Original Article

Assessment of Knowledge and Attitude of Dentistry Professors, Residents, and Interns Towards Medical Emergencies at the Dental Faculty of Hamadan University of Medical Sciences

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Abstract

Background and Aim: Life-threatening medical emergencies might happen at any time to a patient in a dental office. These emergencies should be treated immediately and cannot be avoided or referred. The purpose of this study was to assess the knowledge and attitude of dentistry professors, residents, and interns towards medical emergencies at the dental faculty of Hamadan University of Medical Sciences.

Materials and Methods: A cross-sectional study was conducted among 174 dental practitioners practicing as dentistry professors, residents or interns at the dental faculty of Hamadan University of Medical Sciences. A questionnaire comprised of three parts, including demographics, knowledge, and attitude, was distributed among the participants. The collected were tabulated and analyzed using SPSS 24. The results were reported in terms of the frequency. Comparisons were made using one-way analysis of variance (ANOVA) with a 95% confidence interval (CI). $P<0.05$ was considered statistically significant.

Results: The residents' knowledge score was significantly higher than that of the faculty members ($P=0.02$). The faculty members' score was higher than that of the interns but the difference was not significant. Less than half of the participants stated that the quality of the provided theoretical educations was satisfactory.

Conclusion: The results indicate the lack of proper medical emergency preparedness among the studied dentists. It seems that periodic theoretical and practical medical emergency training courses are necessary for dentists during education and, more importantly, after graduation.

Key Words: Knowledge, Attitude, Dentistry, Medical Emergency Service

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Introduction

Dental sciences are interwoven with medical and biological foundations [1]. medical emergencies and urgencies might happen at any time to a patient in a dental office [2]. An emergency may be defined as a situation that may put the patients' lives at risk, while urgency is defined as a condition where there is no

significant risk to the patients' lives; nevertheless, immediate management is crucial in both cases [3]. Emergencies should be treated immediately and cannot be avoided or referred because they put the lives and health of the patients at risk [3]. Legally, the jury would expect dentists to be trained in treating any complication resulting from treatment, at least to the extent of providing basic life support (BLS) [3]. Dentists should be familiar with emergency interventions including BLS and, if necessary, advanced methods such as administration of specific medications [2]. To reach the best diagnosis and provide proper treatment, a dentist has to be well prepared to manage medical emergencies [1]. Despite this demand, previous studies have shown that the knowledge and skills of dentists from different countries regarding cardiopulmonary resuscitation (CPR) and medical emergencies are inadequate [4-6], and dental graduates across the world may not be adequately prepared for the management of medical emergencies [7].

Many schools have tried to compensate for this deficiency by introducing certain emergency medical requirements; nevertheless, many dental students miss the chance of getting enough training at dental schools [2]. The purpose of this study was to assess the knowledge and attitude of dentistry professors, residents, and interns towards medical emergencies at the dental faculty of Hamadan University of Medical Sciences.

Materials and Methods

A cross-sectional study was conducted for three months, from October 2017 to December 2017, among 174 dental practitioners practicing as professors, residents or interns at the dental faculty of Hamadan University of Medical Sciences, Hamadan, Iran. The ethical code assigned to this paper is IR.UMSHA.REC.1395.487.

Every dentistry professor, resident or intern who studied only at Iranian universities and was practicing at the mentioned dental faculty during the study was invited to participate in the research.

The questionnaire consisted of three parts, including demographics, knowledge (Table 1), and attitude (Table 2). Before sampling, the questionnaires were assessed by 10 experts, and the content validity ratio (CVR) of each question was calculated. The CVR of the questions ranged between 0.71 and 0.86. Also, to assess the reliability of the third part of the questionnaire (attitude), 30 participants were randomly selected to respond, and the Cronbach's alpha was assessed to be 85% which indicates the high reliability of the questionnaire.

The demographic part was directed towards obtaining the following information about each volunteer: gender, birth year, years of experience (if available), and type of activity at the college (professor, resident or intern).

The second part consisted of 20 closed-ended questions to assess the theoretical knowledge of the volunteers on diagnosis and treatment of common medical emergencies, such as asthma, hyperventilation, thyroid crisis, stable angina, anaphylactic reactions, vasovagal syncope, hypoglycemic shock, and myocardial infarction (MI), which may occur in dental offices.

