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ORIGINAL RESEARCH

Medical Emergency Management among Iranian Dentists

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ABSTRACT

Aims: More than 18,000 patients need medical emergencies management in dental offices in Iran annually. The present study investigates medical emergencies management among Iranian dentists.

Materials and methods: From the list of the cell phone numbers of the dentists practicing in the city of Tehran, 210 dentists were selected randomly. A self-administered questionnaire was used as the data collection instrument. The questionnaire requested information on personal and professional characteristics of the dentists, as well as their knowledge and self-reported practice in the field of medical emergency management, and availability of required drugs and equipments to manage medical emergencies in their offices.

Results: Totally, 177 dentists (84%) completed the questionnaire. Less than 60% of the participants were knowledgeable about characteristics of hypoglycemic patient, chest pain with cardiac origin, and true cardiopulmonary resuscitation (CPR) practice. Regarding practice, less than one quarter of the respondents acquired acceptable scores. In regression models, higher practice scores were significantly associated with higher knowledge scores ($p < 0.001$).

Conclusion: The results call for a need to further education on the subject for dentists. Continuing education and changing dental curriculum in the various forms seems to be useful in enhancement of the self-reported knowledge and practice of dentists.

Clinical significance: To successful control of medical emergencies in the dental office, dentists must be prepared to recognize and manage a variety of such conditions. In addition to dentist's knowledge and skill, availability of necessary equipments and trained staff is also of critical importance.

Keywords: Medical emergencies, Dental education, Emergency treatment, Dentists, Iran, Cross-sectional.

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INTRODUCTION

Medical emergencies in dental practice are uncommon but they can be potentially serious and life-threatening.[1-3] The number of medically compromised patients seeking dental care is growing with improvement of the quality of healthcare. It has been shown that about half of all patients treated by dental students have at least one chronic disease or condition.[4] It should be noted that the dentist will often be held legally responsible for any untoward outcome allegedly resulting from causation or mismanagement of these medical emergencies.[3] To control these conditions successfully, dentists must be prepared to recognize and manage a variety of medical emergencies in the dental office.[2,4] In addition to dentist's knowledge and skill, availability of necessary equipments and trained staff is also of critical importance.[5]

Many of the previous studies on dentists' preparedness to manage emergency conditions in various countries have shown that some deficiencies exist in this regard.[1,6-10] Thus, although nearly all dentists have received trainings in this context, most of them are receptive to the idea of receiving further medical emergency-related training.[11] To design appropriate training, the first step is to recognize the areas in which the preparedness of the dentists is inadequate.

In Iran, prevalence of medical emergencies in dental offices has been reported to be 0.75 cases per dentist per year.[12] With regard to the fact that currently 24000 dentists work in Iran, annually more than 18000 patients are at risk of a medical emergencies in dental offices. The present study investigated medical emergencies management among Iranian dentists in terms of knowledge and self-reported skills as well as availability of necessary equipments and drugs.

MATERIALS AND METHODS

Subjects and Data Collection

The present study approved and supported by WHO Patient Safety Project. This cross-sectional study

was conducted in the city of Tehran, Iran. The target population was all dentists working in public and private offices in the city of Tehran. The inclusion criteria included working as a general practitioner in an office, and delivering a variety of dental services. Thus, the specialists delivering only specific services, or the general dentists working only in one discipline (for example pediatric dentistry) were excluded.

A list of the cell phone numbers of all dentists working in Tehran was prepared. After random selection of each dentist by random numbers table, we called him/her explaining about the study. If the dentist agreed we included his/her name in our sample. If not, the name was replaced with the next number in the list. We continued in this way till we could get agreement of 210 randomly selected dentists. These dentists were invited to participate in a continuing education program at Dental School of Tehran University of Medical sciences. At the date of the program, the dentists were asked to fill in a questionnaire. For those not participating in the program (70 dentists), the questionnaire was sent to their office by a peon to be collected after 1 or 2 days.

Questionnaire

A self-administered questionnaire was used as the data collection instrument. The first part of the questionnaire consisted of demographic, and personal and professional characteristics of the dentists. The next part of the questionnaire contained questions on knowledge, self-reported practice, and availability of requires drugs and equipments to manage medical emergencies.

To develop the questionnaires a comprehensive list of medical emergencies was prepared from a textbook. To provide content validity, using a Delphi method this list was sent to a group of experts. This group comprised one research methodologist, one specialist in emergency medicine, one specialist in oral and maxillofacial surgery, and three members of the research team. The questionnaire was distributed among a convenient sample of dentists two times to test its reliability. The kappa coefficient for knowledge questions was 0.79, and for practice questions was 0.83, meaning that about 80% agreement existed between the pre- and post-test answers of the respondents to the same questions. Thus, the reliability of the questionnaire was approved.

