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Evaluation of Status of Emergency Equipment, Medicines, and Usage Ability at the Appropriate Time in General Dental Offices

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Abstract

Background: Medical emergencies are a series of clinical events that occur during/after dental procedures accidentally or due to patients' systemic problems. In this case, basic life support measures are the first and most important step for controlling medical emergencies, which require the knowledge, skills, and equipment. Accordingly, this study aimed to investigate dentists' awareness of emergency equipment and medicines in general dental clinics in Rasht in 2019.

Methods: To this end, 56 general dentists working in dental offices in Rasht in 2019 were included in this cross-sectional study by a census sampling method. The data were analysed by Kruskal-Wallis and Pearson correlation tests in SPSS software version 24, and the significance level was set at 5%.

Results: Based on the obtained data, 94.6% (53 dentists) of the participants answered the questionnaire, and 26.4% (14 dentists) of dental offices reported facing with emergency cases during the previous year. In addition, the highest frequency (33.3%) was associated with unconsciousness. All (100%) dentists asked their patients about cardiovascular and respiratory diseases before treatment. From the dentists' perspective, oxygen and dopamine were the most and the least important medications in the frequency distribution of emergency medicines, respectively. Eventually, the investigation of the medicines and emergency equipment showed that oxygen was the most frequent equipment while verapamil was the least frequent medicine in dental offices.

Conclusions: The mean score of dentists' knowledge was moderate. Thus, there is a clear need for educating dentists regarding increasing their preparedness for emergency management. Therefore, it is recommended that dental students pass some courses in relation to a medical emergency in dentistry during their studies, and educational programs should be considered as the retraining classes and continuous short courses for graduated dentists.

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Background

In recent years, along with therapeutic advances, increasing the elderly population, the growth of life expectancy in patients with systemic problems, the use of medications in dentistry, and patients' willingness for treatment in fewer but longer appointments have led to more frequent emergencies in the dental office (1-5). On the other hand, dental treatment (i.e., local anesthesia administration and stress) can intrinsically cause various emergencies in the patient or exacerbate the systemic disease (2,6,7). In addition, underlying diseases are more likely to cause an emergency when the patient faces emotional and physiological fears (8,9). About 70.2% of general dental practitioners in the United Kingdom have experienced medical emergency events (10,11). In a study initiated by Fast and Martin in 1986 and published by Malamed in 1993, 3068 emergencies were recorded over 10 years for a group of 4309 dentists. (12) During an emergency, the dentist has no opportunity to consult with other colleagues or refer to medical sources and should only rescue the patient by relying on his or her information, experience, and the availability of relevant equipment (1-3).

Preventing medical emergencies is the basis treatment,

Highlights

- The mean score of dentists' knowledge was moderate;
- From the perspective of the dentists, oxygen was the most important medication;
- From the dentists' viewpoint, dopamine was the least important medication;
- Oxygen was the most frequent equipment in this investigation;
- Verapamil was the least frequent medicine in this evaluation.

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followed by dentist skills and office equipment for medical emergencies as the second most important factor in treatment (8,13). When a dentist has greater scientific ability and equipment, he/she can better respond to emergency events (14,15).

According to (12,16), an emergency kit is a set of drugs (e.g., epinephrine, diphenhydramine, oxygen, nitroglycerin tablets, diazepam, hydrocortisone, dopamine, sugar solution, dextrose serum, glucagon, and the like) and supplies (e.g., suction, suction tip, tourniquet, scalpel, peripheral venous catheter, bag valve mask, plastic airway, and the like) which is available on the market or can be prepared by dentists (8). Bennett believed that two principals should be observed, including a thorough understanding of the contents and position of the components of the kit and its simplicity (17).

Macadam suggested that having a standard level of awareness and preparedness for dealing with unexpected events is the duty of every dentist (18). Due to the importance of the required equipment and drugs in emergency situations and the direct relation of the above-mentioned cases to human lives, the present research was conducted to provide a report on the available drugs and equipment in dental offices and dental practitioners' awareness in Rasht, Iran, 2019.

