



# Evaluation of the Knowledge Level of Dental Students Regarding the Dental Management of Medically Compromised Patients

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## Abstract

**Background:** The chances of survival for people suffering from various systemic diseases have increased due to medical advances and better access to medical services. This has led to an increase in the number of medically compromised patients in society. These patients undoubtedly need dental treatments during their lifetime. Dentists' knowledge of these situations is crucial to prevent the health of these patients from being compromised during dental treatment.

**Objectives:** Therefore, the present study evaluated the knowledge of students in the management of medically compromised patients using a questionnaire.

**Methods:** This descriptive cross-sectional study was conducted among clinical students of the Ahvaz Faculty of Dentistry. A sample size of 150 people was selected using a convenience sampling method. Data was collected using a self-made questionnaire regarding the dental management of medically compromised patients. *t*-tests and Mann-Whitney tests were used for statistical analysis of quantitative variables. The significance level in statistical tests was considered to be 0.05, and P-values less than 0.05 were considered significant.

**Results:** In this study, the mean score of knowledge was  $9.60 \pm 3.45$ , and the knowledge of dental interns was higher than that of other students. The analysis of variance test showed that the mean scores of total knowledge were significantly different in four entries ( $P < 0.001$ ). More than seventy percent of students were not satisfied with the teaching method of this course.

**Conclusions:** The level of awareness of dental students regarding the dental considerations for systemic patients is not high, and the students are not satisfied with the way this course is taught.

**Keywords:** Dental Students, Awareness, Patients, Systemic, Disease

## 1. Background

Medically compromised patients in dentistry are individuals whose dental treatment plans need to be adjusted due to systemic diseases that pose a risk to their overall health (1). A study revealed that approximately 40% of patients seen at general dental clinics in 2014 fell into this category. Age appears to play a significant role, with reports indicating that 45.2% of individuals in their 50s and a striking 80% of those aged 70 and above are medically compromised (2). In a study by Mesgarzadeh et al., it was found that out of 968 patients referred to the Tehran Faculty of Dentistry, 397 met the criteria for being medically compromised as

defined above (3). Hypertension (13.9%) and diabetes mellitus (6.3%) emerged as the most prevalent systemic diseases among the study population.

Mehdizadeh et al. found that a significant portion of dental students (48%) and dentists (44%) in Babol, Iran, exhibited poor knowledge levels, with only 8% of dentists demonstrating a very good understanding of medical emergencies (4). Tabrizi and Lee discovered that a majority of dental students in the United States lacked comfort in managing medically compromised geriatric patients (5). Similarly, Konidena et al. reported an average knowledge score of  $9.66 \pm 2.94$  among Indian dental students regarding the management of

medically compromised patients, highlighting a knowledge gap in this area (1).

## 2. Objectives

Understanding medically compromised patients is crucial for dental students, as they are the future dentists responsible for treating individuals with systemic conditions. The question arises: Have these students received adequate education and training on this topic, equipping them with the necessary knowledge to care for such patients effectively? Despite the importance of this issue, no research has been conducted on the knowledge of Ahvaz dentistry students concerning medically compromised patients. Therefore, this study aims to assess their knowledge in this critical area.

## 3. Methods

### 3.1. Study Design and Ethical Considerations

This descriptive cross-sectional study was conducted among 150 clinical students (third-, fourth-, fifth-, and sixth-year dentistry students) of Ahvaz Faculty of Dentistry in the spring of 2022. The code of ethics IR.AJUMS.REC.1401.096 was obtained from the ethics committee of Jundishapur University of Medical Sciences, Ahvaz. The study adhered to the principles outlined in the Declaration of Helsinki. Students were informed that completion of the questionnaire would be considered as their consent to participate.

