

# The ability of dentists and dental assistants to deal with medical emergencies in dental clinics in Najran, Saudi Arabia

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## Abstract

### Objectives:

To investigate the ability of dentists and dental assistants to manage the medical emergencies in dental clinics in the Najran region, Saudi Arabia.

### Methods:

A cross-sectional study was carried out using a questionnaire that was distributed online to 87 dentists and dental assistants working in private dental clinics in the Najran region, Saudi Arabia in November and December 2022. The questionnaire gathered information regarding the prevalence of medical emergencies, knowledge of the about the deal with emergency cases, and the availability of emergency equipment and drugs.

### Results:

78.2% experienced an emergency in the dental clinic. 25.3% of emergencies situations were diabetic problem (hypoglycemia/hypoglycemia). 86.2% have undergone emergency medical training and/or basic life support training, 83.9% thought that they can handle any emergency situation. 66.7% are able to do CPR. The participants had insufficient level of knowledge regarding the management of emergency medical situations. The required equipment and drugs in emergency cases are available in most dental clinics in Najran region, Saudi Arabia.

### Conclusion:

There is a high prevalence of medical emergencies in dental clinics in Najran region, Saudi Arabia. There is a deficiency of knowledge regarding the management of emergency medical situations among

dentists and dental assistants. The required equipment and drugs in emergency cases are available in most dental clinics.

**Keywords:** dentists, dental assistants, medical emergencies, syncope, hyperventilation, allergy, diabetic emergencies.

## **Introduction**

Medical emergencies (MEs) in dental practice are the adverse medical events that may occur during or after dental practice (Uyamadu & Odai, 2012; Sakr et al., 2016). Those medical events often arise suddenly and unexpectedly, so dentists should be able to rapidly realize the emergency onset, diagnose the case, and manage the situation (de Bedout et al., 2018). MEs are uncommon, however it can occur at any time in the dental office, and most dentists may have faced them at some point in their careers (Al-Sebaei et al., 2015; Sakr et al., 2016). It may pose a direct threat to the patient's life, and impact the dental care (Al-Sebaei et al., 2015), therefore, it should be treated immediately and cannot be referred or avoided (Pravina & Ganesh, 2020).

The prevalence of MEs that may happen in the dental clinics is unknown (Uyamadu & Odai, 2012; Alkhater, & Al-Harthy, 2017). However, some factors contribute in increasing the incidence of MEs in dental clinics now and in the future. First, factors related to community itself including; the increasing variety of older people seeking health care, the growing use and intake of medications, the increasing trend toward extended dental appointments, and the therapeutic advances within the medical professions (Sakr et al., 2016; Alkhater & Al-Harthy, 2017; Mirza et al., 2019). Second, factors related to patients due to the dental treatment itself, that can cause emotional stress such as surgical treatments, stimulating endodontic procedures, and the use of local anaesthetics (Marks et al., 2013; Alkhater & Al-Harthy, 2017; de Bedout et al., 2018).

In the Kingdom of Saudi Arabia, Alhamad et al. found that dentists quite commonly face MEs during their practice in dental clinics. About 67% of the dentists reported having encountered any episodes of medical emergencies (Alhamad et al., 2015). Studies in Japan, United States, and Canada revealed many forms of MEs, those studies have shown that syncope is the most common MEs seen by dentists, with hyperventilation and mild allergy the next most frequent. The other reported MEs included postural hypotension, bronchospasm, seizures, angina pectoris/myocardial infarction and diabetic emergencies (Haas, 2006).