Materials and Methods

This cross-sectional observational analytic study was designed based on the STROBE guideline. This study was conducted to evaluate dentists' awareness of emergency equipment and medicines in general dental clinics in Rasht during 2019. To this end, a questionnaire was administered to 56 general dental practitioners working in their offices in Rasht. To prepare the list of dentists, researchers referred to the Iranian Medical Council and selected the dentists by a census sampling method. Then, by arranging an appointment, the questionnaire was given to individuals who showed their willingness for participation. The ethical considerations were observed by not disclosing personal information. The inclusion criterion was being general dental practitioners working in personal offices in Rasht while the exclusion criterion was a reluctance to cooperate in this study. The questionnaire consisted of four basic parts. The first part included the demographic characteristics of the dentists (i.e., age, gender, year of office establishment, and the like). In addition, the second part encompassed 10 questions about function, the third part contained 10 questions about medical emergency awareness. Finally, part four included a list of medications and emergency equipment needed by dentists. In this regard, dentists were asked to mark each of them in front of their box if available. To distinguish between dentists who answered correctly and incorrectly, awareness questions scored one and zero for correct and incorrect answers, respectively. Then, using the mean score, they were categorized into poor (1-5), moderate (6), and good (≥7) groups (the awareness score was from 10). Before collecting the data, the validity of the questionnaire was confirmed by the content validity index. To this end, the questionnaire was presented to 9 specialists to judge the relevancy of the content of questions and the aim of the study. For the reliability assessment of the form, the Cronbach's alpha test was used and the form was given to 15 participants again after 2 weeks, and finally, the reliability level was 86.5%.

Most dentists were diligent in completing the questionnaire and carefully completed it. In general, 53 out of 56 dentists (from 44 dental offices) cooperated with the researchers. Only 3 dentists were reluctant to participate in the project for various reasons such as the lack of time. Eventually, Kruskal-Wallis and Pearson correlation tests were used to analyse the data, and all tests were performed at a 5% level using SPSS software, version 24 (IBM Crop., Armonk, NK, the USA).

Results

The distribution of gender among the respondents was such that 20 (37.7%) were females and 33 (62.3%) of them were males. Further, the age group of 41-50 years had the highest frequency while the age group of 31-40 years had the lowest frequency. Furthermore, the mean age of participants was 47.22 ± 56.6, and the youngest and oldest participants were 32 and 60 years old, respectively. Moreover, the frequency of the studied offices in the case of the establishment year was found to be the highest in 2001 with 5 cases (11.4%).

Based on the obtained data, the greater number of offices (25%) admitted 5 patients/day and the least of them (2.3%) admitted only 3 patients/day. Among these offices, some accepted 20 patients/day as the highest acceptance and some could treat only 3 patients/day as the lowest acceptance. The average number of the referred patients was 4.71 ± 8.77 each day.

Additionally, most dentists worked for 4 hours/day while 10 hours/day was recorded for only one dentist (2.2%). Likewise, the mean working hours/day was 5.76 ± 1.87 (a minimum of 3 hours and a maximum of 10 hours each day).

In addition, 20 (37.7%) dentists examined the vital signs of the patient before starting the work and 53 (100%) of them examined the medical records of patients. Further, 13 dentists (24.5%) had completed a short-term workshop or course on medical emergencies in dentistry but 4 of them (7.5) felt the need for retraining or separate training in emergency care and how to deal with it. Furthermore, 24 individuals (45.2%) were able to inject a serum and only 1 dentist (1.8%) could perform the intramuscular injection. Eventually, 8 dentists (15%) could manage the occurred emergencies during the treatment, 14 dentists (26.4%) had experienced emergency cases in the previous year.