### 3.2. Questionnaire Development

A self-made questionnaire was designed due to the lack of a standard questionnaire on the subject of the study. It included three sections. The first section covered demographic characteristics, and the second section evaluated the knowledge of the students with 20 multiple-choice questions (each with only one correct answer). This section was designed with the help of similar research (1) and focused on chronic and common systemic diseases. These questions were classified into four categories: Cardiovascular, AIDS, medical and dental emergencies, and other systemic diseases. Each correct answer received a score of 1. Thus, if the subject did not provide a correct answer, their knowledge score was zero, and if they provided the

correct answer to all the questions, their knowledge score was 20. The total score and the score for each group of questions were calculated separately for each person. Subjects who scored between 0 and 6.6 were classified in the poor knowledge group. Those who scored between 6.67 and 13.33 were in the moderate knowledge group, and those who scored between 13.34 and 20 were in the good knowledge group.

The third section consisted of dichotomous questions designed to evaluate students' opinions about their satisfaction with the teaching method of dental considerations for medically compromised patients and their level of study in this course. No scores were given for this part of the questionnaire.

Due to the high prevalence of cardiovascular diseases, the need for dental students to be familiar with the transmission methods of blood-borne infections such as HIV, and the necessity for dentists to provide emergency first aid, more focus was given to questions related to these topics in the questionnaire (2).

The questionnaire's validity was confirmed by the opinions of five oral medicine specialists who teach dental management of medically compromised patients to dentistry students. To evaluate the reliability of the questionnaire, 15 students who met the criteria for the study were asked to answer the questionnaire during the design stage. Two weeks later, they were asked to answer the questionnaire again. The questionnaire reliability was assessed at 0.81, which was an acceptable level, using Cronbach's alpha.

### 3.3. Target Population and Sample Size Calculation

Students who were in their clinical studies and internships in dentistry, proficient in Persian, and registered in the education department met the criteria for participation in the study. Exclusion criteria included having a background in basic and pre-clinical sciences or a lack of consent to participate. The project manager utilized the list of students enrolled in practical courses at the time of the research, totaling 345 individuals, whose attendance was required across various departments. With permission from department lecturers at Ahvaz Dental Faculty, questionnaires were distributed to 50 students, conveniently selected from the list. The study's objectives and the confidentiality of results were verbally explained to the students, who were then

requested to complete and return the questionnaire. Any clarifications regarding the questionnaire could be sought from the question design moderator. Each student was allotted two hours to complete the questionnaire, and returning the questionnaire signified consent to participate. Full completion of all questions was mandatory, and incomplete questionnaires were excluded from the study.

The sample size was calculated based on previous studies, considering a 95% confidence level and the standard deviation for the knowledge score from the same former study (1), with an estimation error of 0.5. As a result, 150 dental students were recruited. Considering the possibility of students not returning or not completing the questionnaires, it was decided to distribute questionnaires to 200 students.

After providing a brief explanation about the study's objectives, the questionnaire was distributed among the students who were present at the faculty on the day of the study, as their attendance at the faculty based on their curriculum was mandatory. The sampling method was census. They were asked to answer all the questions, and in case of ambiguities, they could raise them. The responses were collected anonymously.

### 3.4. Statistical Analysis

Descriptive statistics were calculated by determining the mean and standard deviation, percentage, and frequency distribution for four different inputs. T-tests and Mann-Whitney tests were used for statistical analysis of quantitative variables. The significance level in statistical tests was set at 0.05, and P-values less than 0.05 were considered significant. After collecting the questionnaires and checking the students' answers, the data were analyzed using SPSS-26 software.

## 4. Results

Out of 150 students participating in the study, 67 were male (44.7%) and 83 (55.3%) were female. Among the participants, 48 (32%) were sixth-year dentistry students (interns), and 27 (18%), 39 (26%), and 36 (24%) were third-year, fourth-year, and fifth-year students, respectively. The mean age of the subjects was  $24.4 \pm 1.93$  years. Table 1 presents the mean scores and range of correct answers in each entry. The analysis of variance test showed that the mean scores of total knowledge were significantly different among the four entries ( $P < 0.001$ ).