In general, the dentist is the main responsible of managing emergency situation that may occur in the dental clinic (Sakr et al., 2016; Alkhater & Al-Harthy, 2017). Inadequate awareness and inability to manage the MEs can resulting in tragic consequences. Thus, dental care professionals must be well prepared to manage MEs (Sakr et al., 2016). Globally, there are limited data regarding the level of preparedness of managing MEs among oral health providers (de Bedoutet al., 2018). Vaughan et al. found a deficiency preparedness toward MEs in dental practices despite the universal recognition of its importance (Vaughan et al., 2018). Many international studies also have reported that almost half of the dentists worldwide are unable to perform cardiopulmonary resuscitation [CPR] or basic life support [BLS] properly (Alkhater & Al-Harthy, 2017). In Saudi Arabia, Al-Sebaei et al. found a lack in personnel training for MEs and in the availability of emergency equipment and drugs at their study of private dental offices and polyclinics (Al-Sebaei et al., 2015), even though, the dental boards in Saudi Arabia require specific training in the management of MEs and current CPR or BLS certification as a prerequisite for licensure (Alkhater & Al-Harthy, 2017).

Hence, this study aimed to investigate the ability of dentists and dental assistants to manage the medical emergencies in dental clinics in the Najran region, Saudi Arabia.

## **Materials and methods**

This study is a cross-sectional study, was designed to investigate the ability of dentists and dental assistants to manage the medical emergencies in dental clinics in the Najran region, Saudi Arabia.

This study was carried out through a questionnaire that was distributed to a sample of dentists and dental assistants whose work in private dental clinics. Inclusion criteria included any dentists and dental assistants whose work in private dental clinics in the Najran region, Saudi Arabia. In the introduction to the questionnaire, a pledge was made to preserve the confidentiality of the data and not to use the answers except for scientific research. The questionnaire consisted questions divided into four main parts. Where the first section contained questions about the personal data of the study sample, while the second section contained questions to assess the prevalence of medical emergencies in dental clinics in the Najran region, and the third section contained questions to assess the knowledge of the study sample about how to deal with emergency cases, and finally the fourth section that contained questions about the preparations of dental clinics in the Najran region (the availability of emergency equipment such as oxygen cylinders and emergency medicines such as epinephrine, nitroglycerin and salbutamol) for emergencies. The questionnaire was formulated in Google forms, and then distributed online to the study sample.

The sample was chosen randomly from different geographic locations of Najran region, Saudi Arabia. No one was forced to participate in this study. The study was conducted in November and December 2022.

The statistical analysis program (SPSS v.26) has been used in the study in data entry and analysis, with using the necessary statistical methods to achieve the objectives of the study.

## Results

Among the (87) study participants, of whom 72.4% were males and 27.6% were females, their ages ranged from less than (30) years to over (50) years, 63.2% of them were in the age group of (30-40) years, 26.4% had working years from (6-10) years, 23% have working years from (1-5) years, and the same percentage of 23% have working years from (11-15) years.

One-third of the study participants are dentists, and two-thirds are dental assistants, 50.6% have a bachelor's degree, 39.1% have a diploma, 8% have a master's degree, and 2.3% have a doctorate, and the vast majority, 88.5%, are Saudis.

Table 1

		N (%)
<b>Gender</b>	Male	63 (72.4%)
	Female	24 (27.6%)
<b>Age</b>	Less than 30 years	21 (24.1%)
	From 30-40 years	55 (63.2%)
	From 40-50 years	9 (10.3%)
	More than 50 years	2 (2.3%)
	less than one year	9 (10.3%)
<b>Work</b>	From 1-5 years	20 (23%)
	From 6-10 years	23 (26.4%)
	From 11-15 years	20 (23%)
	More than 15 years	15 (17.2%)
<b>Job title</b>	Dentist	29 (33.3%)
	Dental assistant	58 (66.7%)
<b>qualification</b>	Diploma	34 (39.1%)
	Bachelor	44 (50.6%)
	Master	7 (8%)
	Ph.D	2 (2.3%)
<b>nationality</b>	Saudi	77 (88.5%)
	Other	10 (11.5%)

## The prevalence of medical emergencies in dentistry

Table (2) shows the distribution of dentists and their assistants according to their exposure to medical emergencies in dentistry, as we note that 78.2% of the participants experienced an emergency in the dental clinic in which they work, 25.3% faced a case suffering from diabetes, and 17.2% faced a case suffering from vague vasovagal syncope, 12.6% faced a case suffering from an epileptic fit.