Among them, 7 dentists, as the majority of frequency,

reported one emergency case during the previous year while 1 dentist had 3 emergency cases in the previous year as the lowest frequency. Regarding the type of emergency including hypertension, unconsciousness, shock and epilepsy, and drug sensitivity, as well as a combination of unconsciousness -and drug sensitivity and a combination of shock and epilepsy-and drug sensitivity, it was found that the highest frequency (33.3%) relates to unconsciousness. To answer whether dentists ask their patients about important systemic diseases (e.g., heart disease or lung disease) before initiating their work, it was concluded that all dentists ask their patients in this respect. As regards determining the type of systemic diseases (i.e., rheumatism, asthma, consuming drugs, digestive disease, asthma and allergies, cardiac disease, hypertension, hypotension, pulmonary disease, and diabetes) it was reported that each of the above-mentioned cases or their combination had the same share. To find whether dentists ask their patients about the history of medical emergencies during previous dental treatments before beginning their work, It was revealed that 6 cases (11.3%) routinely asked this question. While determining the type of emergency history including after injection, any problems, unconsciousness, hypotension, tachycardia, arrhythmia, diabetes, allergy, medication sensitivity, and seizure, it was found that each of these factors or their combination played the same role.

Based on the results, the highest frequency of dentists' knowledge score was 6 (n=23, 43.3%) while the lowest one was 2 (n=1, 1.88%) and 3 (n=1, 1.88%). In addition, the mean score of total awareness was 6±1.43. It should be mentioned that there was no significant difference between the knowledge scores of men and women (P = 0.893, Kruskal-Wallis test), and the relationship between age and the knowledge score was not significant (r = 0.09, P = 0.581, Pearson correlation test). The questions were scored 1 and 0 in the cases of having the correct and wrong answers, respectively, and then using the mean score, were classified into poor (1-5), average (6), good (≥7) groups (The awareness score of 10). Table 1 presents the data on the evaluation of the minimum emergency medications that a dentist should have in his/her office from the dentists' viewpoint. According to the results, oxygen and dopamine had the highest and the least importance from the dentists' viewpoint, respectively.

Further, Table 2 provides the review on the available medicines and emergency supplies in the investigated dental offices. The results demonstrated that oxygen had the highest amount while verapamil had the lowest amount in the dental office.

Discussion

As previously explained, the aim of this study was to evaluate dentists' awareness of emergency equipment and medicines in general dental offices in Rasht in 2019. A survey on whether dentists assess vital signs and medical

Table 1. Least Emergency Medicines at Dental Office Based on Dentist's Opinion

Medicines	Yes (%)	No (%)
Oxygen	50 (94.3)	3 (5.7)
Sodium bicarbonate	3 (5.7)	50 (94.3)
Hydrocortisone vial	39 (73.5)	14 (26.5)
Anti-histamine vial	30 (56.6)	13 (24.4)
Adrenalin	36 (67.9)	17 (32.1)
Dopamine	2 (3.77)	51 (96.2)
Nitroglycerin	8 (15)	45 (85)
Nifedipine	3 (5.7)	50 (94.3)
Diazepam vial	27 (50.9)	26 (49.1)
Ringer solution	17 (32)	36 (68)
Atropine vial	16 (30.1)	37 (69.9)
Dextrose saline	33 (62.2)	20 (37.8)
Ammonia	3 (5.7)	50 (94.3)
Inhaler bronchodilator	16 (30.1)	37 (69.9)

Table 2. Medicines and Emergency Supplies Available in the Investigated Dental Offices

