it seems that holding a workshop or skill lab to teach the prescription guidelines based on WHO recommendations is essential.

#### Limitations and recommendations

In this study, participants were last-year dental students at the Tabriz Faculty of Dentistry, which limits the external validity and generalizability of the results to other dental students and dentists. The cross-sectional design is another limitation of the study that limits possible judgment about the awareness of other dental students and could be improved by a longitudinal study to assess the knowledge of students in different years. More studies are recommended with a larger sample size, along with comparing the knowledge of dental and medical students and comparing the knowledge of students at different universities across the country. To decrease potential sources of bias such as personal impressions, the study aims were precisely described to participations. Some of the students did not specify their sex in the questionnaires. These questionnaires were excluded when testing for significance between males and females and the remaining ones were evaluated based on the students' gender, but this issue could affect the results.

#### Conclusion

The majority of students had high skill in writing the particulars of the patients on the prescriptions, with more than half of them writing the patients' names, gender and age completely. The skill of half of the students in writing the drug orders on the prescriptions was at a high level but none of the students fully observed all principles involved in writing the drug orders. In relation to writing the particulars of the physician, the students' skill was at a low level, with almost two-thirds of them not having signed

the prescription.

In general, the students' skill in writing prescriptions was at a moderate level and none of the students fully observed all the guidelines and principles for writing prescriptions. The lowest skills were related to including the signature, seal and particulars of the physician and the refill order. The highest level of skill was related to writing the names, forms, and doses of drugs.

#### Ethical approval

The present study was conducted in accordance with the Helsinki Declaration of 1975, which was revised in 2002. The protocol of the study was approved by the Ethics Committee of the Tabriz University of Medical Sciences (Registration code: IR.TBZMED.IR.1395.208). The aim of the study was explained to all the subjects before the study was instituted and Participants' information was kept confidential. Detailed informed consent was obtained from all participants.

#### Competing interests

The authors declare that there is no conflict of interest.

#### Authors' contributions

MP and EM were responsible for the design and concept of the study as well as revision of the prepared manuscript. MG, JY and MK analyzed the data, carried out the literature search and drafted the manuscript. All the authors have read and approved the final manuscript.

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