The third part consisted of 13 closed-ended questions pertaining to attitude and perceived confidence of the participants in handling medical emergencies in the dental clinic.

The collected data were tabulated and analyzed using SPSS 24 (IBM Corp., Armonk, NY, USA).

The results were reported in terms of the frequency. Comparisons were made using one-way analysis of variance (ANOVA) with a 95% confidence interval (CI). $P<0.05$ was considered statistically significant.

Results

A total of 174 out of 205 dental practitioners at the dental faculty of Hamadan University of Medical Sciences agreed to participate in the study. The respondents were divided into three groups as professors (N=46), residents (N=68), and interns (N=60). The age of the respondents ranged from 23 years to 58 years with the mean age of 35 years.

43% of the participants were males, and 57% were females. The mean work experience of the

participants was 8 years for professors and 3 years for residents (Table 3).

As Table 4 shows, the P-value for all the questions questions was <0.001; this indicates that there is a significant difference between the knowledge of the participants and their job status.

To assess the significance of the difference between the mean scores of the participants' knowledge in the three groups, one-way ANOVA was used. There was a significant difference between the mean scores of knowledge in the three groups (P<0.001).

Table1. Knowledge assessment questionnaire

Knowledge assessment questions	Professor	Resident	Intern
What are the first therapeutic measures in acute asthma attacks, respectively?			
What is considered as an inappropriate action in treating a patient with hyperventilation?			
Which of the signs does not appear in hyperventilation?			
What is the most appropriate approach of a dentist in case of a thyroid crisis?			
Which option is incorrect about dental treatment protocols for patients with stable angina?			
What is the essential treatment for an acute anaphylactic reaction?			
What is the effective treatment for vasovagal syncope?			
What is the first effective treatment for hypoglycemic shock?			
What is the appropriate treatment for a patient anesthetized due to foreign body aspiration?			
Which of the following actions is suitable when a pregnant woman in the 8th month of pregnancy experiences orthostatic hypotension during dental treatment?			
What is your treatment procedure for a patient that suffers from orthostatic hypotension due to the use of antihypertensive drugs and experiences dizziness and blurred vision when he gets out of the dental unit?			
Which drug is usually used as an injection to control severe epileptic seizures?			
What is the first therapeutic procedure for a patient with a seizure attack?			
Which one is not a symptom of acute adrenal crisis?			
Which of the characteristics is not related to the myocardial infarction (MI)-associated pain?			
Which of the signs is related to severe intoxication with local anesthetic drugs?			
What is the first step in the treatment of mild overdose of topical anesthetic drugs?			
What is the main cause of syncope?			
What is your first treatment choice when a patient is suffering from severe bleeding?			
What are your first steps in case of an MI, respectively?			

Table 2. Attitude assessment questionnaire

Attitude assessment questions	Professor			Resident			Intern		
	No	I don't know	Yes	No	I don't know	Yes	No	I don't know	Yes
Have enough self-confidence to treat patients with systemic disease									
Know the indications and how to use standard drugs and devices of emergency kits									
Evaluation of medical emergency equipment prior to starting the work									
Ability to diagnose and treat a patient who suddenly loses his consciousness during dental treatment									
Ability to properly manage a patient who has a seizure attack									
Know to deal correctly with a patient who has been exposed to foreign body aspiration									
Have the ability to properly diagnose the emergencies that you have encountered									
Have the ability to properly treat the emergencies that you have encountered									
	high	low	never	high	low	never	high	low	never
How do you assess that dentists need to be retrained?									
	good	moderate	poor	good	moderate	poor	good	moderate	poor
How do you evaluate the theoretical training related to the prevention and treatment of medical emergencies in dentistry?									
How do you evaluate the practical training related to the prevention and treatment of medical emergencies in dentistry?									
In your opinion, courses for medical emergencies for dentists should be available at least once…?									