Medicines	Yes (%)	No (%)
Verapamil	2 (3.77)	51 (96.2)
Atropine vial	15 (28.3)	38 (71.6)
Peripheral venous catheter	23 (43.3)	30 (56.7)
Anti-histamine vial	24 (45.2)	29 (54.8)
Ammonia	3 (5.7)	50 (94.3)
Solution set	20 (37.7)	33 (62.3)
Nifedipine	6 (11.3)	47 (88.7)
Dextrose saline	21 (39.6)	32 (60.4)
Lidocaine	29 (54.7)	24 (45.3)
Normal saline	16 (30.1)	37 (69.9)
Procaine	6 (11.3)	47 (88.7)
Ringer solution	16 (30.1)	37 (69.9)
Sodium bicarbonate	7 (13.2)	47 (88.6)
Dopamine	5 (9.4)	48 (90.6)
Epinephrine vial	41 (77.3)	12 (22.7)
Inhaler bronchodilator	20 (37.7)	33 (62.3)
Suction	38 (71.6)	15 (28.4)
Diphenhydramine vial	23 (43.3)	30 (56.7)
Phenylephrine	11 (20.7)	42 (79.3)
Oxygen	48 (90.5)	5 (9.5)
Dextrose	26 (49.1)	27 (50.9)
Tourniquet	13 (24.5)	40 (75.5)
Nitroglycerin	42 (79.2)	11 (20.8)
Hydrocortisone vial	35 (66)	18 (34)
Surgical blade	36 (67.9)	17 (32.1)
Diazepam vial	36 (67.9)	17 (32.1)
Propranolol	23 (43.3)	30 (56.7)
Cricothyrotomy needle	6 (11.3)	47 (88.7)

history revealed that not everyone checked vital signs while all of them checked patients' medical history pre-treatment.

The findings are in line with the results of the study by Al-Iryani assessing the preparedness, perception, and awareness of medical emergencies and demonstrating that 96% of the participants examined their patients' medical history (19). Similarly, Kumarswami et al reported that 98% of their surveyed dentists evaluated the medical history of their patients (20). Failure to examine the vital signs of the patients by the studied dentists may be due to the lack of time or their unfamiliarity with the possible events of medical emergencies in dentistry. The evaluation of these dentists' history on their knowledge of medical emergencies in dentistry revealed that only some of them participated in short-term workshops or courses on medical emergencies (9,13,19).

The results of the above-mentioned studies are consistent with those of Raffee et al. They examined the understanding of knowledge, training, and competency in medical emergency management in dental seniors in the college and reported that not all the studied students could pass the training on emergency events (21). Likewise, Yaghooti Khorasani and Vazirinejad reviewed the availability of essential medicines and emergency equipment in dental offices in 4 southern cities of Iran (22). However, our findings are inconsistent with those of Al-Iryani et al, which represented that 95% of subjects passed the basic life support course (19). Moreover, Al-Hammad et al reported that 54% of those surveyed cases completed medical emergency courses (23). Based on the findings of a study conducted in the United Kingdom, Atherton et al concluded that 75% of respondents had received cardiopulmonary resuscitation training prior to graduation, and 25% of them had subsequently received medical emergency training (24). The above-mentioned findings show that there are significant defects in our community of dentists. Additionally, the present study examined the need for retraining or separate training in emergency situations and how to deal with them, and based on the obtained data, only a few dentists responded it positively. However, in a study conducted by Atherton et al, 96% felt the need for retraining, indicating that dentists were unaware of the importance of medical emergencies in dentistry (24). In addition, 45.2% and 1.88% of dentists showed the ability to inject serum and intramuscular injection, respectively, and only 15% of them reported that they are prepared to manage emergency events during the treatment. These consequences confirmed the importance of the need for medical emergency training in dentistry. Regarding facing emergency events in the previous year, the present study revealed that 26.4% of participants were exposed to it. The results of our study corroborate with those of Yaghooti Khorasani and Vazirinejad (22), while contradicting the results of the study by Behnia and Reshad, where the probability of at least one case of medical emergency for each dentist was reported approximately 90% within one year (25). This may be because our study focused on evaluating the history of facing with the emergency event while Behnia and Reshad evaluated the probability of an emergency (25). In another study by Farhad Mollashahi and Honarmand in Zahedan, more than half of the studied dentists faced a medical emergency during the previous year, which is inconsistent with the findings of this paper probably due to differences in the recognition of emergency cases in individuals (26). In the present study, the type of emergency was determined, and the highest frequency belonged to unconsciousness (approximately 33%). The results of the present study are in contrast with those of Mesgarzadeh and Dabbagy Tabrizi (8). The most frequent emergency cases in previous reports included orthostatic hypotension, vasodepressor syncope, anesthesia, epilepsy, angina, hypoglycemia, atherosclerosis, foreign body aspiration, asthma, and hyperventilation (10,12).