82.8% of dentists and their assistants faced less than (10) medical emergencies in dental clinics, 14.9% faced between (11-30) emergencies in dental clinics, and 2.3% faced more than (30) emergencies in dental clinics.

55.2% of dentists and their assistants encountered emergency situations in the patient waiting area, 20.7% in treatment rooms, and 24.1% in other locations.

Table 2

		N (%)
<b>Have you ever had an emergency situation at your dental clinic?</b>	Yes	68 (78.2%)
	No	19 (21.8%)
<b>If the answer to the previous question is yes, then what is the type of emergency?</b>	Vasovagal syncope	15 (17.2%)
	Diabetic problem (hypoglycemia/hypoglycemia)	22 (25.3%)
	Epileptic insult	11 (12.6%)
	Allergic shock	1 (1.1%)
	Cardiac arrest	1 (1.1%)
	An emergency but undiagnosed condition	3 (3.4%)
<b>How many emergencies have the dentists reported in your practice?</b>	Other cases	15 (17.2%)
	<10 cases	72 (82.8%)
	11-30 cases	13 (14.9%)
	>30 cases	2 (2.3%)
<b>What is the location of the emergency incidents?</b>	Waiting area	48 (55.2%)
	Treatment room	18 (20.7%)
	Other places	21 (24.1%)

### Knowledge of medical emergencies and the ability to manage them for dentists and dental assistants

Table (3) shows the distribution of dentists and their assistants according to their knowledge of medical emergencies, where we note that 86.2% of the participants had previously undergone emergency medical training or basic life support training, 83.9% of dentists and their assistants believe that they can deal with any emergency.

Table 3

	Yes N (%)	No N (%)
Have you ever undergone any emergency medical training and/or basic life support training?	75 (86.2%)	12 (13.8%)
Do you think you can handle any emergency situation ?	73 (83.9%)	14 (16.1%)

Figure (1) shows the distribution of dentists and their assistants according to their behavior regarding an emergency event with an unresponsive adult, where 47.1% answered with immediate examination for cardiac arrest and activation of the emergency response system, 23% will monitor the patient, 20.7% will put the patient in the recovery position, and 9.2% will remove rapid defibrillation.