Table 3. Descriptive analysis of age (year) and work experience (year) of the participants

-	N	Age		Experience	
		Mean	SD	Mean	SD
Attending	46	35	5.49	8	2.38
Resident	68	28	2.15	3	1.24
Intern	60	24	1.10	0	0

SD=Standard Deviation

Table 4. Results of one-way analysis of variance (ANOVA) in assessing the significance of the difference between the mean scores of participants' knowledge in the three groups

-	N	Mean	SD	F	P-value
Attending	46	9.73	3.51		
Resident	68	11.48	2.42	12.41	<0.001
Intern	60	9.31	1.86		

SD=Standard Deviation

By considering the significant result of ANOVA, to measure the difference between the mean scores of knowledge of the groups, pairwise comparisons were made using Tukey's HSD (honestly significant difference) test. The difference between the scores of the residents and the other two groups was significant (P=0.02) but the difference between the scores of the professors and the residents was not significant (P=0.68). These findings indicate that the difference in knowledge is significant between the professors and the residents and between the residents and the interns but it is insignificant between the professors and the interns.

To assess the significance of the difference between the mean attitude scores of the participants in the three groups, one-way ANOVA was used. As Table 5 shows, there is a significant difference in the mean attitude score among the three groups.

By considering the significant result of ANOVA, to measure the difference between the mean attitude scores of the groups, pairwise comparisons were made using Tukey's HSD test. P-values indicate that the difference in attitude between the professors and the residents and between the professors and the interns is significant (P=0.02); however, the difference between the residents and the interns is not significant (P=0.80).

In the present study, 19.6% of the faculty members, 40% of the residents, and 30% of the interns described the quality of the provided theoretical educations satisfying to some extent, whilst others were not satisfied. Moreover, 26% of the faculty members, 50% of the residents, and 50% of the interns were satisfied by the quality and quantity of the provided practical educations. The present study revealed that one (2.2%) faculty member, 7 (10.3%) residents, and 29 (48.3%) interns were unable to perform any kind of injections used in medical emergency conditions. Intramuscular (IM) injection was the most known type of injection between the participants with 93% of the faculty members, 70% of the residents, and 50% of the interns being familiar with it.

39% of the faculty members, 6% of the residents, residents, and 10% of the interns claimed that

Table 5. Results of one-way analysis of variance (ANOVA) in assessing the significance of the difference between the mean attitude scores of the participants in the three groups

-	N	Mean	SD	F	P-value
Attending	46	36.43	6.10		
Resident	68	32.28	6.28	10.29	<0.001
Intern	60	31.71	4.61		

SD=Standard Deviation

they were able to perform intravenous (IV) injections. In the present study, 13 faculty members reported a total of 18 medical emergency conditions. Ten residents encountered a total number of 13 emergency conditions, and 8 interns encountered a total number of 9 medical emergency conditions. Details are shown in Table 6.

Considering the fact that all the participants of the present study are from the same department, it is probable that in some cases, the participants faced the same medical emergency conditions simultaneously; hence, in order to estimate average medical emergency condition per each clinician and to avoid errors arising from repetitious encounters, only the population of the faculty members is included in the calculations.

Regarding the 18 medical emergency conditions encountered by 46 faculty members, it can be estimated that each clinician may encounter medical emergency conditions once over a time period of 2.6 years.

Discussion

As discussed above, the importance of up-to-date knowledge and the ability of dentists to manage the medical emergencies during dental treatments is obvious.

The occurrence of medical emergencies is probable at any time and anywhere but in dentistry, it is more probable for patients with an underlying systemic disease because stress exacerbates and initiates many diseases, such as chest discomfort, dysrhythmia, pulmonary edema, acute respiratory dysfunction, hypoventilation, and vasovagal syncope [8,9]. It is said that about three-quarters of emergencies occurring in dentistry offices are due to the lack of attention of dentists to patient anxiety and failure to comply with stress reduction protocols [10].

In this study, the responsiveness of the participants (46 faculty members, 68 residents, and 60 interns) to questions about medical emergencies was 49%, 57%, and 46 %, respectively. Statistically, there was no significant difference between the faculty members and the interns but both groups differed significantly from the residents. In other words, the knowledge of the residents was significantly higher than that of the faculty members. Most likely, because faculty members have passed the relevant courses years ago, the lack of repetition and routine use of these sciences has led to forgetfulness.