These discrepancies may be due to differences in the intended communities and varying levels of dentists' awareness of such emergencies. In the next step, the dentists' knowledge score was assessed and their mean score was found to be 6±1.43 out of 10. Based on the results, there was no significant relationship between the knowledge score and gender or the knowledge score and age. Hashemipour et al examined the knowledge and practice of dentists regarding emergency cases in dental offices and reported that their score was 5.89±1.39 (27). In another study, Birang et al (28) demonstrated that the average score of Isfahanian dentists' knowledge in the same field was 5.42±1.81, which is nearly in line with the result of the present study. Nawab Azam et al (29) reported a mean score of 77±16 and some other studies reported higher scores in this regard (30-31). This may be due to the lack of proper educational planning during the study and the limitation of attendance at training seminars, which was discussed earlier. The above-mentioned discussion specifies the implementation of the 2002 American Dental Association Agenda for Consecutive Dentist Training in the Emergency (32). The outcomes of Hashemipour et al and Birang et al also showed no significant relationship between gender and the level of awareness (27,28), which is consistent with our study. However, Hashemipour et al reported a significant and inverse relationship between age and awareness, which may be due to differences in the sample size of the two studies (27). By assessing the dentist's view on the least emergency medication at the dental office, it was found that oxygen had the highest while dopamine had the least importance in the dentist's viewpoint, which is supported by Hashemipour et al (27). In addition, by studying the drugs and emergency supplies in the dentist's office, it was revealed that oxygen and verapamil were the highest and lowest in the dentist's office, respectively. According to the study by Haas on emergency medicine, oxygen, epinephrine, nitroglycerin,

injectable diphenhydramine or chlorpheniramine, albuterol, and aspirin should be available in a dental office (33). In the study by Hashemipour et al, nitroglycerin tablets and oxygen were the most common medications that dentists used in their office as emergency medications. (27)

The main limitation of this study is the number of surveyed dental offices. In addition, selection bias is an intrinsic limitation since this is a questionnaire-based study.

Accordingly, future studies should include a greater study population. Further, researchers can repeat similar studies to evaluate the efficacy of training workshops.

Conclusions

In general, the findings of this study showed that considering the mean score of knowledge, the level of dentists' information was moderate. Most offices had no bag valve masks thus the dentist was virtually incapable of resuscitating his/her patient while medical emergency training in dentistry was inadequate. Furthermore, after graduation, attendance at a workshop associated with the above-mentioned for a short time was very little. Therefore, there is a clear need for educating dentists regarding increasing their preparedness for emergency control. If all staffs working in the office are capable of dealing with medical emergencies, the ability to give a proper response to hazardous situations will increase and the dentist can provide more appropriate emergency management by trained personnel in the crisis.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interests.

Ethical Statement

This study was approved by the Ethics Committee of Guilan University of Medical Sciences in February 2019(IR.GUMS.RES.97.222).

Authors' Contribution

NK: Concepts, design, definition of intellectual content, data acquisition, data analysis, statistical analysis, manuscript review. BV: Design, definition of intellectual content, manuscript review. MG: Concepts, definition of intellectual content, literature search, clinical studies, data acquisition, data analysis, manuscript review. DM: Concepts, definition of intellectual content, literature search, clinical studies, experimental studies, manuscript preparation, manuscript editing, manuscript review, guarantor. All authors read and approved the manuscript.

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