The highest percentages of correct answers were for questions one (75.5%), four (72.2%), and twelve (70.7%). The highest percentages of incorrect answers were for questions fourteen (80.5%) and ten (80%) (Table 2). In response to the seventeenth question about the risk of transmission of infection in the case of a needle stick with a known HIV patient, only 58.3% of 2016 and 2017 entry students, 33.33% of 2018 entry students, and 14.8% of 2019 entry students provided the correct answer, indicating that their knowledge is inadequate in this area.

**Table 1.** Comparison of the Average Score of Total Awareness in Four Academic Entrances

Entrance	Mean $\pm$ SD	Range	P-Value
95	11.3 $\pm$ 1.65	8 - 17	< 0.001
96	11.02 $\pm$ 2.96	4 - 17	
97	8.10 $\pm$ 2.54	4 - 12	
98	6.85 $\pm$ 2.41	2 - 12	
Total	9.60 $\pm$ 3.05	2 - 17	

**Table 2.** Frequency Distribution of Students' Responses to Dental Management Questions of Medically Injured Patients

	Students Answer	No. (%)
1- What is the general standard prophylaxis to deal with endocarditis?	Correct	112 (75.5)
	False	38 (24.5)
2- In case of penicillin allergy, what is the drug of choice in infective endocarditis?	Correct	80 (53.3)
	False	70 (46.6)
3- In a patient with hypertension, if the blood pressure is 200/100 mmHg, which one is preferable?	Correct	27 (18)
	False	123 (82)
4- What should be the INR for surgical procedures in patients who take anticoagulants?	Correct	109 (72.7)
	False	41 (27.3)
5- A patient with an angina pectoris attack, if she/he does not improve after using 2-3 sublingual nitroglycerin tablets, after how many minutes should she be referred?	Correct	56 (37.3)
	False	94 (62.7)
6- In patients treated with anticoagulant drugs and abnormal INR, at least for how long before the surgical procedure should the drug be stopped?	Correct	73 (48.7)
	False	77 (51.3)
7- In which category of patients is general anesthesia prohibited?	Correct	62 (41.6)
	False	88 (58.4)
8- If a patient has an epileptic attack in the dental office, what is the treatment of choice?	Correct	51 (34)
	False	99 (66)
9- What is the maximum recommended dose for lidocaine with vasoconstrictor?	Correct	71 (47.3)
	False	79 (52.7)
10- What is the maximum recommended dose for lidocaine without vasoconstrictor?	Correct	30 (20)
	False	120 (80)

	Students Answer	No. (%)
11- How deep should the pressure on an adult's sternum be when performing CPR?	Correct	72 (48)
	False	78 (52)
12- Which is the best treatment for hematoma/ecchymosis?	Correct	106 (70.7)
	False	44 (29.3)
13- What is the best environment for keeping the avulsed tooth (if there is no access to HBSS solution)?	Correct	48 (32)
	False	102 (68)
14- What are the symptoms that enable the doctor to diagnose hypoglycemia in a diabetic patient?	Correct	29 (19.5)
	False	121 (80.5)
15- What is the drug of choice for a disease with acute anaphylactic reaction?	Correct	48 (32)
	False	102 (68)
16- Internationally, the red ribbon is the symbol of which disease?	Correct	115 (77.3)
	False	35 (8.27)
17- What is the risk of contracting HIV through a needle stick injury from an HIV positive patient?	Correct	66 (44.3)
	False	84 (55.7)
18- Living with HIV positive patients in the community	Correct	17 (11.3)
	False	133 (88.7)
19- What is the prophylaxis protocol for a person after exposure to HIV virus?	Correct	106 (70.7)
	False	44 (29.3)
20- In which of the following patients is the absolute prohibition of prescribing vasoconstrictors in dentistry?	Correct	111 (74)
	False	39 (26)

The mean level of knowledge in different subjects among different entries was evaluated, and it was found that sixth-year students have a higher level of knowledge than other students in all subjects ([Figure 1](#)). [Table 3](#) shows the frequency of answers to dichotomous questions based on students' personal opinions. Additionally, 107 subjects (71.3%) were not satisfied with the way dental considerations of systemic diseases were taught, and 95 subjects (63.3%) did not allocate sufficient time to study the dental management of medically compromised patients.