Narayan et al [11] assessed the level of knowledge and skill in 202 students (102 general dental students and 100 residents) in one of the Indian dental schools and reported a moderate level of knowledge in both groups without significant differences. They stated that only 19.6% of the interns and 20% of the residents had good knowledge of medical emergencies (they did not mention in their article how to divide knowledge into low, medium, and good). In the present study, the knowledge of the residents was significantly higher than that of the interns.

In this study, 26% of the faculty members, 50% of the residents, and 50% of the interns were satisfied with the quality and quantity of their education. This is consistent with the results of studies conducted in New Zealand and Brazil in which more than 50% of the participants agreed with their education [12,13]. Also, in

Table 6. Frequency distribution of medical emergency experiences among the participants within the last year

Type of emergency	Faculty member	Resident	Intern
Vasovagal syncope	10	6	5
hyperventilation	2	0	0
Orthostatic hypotension	2	2	0
Hypoglycemic shock	2	0	1
Angina pectoris	2	1	0
Seizure	0	0	0
Myocardial infarction (MI)	0	0	1
Local anesthetic drug overdose	0	1	0
Hypertension	0	2	0
Total	18	13	9

other studies conducted on general dentists in Australia and the United Kingdom, the participants' satisfaction from education was 55% and 40-30%, respectively.

Several studies have been carried out on the prevalence of various medical emergencies related to dental treatments, which have concluded that such emergencies are common with different degrees and severity but serious life-threatening emergencies are relatively rare [7]. This finding was confirmed by the present study, which will be discussed in more detail below.

In this study, the most common medical emergency reported by the participants was vasovagal syncope. Orthostatic hypotension, hyperventilation, hypoglycemic shock, and angina pectoris were reported with a relatively similar prevalence, respectively. Overdose of local anesthetics, anaphylaxis, and seizures were reported with a minimum incidence.

In a similar study conducted in Brazil, the most commonly reported medical emergencies were syncope and orthostatic hypotension [4]. Mild allergic reactions, increased blood pressure, asthmatic attacks, and syncope were prevalent, largely reflecting the results of the present study. Both in the mentioned study and in our study, the occurrence of life-threatening medical emergencies, such as anaphylaxis, was less prevalent, while less threatening emergencies, such as syncope and orthostatic hypotension, were the most common.

According to a study conducted in the United Kingdom, general dentists face medical emergencies every 3.6 to 4.5 years [14]. This statistic was higher in our study and was about 1 in every 2.6 years. The reason for this difference can be the diversity in the research population. In the study conducted in the United Kingdom, the participants were general dentists working in private clinics.

It can be stated that patients who have a particular underlying problem do not refer to general dentists. Also, general dentists choose their patients and do not provide stressful treatment for patients with systemic disease and preferably refer them to the relevant specialist.

Our study was conducted in a university which is a place where different patients are referred to with various underlying problems and hard-line remedies or with a view to the hope that in the educational environment, the knowledge and the ability of dentists specializing in medical emergencies are at a higher level. As a result, such emergencies are expected to occur more prevalently in

educational settings and specialized offices, similar to the situation of our study.

In another study conducted in Brazil with the participation of interns and residents of a dental school, 75% of the participants reported that they had experienced at least one medical emergency in their patients during the past year [4], which is somewhat close to the findings of our study in terms of the prevalence.

In our study, 52% of the professors, 29% of the residents, and 37% of the interns stated that they had enough self-confidence to perform dental treatment for a patient with systemic disease. Of course, the higher statistic related to the interns in this study, although less knowledgeable than the rest of the groups, is likely to be due to less experience and false self-confidence.

A study by Chapman [15] in Australia showed that 55% of the dentists participating in the study were confident enough to perform CPR. These statistics were also reported in India to be 55% in a study by Mohan et al [6], which is somewhat consistent with the present study although the percentage was slightly lower in our study. Chew et al [16], in a study conducted on 100 young general practitioners in a Malaysian hospital (2011), stated that 85% of the participants did not have the confidence to perform CPR, while these people are almost always the first line of emergency care for the patient. Of course, the fact that the general practitioners in the mentioned study had lower self-esteem than the dentists in our study was not very cited as firstly, the questionnaires were not the same in the two groups, and secondly, due to the lack of a feasibility study and the deduction of the results of theoretical questions and the individual statements of the participants, the result cannot be very reliable. They also reported that self-esteem increases with an increase in work experience, while general health practitioners have emphasized the need for more academic and practical education during their trainings as well as continuous retraining at least once in two years [16].