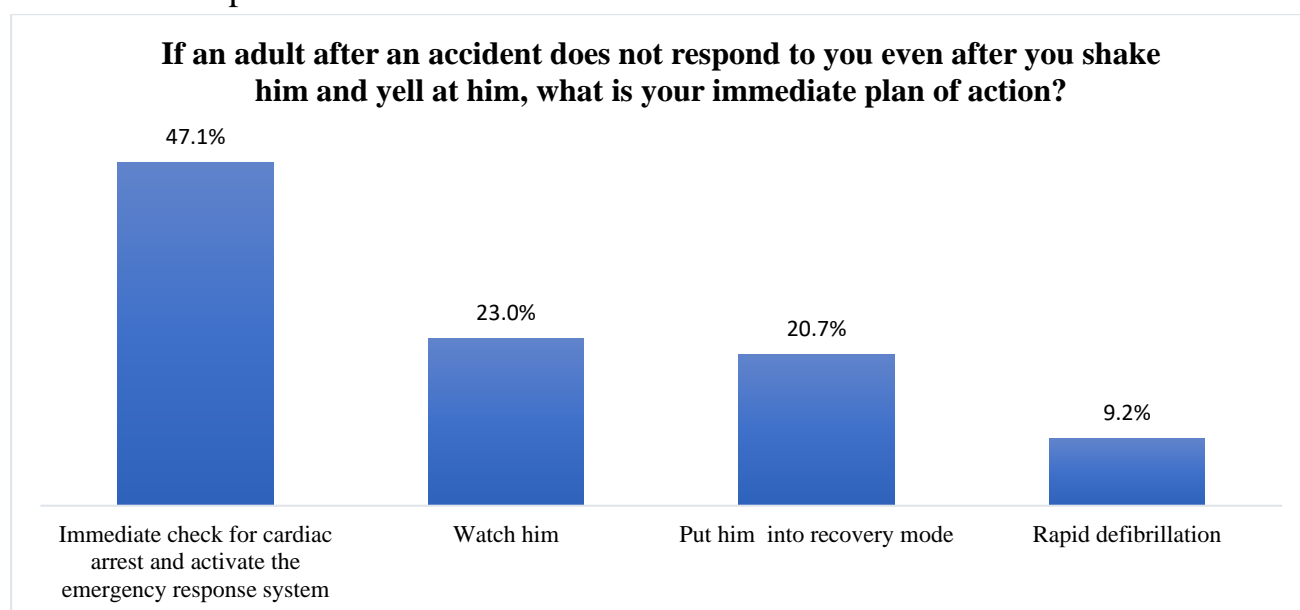


Table No. (4) shows that 63.2% of dentists and their assistants are very confident in their ability to maintain the airway in unconscious patients,

66.7% of them are very confident in their ability to perform CPR, and 36.8% are very confident in their ability to use a Automated external defibrillator (AED) for a patient with a pacemaker.

Table 4

	<b>Very confident</b>	<b>Slightly confident</b>	<b>I don't know</b>
	N (%)	N (%)	N (%)
How would you rate your ability to maintain an airway in an unconscious patient?	55 (63.2%)	24 (27.6%)	8 (9.2%)
How would you rate your ability to perform CPR?	58 (66.7%)	21 (24.1%)	8 (9.2%)
Can you use an automated external defibrillator (AED) for a patient with a pacemaker?	32 (36.8%)	20 (23.0%)	35 (40.2%)

Figure (2) shows the distribution of dentists and their assistants according to their arrangement for the approach to dealing with an emergency, as we note that 34.5% of them will use the (posture, airway, breathing, blood circulation, and final care) approach, and the percentage of 34.5% of them will use the (airway, breathing, circulation, terminal care, posture).

**What should be the order of your approach to dealing with an emergency?**

A= airway      B= breathing      C= circulation      D=terminal care      P= posture