**Table 3.** Frequency Distribution of Answers Questions of Dental Students About Dental Management of Medically Compromised Patients

Questions	Students Answer	No. (%)
Are you interested in "dental management of the medically compromised patient"	Yes	86 (57.3)
	No	64 (42.7)
Do you think that the "theoretical" teaching of dental management of the medically compromised patient is	Yes	65 (43.3)
	No	95 (63.3)

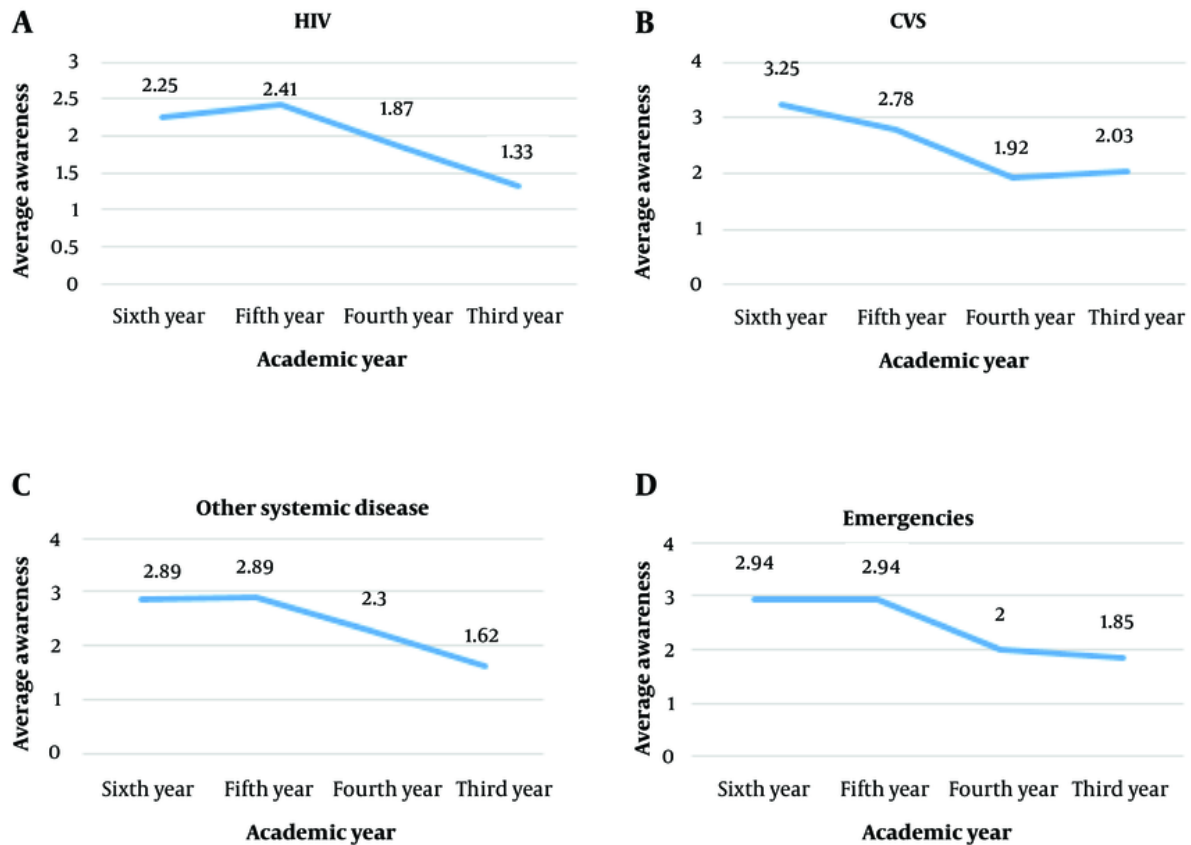
Questions	Students Answer	No. (%)
sufficiently considered in the educational curriculum of dental students?	No	85 (56.7)
Do you think the "practical" teaching of dental management of the medically compromised patient is sufficiently addressed in the educational curriculum of dental students?	Yes	59 (39.3)
	No	91 (60.7)
Are you satisfied with the way of teaching dental management of medically compromised patient?	Yes	43 (28.7)
	No	107 (71.3)
Are you dedicating enough time to study the dental considerations of systemic diseases?	Yes	55 (36.7)
	No	95 (63.3)
How important is the topic of teaching dental considerations of systemic diseases to dental students	Low	30 (20)
	Moderate	62 (41.3)
	High	58 (35.7)