Knowledge

To assess knowledge, the respondents were asked to react to 12 statements regarding various aspects of medical emergencies management on a five-point Likert scale, ranging from completely agrees to completely disagree. The responses were then scored from one to five according to the degree of the respondent's knowledge. The scores were summed in order to calculate final knowledge scores varying from 12 (no correct answers) to 60 (correct answers to all the questions).

Self-reported Practice

To assess self-reported practice, eight cases representing various emergency situations were presented and the participants were asked to first make a diagnosis, and then describe and prioritize the actions that should be performed to manage the situation. The score for correct diagnosis was 1 and for incorrect diagnosis was 0. By summing the scores for eight cases, we calculated the final diagnosis scores varying from 0 (no correct diagnoses) to 8 (correct diagnosis for all the cases). Regarding the management of the cases, guidelines for scoring the response were extracted in an expert panel. Two calibrated members of the research team determined the score of each participant separately for each of the cases based on his/her responses (0-5). An acceptable practice score for each of the cases was defined as acquiring a score of 3, 4 or 5. For further analysis, by summing the scores, the final practice scores with the possible range of 0 (no correct answer) to 40 (correct answers for all the cases) were calculated.

Availability of the Drugs and Equipments

In the last part of the questionnaire, the availability of the drugs and equipments was evaluated through completing a checklist. If an item was available, the score was 1. Otherwise the score was 0.

STATISTICAL ANALYSIS

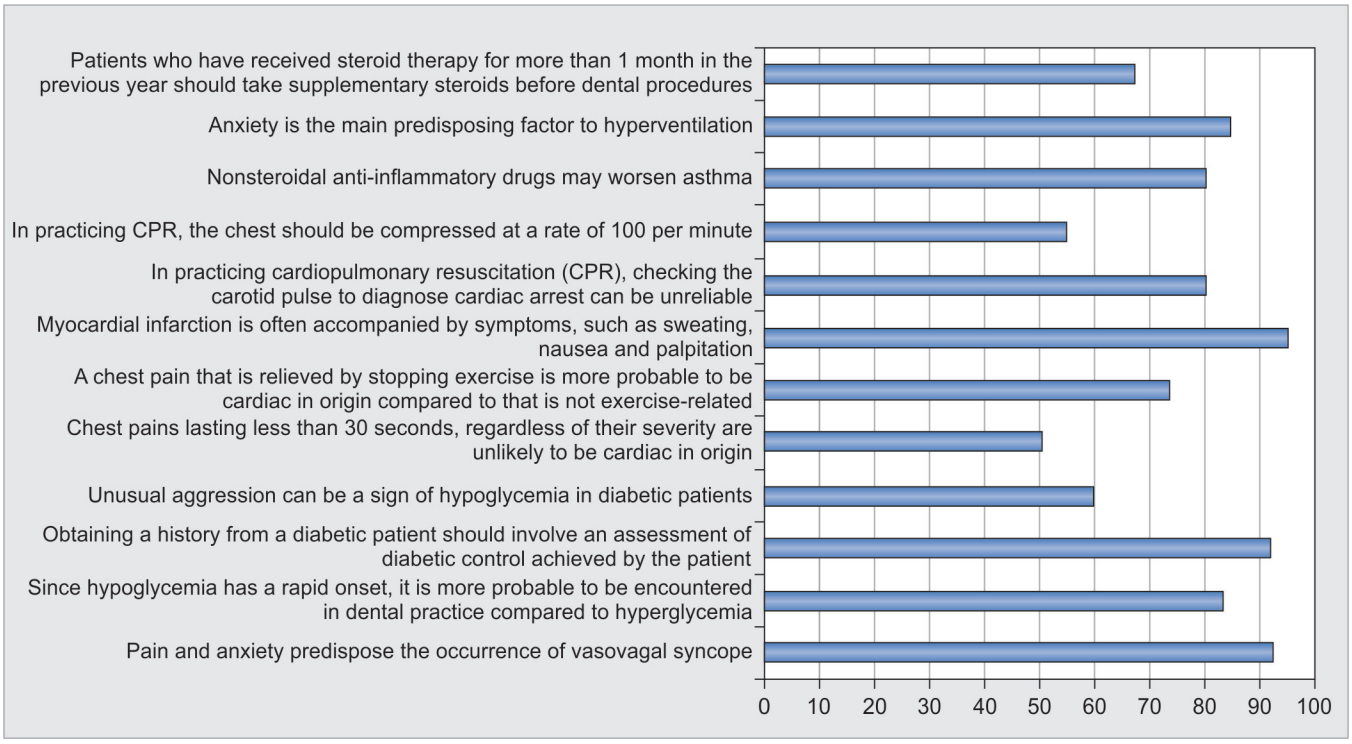
The data were analyzed with SPSS software, version 17.5. T-test and linear regression models served for statistical analyses.