According to a self-assessment by the participants, 63% of the professors, 40% of the residents, and 38% of the general students said they were prescribing and using the equipment and drugs in the emergency kit. In a study done on Brazilian dentists, 28% of the participants said they knew how to use emergency equipment [3]; this percentage is lower than that reported in our study probably because the participants in the mentioned study were all general dentists, while in our study, professors and residents were also evaluated.

With regard to the equipment needed to manage emergency situations, in our study, only 45% of the professors, 40% of the residents, and 45% of the interns stated that they assess the presence or absence of emergency equipment at the site before starting to work. A similar study was not found for comparison but this figure correlates somewhat with the number of people who believe they know how to use and prescribe emergency drugs. In other words, people who believe they know how to use drugs, control their availability before starting to work, whereas those who believe that they do not know the use of drugs of emergency kits and do not have enough confidence in this field neglect to investigate the availability of emergency equipment, which accounts for more than half of the participants of our study. This confirms the need for more academic and practical training courses among people of all the three groups.

In the field of practical skills necessary for management of emergencies during dental treatment, one of the most important and most practical skills is the ability to inject the drugs; for example, although an anaphylaxis shock is rare, as it was mentioned earlier, if the patient is allergic to topical anesthetic drugs, its occurrence is probable. Anaphylaxis shock is extremely life-threatening, and in the absence of timely intervention, the patient may even die. The most important action in treating these individuals is IM injection (epinephrine) at the earliest possible time [17].

Assuming the correct diagnosis of this condition by the participants in this study, 10-50% stated that they were able to perform such an injection while doing so could save a patient from the risk of certain deaths.

In a study performed in Brazil, about 75% of the dentists believed that they had the ability to perform IM injections [4], which is higher than the percentage reported in our study. In the present study, on average, 20% of the participants stated that they were capable of IV injections (39% of the faculty members, 6% of the residents, and 10% of the interns). This percentage was 35% according to the study performed among Brazilian general practitioners [4], which is slightly higher than that reported in our study, taking into account the differences in the level of education of the participants in the two studies.

About 55% of the participants of our study believe they are capable of taking appropriate action for a patient that had foreign body aspiration. This percentage was reported in the Brazilian study to be 60% [4], which is almost consistent with our study. In another study in India, this percentage was reported to be 20% for general students and 46% for residents [6], which are lower than the percentage reported in our study.

The results of our study indicate that dentists are inadequately prepared for the management of medical emergencies during dental treatment. Atherton et al [18] also believe that re-education of medical emergencies should include all dentists (students and faculty members).

Some non-routine therapies should be frequently trained and repeated so that they can be properly implemented if necessary [7]. The lower knowledge score of the faculty members in our study, compared to the residents, also emphasizes the fact that the passage of time, lack of repetition, and failure to use the existing knowledge make the faculty members forgetful. Carvalho and colleagues [13] reported that Brazilian dentists were eager to learn the management of medical emergencies on a regular basis during their years of activity.

In addition, due to the update of the guidelines every 5 years, continuous retraining seems to be necessary to keep up-to-date with the latest changes. Since December 2005, dentists in the United Kingdom have been required to spend at least two hours of training on emergencies every two years; 80% of them considered these courses necessary and sufficient [11]. In our study, most participants were interested in training courses to be conducted at least once a year. Nevertheless, after examining regular educational courses, it is advisable to consider whether they are sufficient or not.

The inability to practically examine the skills of the participants was one of the main limitations of this research; even if the participants have sufficient knowledge to answer the questions, they may not be able to manage the medical emergencies of dental patients.

Conclusion

The present study revealed that the knowledge of the professors, residents, and interns of the dental faculty of Hamadan University of Medical Sciences, Hamadan, Iran, about medical emergencies in dentistry is moderate to poor.

It seems that periodic theoretical and practical medical emergency training courses are necessary for dentists even after graduation.

Most of the participants believe that holding training courses once or twice a year is suitable.

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