## 5. Discussion

The results revealed that the level of knowledge of all students about the dental considerations of systemic diseases is moderate. According to most students, the mentioned subject has moderate to high importance for them. However, most of them do not allocate sufficient time to study this course and are dissatisfied with the way it is taught.

The mean score of students' knowledge of dental considerations for systemic patients was 9.96. According to Ghapanchi et al.'s study, the scoring system in Iran categorizes a score of 0 to 7 out of 20 as weak, 8 to 14 as medium, and 15 to 20 as good. Thus, the level of students' knowledge about the dental management of medically compromised patients in this study is evaluated as medium (6). These results are consistent with those of studies conducted by Konidena et al. (1) and Tanveer et al. (7) on dental students' and dental school employees' knowledge about dental considerations for various systemic diseases, and Narayan et al. (8) on dental interns' knowledge about first aid.

A study showed that the main source of knowledge for dentists was their academic studies, not their work experience or post-graduate learning such as retraining courses (9). Considering that staying away from the academic environment can lead to a loss of knowledge regarding dental considerations for systemic patients



**Figure 1.** Comparison of the mean knowledge of students of different entrances in the studied subjects

The mean score of fifth- and sixth-year dentistry students' knowledge was higher than that of third- and fourth-year students. These results are consistent with those of studies conducted by Konidena et al. (1) and Tanveer et al. (7) on dentists' knowledge about dental considerations for various systemic diseases, and Narayan et al. (8) on dental interns' knowledge about first aid. The present study revealed that as academic years and the completion of different courses increase, so does the level of students' knowledge about the dental management of medically compromised patients (Table 1). This aligns with the results of the study by Mojarrad et al. (10), which showed that dental residents have more knowledge than interns. Al-Mohaissen et al. also showed that the level of knowledge about dental considerations for cardiac patients increases with higher academic degrees (11). However, since dealing with medically compromised patients and

providing services is not restricted to the academic year of students according to the dental curriculum, and a fourth-year dental student may provide dental services to a patient with a systemic problem, it is necessary to include these courses in the initial years of their study.

Rashidi Maybodi et al. (9) showed that the level of knowledge of dental interns about dental considerations for pregnant women is above moderate and good. This result is not consistent with that of the present study since the former only measured knowledge about one topic, whereas the present study assessed knowledge about various systemic diseases (Figure 1).

In the present study, the highest correct answer rate was related to the correct antibiotic prophylaxis protocol to prevent bacterial endocarditis, with more than 75% of the students answering correctly. This is



consistent with the results of the study by Kumar MP and S (12), which showed that out of one hundred dentistry students in India, 73% knew the correct guideline for the choice of antibiotic and its dose. Gangá et al. (13) in France reported that the level of knowledge of French dentists about infective endocarditis was near 50%. Ryalat et al. from Jordan found that 39% of dentists were unaware of the correct guidelines for patients needing antibiotic prophylaxis, a finding inconsistent with the present study. This discrepancy could be attributed to differences in the study population (students versus dentists) and the study locations (Iran and Jordan) (14). The guidelines related to antibiotic prophylaxis in heart patients are regularly updated every few years (8), and frequent training is necessary to learn these changes. However, this may not occur due to the completion of the dentists' education period.

The most frequently incorrect answer in this study was related to diagnosing the symptoms of hypoglycemia in a patient with diabetes mellitus. Khodakarami et al. (15) showed that the prevalence of diabetes gradually increased from 2004 to 2016 in Iran, reaching about 13%. A significant number of patients are not aware of their disease. Parirokh et al. (16) also showed that these patients are among the most common who refer to dentists for medical services. Hypoglycemia is considered a type of medical emergency in type 1 diabetes patients. Its symptoms should be identified quickly, and appropriate treatment should be provided to prevent complications. Thus, it is necessary to enhance the knowledge of dentistry students and dentists in this area.