RESULTS

In total, 177 dentists (84%) completed the questionnaire, of which 112 (63%) were male. The mean age of the respondents was 43 years (26-67).

Table 1 shows the professional characteristics of the participating dentists. Compared to women, men reported more practice experience in terms of months ($p = 0.01$). They also reported visiting more patients in a month compared to women ($p < 0.001$).

Graph 1 represents the percentage of the respondents with favorable answers to knowledge questions. As it can be seen, more than 90% of the respondents were aware of predisposing conditions for vasovagal syncope, impor-



Graph 1: The percentages of dentists (n = 177) who agreed with the statements given about medical emergencies

tance of including diabetic control in taking history from diabetic patients, and symptoms of myocardial infarction. On the other hand, less than 60% were knowledgeable about characteristics of hypoglycemic patient, chest pain with cardiac origin, and true cardiopulmonary resuscitation (CPR) practice. No gender difference existed in the dentists' responses to the knowledge questions.

As Table 2 shows, more than 70% of the respondents could make true diagnosis on vasovagal syncope, hypoglycemia, myocardial infarction and choking cases. However, less than one-third of them were successful in diagnosing adrenal crisis and hyperventilation. Regarding practice, for seven of the cases less than 15% of the respondents acquired acceptable scores. No gender difference existed in the respondents' diagnosis and practice scores.

Table 1: Professional characteristics of the sample (Mean ± SD)

	Men (n = 112)	*Women (n = 60)*	*p**
Total experience in dentistry in terms of months	188.7 ± 86.9	152.8 ± 90.1	0.01
Experience as a private dentist in terms of months	152.9 ± 85.9	98.2 ± 95.9	<0.001
Number of working hours in a week	36.0 ± 17.2	24.2 ± 10.8	<0.001
Number of patients in a month	139.2 ± 149.0	108.0 ± 115.3	0.18

*Independent sample t-test. SD: Standard deviation

In regression models (Table 3) while knowledge, diagnosis and practice of the dentists was not associated with any of the professional characteristics, higher diagnosis and practice scores were significantly associated with higher knowledge scores ($p < 0.001$).

As it can be seen in Table 4, just for 4 items out of the twelve items of necessary equipments and drugs more than half of the dentists reported presence of the specified item.

DISCUSSION

The present study investigated medical emergencies management among Iranian dentists in terms of self-reported knowledge and practice as well as availability of necessary equipments and drugs. While the knowledge of

Table 2: The percentages of the respondents (n = 170*) who made true diagnosis and acquired acceptable practice scores for each of the defined cases

	True diagnosis (%)	*Acceptable practice score (3,4 or 5) (%)*
Case 1: Vasovagal syncope	79.2	14.0
Case 2: Hypoglycemia	73.0	2.8
Case 3: Myocardial infarction	74.7	13.5
Case 4: Cerebrovascular accident	35.4	21.3
Case 5: Choking	77.5	1.7
Case 6: Adrenal crisis	32.0	5.1
Case 7: Hyperventilation	29.2	2.2
Case 8: Asthma	40.4	9.6

*Seven participants did not respond to the questions on cases

Table 3: Association of dentists' knowledge, diagnosis and practice scores with selected factors, using linear regression models (Backward method)

	Beta	*p*
Knowledge score		
Age	–0.02	0.78
Gender (1: men, 2: women)	–0.1	0.21
Total experience in dentistry (months)	0.03	0.81
Number of working hours/week	0.02	0.87
Number of patients/month	–0.1	0.23
Diagnosis score		
Age	0.02	0.25
Gender (1: men, 2: women)	–0.12	0.14
Total experience in dentistry (months)	0.11	0.4
Number of working hours/week	0.1	0.22
Number of patients/month	0.01	0.9
Knowledge score	0.43	<0.001
Practice score		
Age	–0.05	0.50
Gender (1: men, 2: women)	–0.15	0.07
Total experience in dentistry (months)	0.02	0.86
Number of working hours/week	0.15	0.06
Number of patients/month	–0.003	0.98
Knowledge score	0.35	<0.001

Table 4: Percentages of the dentists (n=165*) reporting presence of necessary equipments and drugs to control medical emergencies in their offices

Necessary equipments and drugs	
Oxygen and its mask	64
AMBU Bag_and its mask	27
Adrenaline 1:1000	54
Antihistaminic injection (Chlorpheniramine)	45
Dextrose injection 50%	38
Hydrocortisone injection	44
Pearl nitroglycerine	65
Salbutamol spray	37
Diazepam (10 mg ampoule)	54
Aspirin (100 mg chewing tablet)	44
IV injection equipments	36

*Twelve participants did not complete the checklist. IV: Intravenous

the dentists toward management of medical emergencies seemed to be acceptable, some deficiencies existed in their self-reported practice, and presence of drugs/equipments in their offices.