In the thematic classification of the questions, the mean knowledge of the students participating in this study in the HIV area was lower than in cardiovascular areas, medical emergencies, and other systemic diseases (Figure 1). Only 44% of the students provided correct answers regarding the risk of HIV transmission, while the rest overestimated the transmission risk. Alali et al. (17) also showed that the level of knowledge of Saudi students about HIV patients is weak, which is consistent with the present study. However, the result of the present study is not consistent with the studies by Singh et al. (18), Susgun Yildirim, et al. (19), Grover et al. (20), and Sufiawati et al. (21). In all these studies, the knowledge of dentistry students was higher than in the present study. This inconsistency might be due to

differences in the study population. In the present study, all pre-clinic, clinic, and intern students were investigated. However, the above-mentioned studies included only either pre-clinic or intern students.

Every curriculum needs to be evaluated to ensure its quality and further improvement. The Kirkpatrick model for evaluating a curriculum includes four levels: Reaction, learning, behavior, and outcomes. These levels evaluate the goals of a curriculum. Monitoring students' reactions to their educational experience is increasingly used in academic centers. It is stated that this initial level of evaluation (reactions) should be an inherent dimension of any curriculum. Students' satisfaction with a curriculum is the most common evaluation index at the reaction level (22). Accordingly, we asked the students to state their satisfaction with the way dental management of medically compromised patients is taught. The results showed that 71% of the students were not satisfied with the teaching. Based on our search, no scientific study directly investigates this issue. However, we can refer to the study by Alqarni (22), who evaluated the satisfaction of students from different educational departments of the Faculty of Dentistry. They showed that students had the lowest level of satisfaction with the transparency of educational goals from the Department of Oral and Maxillofacial Diseases (oral medicine), which is in charge of teaching dental considerations for systemic patients. This comparison indicates that the results of the two studies are consistent.

Teaching the dental considerations of systemic patients is a significant part of Iranian faculties of dentistry. After the basic science exam, students get acquainted with this subject and continue learning it until the final year. The current generation of students has a high level of knowledge due to access to various social networks and internet-based educational platforms. Elliott and Healy argue that students are satisfied when their actual experiences meet or exceed their initial expectations. They defined satisfaction as a short-term attitude resulting from an evaluation of a student's educational experience (23). Dissatisfaction may lead to the non-provision of dental treatment services by these future dentists to medically compromised patients. A survey showed that 83% of students considered their undergraduate training on patients with "special needs" to be poor. When asked

about their willingness to treat those people in the future, 50% were not willing to do so (24).

Dentistry is considered a clinical field, and acquiring sufficient skills and receiving appropriate training is crucial, especially in the field of dental considerations of systemic diseases, as this can improve the level of oral and dental health of patients with systemic diseases. The present study has some limitations. Access to facilities, the performance of lecturers, and the expectations of students may not be the same in different faculties of dentistry. Therefore, it is not possible to generalize the results of this study to all faculties of dentistry. Evaluating the level of knowledge and professional satisfaction of dentists who graduated in previous years about the subject of the study can help us gain a deeper understanding of the effectiveness of training and education in this field and make the curriculum more fruitful.

### 5.1. Conclusions

Although final-year students exhibited greater knowledge compared to their peers in lower years, overall, students' understanding of the dental considerations related to systemic diseases was deemed average. Additionally, the majority of students expressed dissatisfaction with the teaching approach for this subject.

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### Footnotes

**Authors' Contribution:** Mohammad Shooriabi: Study conception and design; Mahdiyeh Ezati: Data gathering; Sedigheh Modarres Mousavy: Data gathering; Mohammad Shooriabi: Drafting the manuscript and critical revision; Mahdiyeh Ezati: Data analysis.

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**Data Availability:** The dataset presented in the study is available on request from the corresponding author during submission or after publication.

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