A relatively high response rate (84%), complete random selection of the dentists for data collection, and preparing a valid and reliable instrument for the data collection enhance the validity of the results. All of the participants of the study were oral health professionals. This homogeneity reduces the probability of biases related to misconceptions and errors,[13] and to non-responses and incorrect answers,[14] which have been reported to exist in studies using self-administered questionnaires with lay populations. In order to get accurate responses, an effort was made to provide a wide range of possible answers. This variation was obtained by implementing a five-point Likert scale for knowledge questions. On the other hand, the questionnaire nature of the study and reliance on self reports to judge about practice remains as the weaknesses of the study.

The results of the present study regarding knowledge of the dentists in management of medical emergencies can be compared with some of the previous studies. For example, previous studies in Britain,[6,7] India,[8] Brazil[9] and Fiji Islands[1] have shown that some deficiencies exist in knowledge, attitudes and behavior of dentists regarding management of medical emergencies. For example, 93.0% of respondents in a UK study[7] and two-third of dentists in an Indian study[8] expressed a desire for some form of further training to improve their readiness to manage medical emergencies. In a similar study in the Fiji Islands, 98.5% of dentists expressed a need for some form of further training or refresher course in this area.[1] In a another study in New Zealand, more than half the respondents were dissatisfied with the training they had received for medical emergencies as undergraduate students, and about 15% of respondents felt inadequately prepared for an emergency in practice.[11] Previous studies on Iranian dentists also had shown that the vast majority of dentists in two other cities in Iran had deficiencies in knowledge regarding management of medical emergencies.[15,16] In these studies a need for additional training on management of medical emergencies has been advocated.

In our study, deficiency was found in making true diagnosis of many of the emergency conditions especially adrenal crisis and hyperventilation cases. This is similar to the findings of a Brazilian study in which only 41% of the dentists judged themselves capable to diagnose the cause of an emergency during a dental visit.[2]

Prominent deficiency in the practice scores of the dentists also resembles the results of some of the previous studies: in Britain, more than half of the dentists surveyed believed that they could not manage myocardial infarction or anaphylaxis.[6] Most of the Brazilian dentists felt unable to treat anaphylaxis, myocardial infarction, or cardiac arrest. However, the majority of them responded that they would be capable of performing initial treatment of presyncope, syncope, orthostatic hypotension, convulsion and choking.[2] Another study in Brazil showed that only 3% of interviewed dentists had a correct concept of CPR; however, the majority of them felt unable to perform CPR or undertake an intravenous injection.[9] In a survey of Australian dentists,[10] nearly all respondents (96%) believed that dentists need to be competent in cardiopulmonary resuscitation, just over a half (55%) felt they were competent in CPR on graduation. These results are

in line with our findings on dentists' knowledge of true CPR maneuver.

To enhance the knowledge and skills of the practicing dentists for management of medical emergencies, most of these studies emphasized on the importance of continuing education programs in this area.[6,7,9,15-19]

In the present study, diagnosis and practice scores were positively correlated with knowledge score in a linear regression model. This is in line with the concept that among health professionals, the knowledge-attitude-practice association seems to be stronger than that among lay population.[20,21] Moreover; we assessed self-reported practice which is heavily based on knowledge.

In previous studies, required equipments to manage medical emergencies also have not been completely available as only one-fourth of Indian dentists[8] and less than one-third of Australian dentists[10] reported to possess necessary equipments and drugs. In the Australian study, the most commonly kept emergency drugs were oxygen (63%) and adrenaline (22%), while the most commonly kept emergency equipment was a manual resuscitator (recoil bag-valve-mask type) which was kept by 27% of the practitioners.[10] Studies on Iranian dentists have shown similar results: only 40% of dentists in Karaj city had 1 to 4 items of necessary drugs and equipments available in their offices.[18] On the other hand, another study in Germany reported that 84% of dentists stated that they owned an emergency bag,[19] which is much more than what was found in the present study.

CONCLUSION

Based on the results of the present study, although the dentists had acceptable level of knowledge regarding some of medical emergencies, certain deficiencies seemed to exist in their diagnosis and management of these conditions. The results call for a need to further education on the subject for dentists. Continuing education programs in various forms and dental curriculum revision seem to be useful in enhancement of the self-reported knowledge and practice of practicing dentists. Moreover, more strict regulation on availability of the necessary equipments to mange medical emergency situation in dental offices is advocated.

CLINICAL SIGNIFICANCE

Since, dentists will often be held legally responsible for any untoward outcome resulting from causation or mismanagement of medical emergencies, to control these conditions successfully, they must be prepared to recognize and manage a variety of medical emergencies in the dental office. In addition to dentist's knowledge and skill, availability of necessary equipments and trained staff is also of critical importance.

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