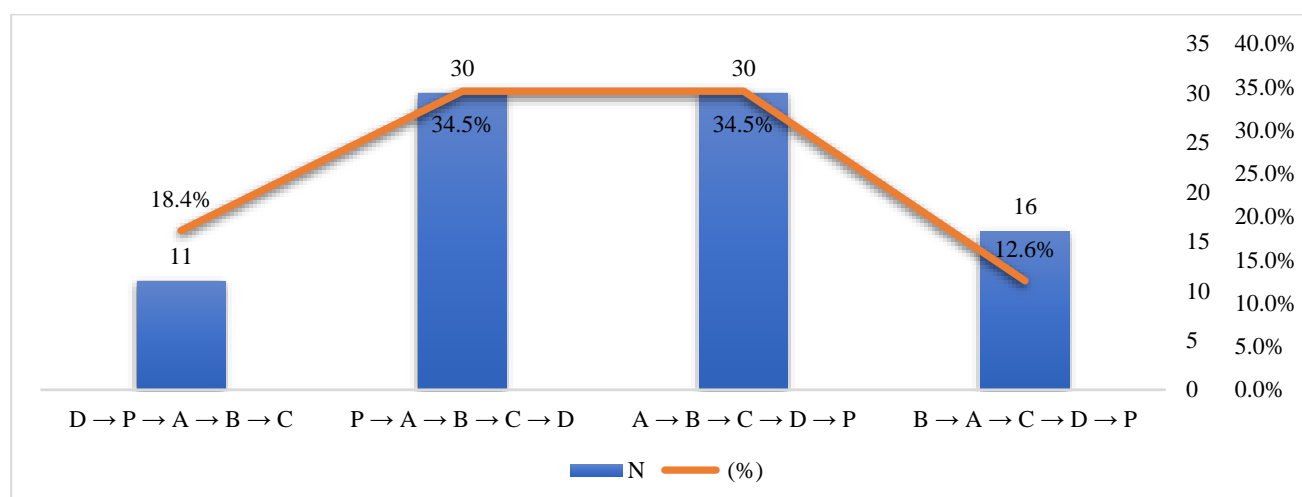


Table (5) shows that 77% of dentists and their assistants will follow the approach (head tilt - chin lift) to open the airway, 67.8% believe that CPR should be performed when the patient's heart is suspected to have



stopped, 63.2% believe that the place of compression is on the chest in case of CPR when Adults should be in the center of the patient's chest between the nipples.

33.3% of dentists and their assistants believe that the depth of pressure for adults during CPR is in the range of 2-3 inches, and 31% of them believe that the average chest pressure for adults and children during CPR is for at least 90 minutes, and 49.4% of them believe that the average chest pressure for adults and children during CPR is for at least (90) minutes. They believe that the ratio of compression and ventilation during CPR is the same for adults and children.

44.8% of dentists and their assistants believe that a defibrillator should be used when the patient is unconscious and their carotid pulse cannot be felt, 73.6% believe that in anaphylaxis only antihistamines can be used.

42.5% of dentists and their assistants will call the emergency room to get help if the patient suffers from sudden chest pain while on the dental chair, 32.2% of them will give the patient aspirin and nitroglycerin, 21.8% will put the patient in a supine position, and 3.4% will make the patient inhales ammonia.

Table 5

		N (%)
<b>Which approach or procedure can be used to open the airway?</b>	Wipe the finger inside the mouth	8 (9.2%)
	Head tilt - chin lift	67 (77%)
	Chin tilt - head lift	8 (9.2%)
	Chest compression method	4 (4.6%)
	Angina pectoris	15 (17.2%)
<b>CPR should be performed when .....</b>	Myocardial infarction	5 (5.7%)
	Cardiac arrest	59 (67.8%)
	Fainting	8 (9.2%)
	In the center of the patient's chest, between the nipples	55 (63.2%)
<b>What is the location of chest compressions in CPR (in adults)?</b>	On the left side of the chest above the apex-beat area	10 (11.5%)
	Above the xiphoid region	9 (10.3%)
	Any of the above	13 (14.9%)
	less than two inches	14 (16.1%)
<b>What is the depth of compression in adults during cardiopulmonary</b>	About 2 inches	21 (24.1%)
	2 - 3 inches	29 (33.3%)
	According to your comfortable	23 (26.4%)

<b>resuscitation?</b>	level	
<b>Rate of chest pressure in adults and children during cardiopulmonary resuscitation?</b>	100 / min at least	23 (26.4%)
	90 / min at least	27 (31%)
	80 / min at least	16 (18.4%)
	70 / min at least	21 (24.1%)
<b>Do you think that the rate of compression and ventilation during CPR is the same for adults and children?</b>	Yes	43 (49.4%)
	No	44 (50.6%)
<b>A defibrillator should be used when.....</b>	The patient feels short of breath	24 (27.6%)
	The patient is unconscious and his carotid pulse can be felt	7 (8%)
	The patient is conscious and his carotid pulse can be felt	17 (19.5%)
	The patient is unconscious and his carotid pulse cannot be felt	39 (44.8%)
<b>In case of anaphylaxis , what is the only medication to take?</b>	Adrenaline	14 (16.1%)
	Antihistamines	64 (73.6%)
	Oxygen	7 (8%)
	Steroids	2 (2.3%)
	Give him aspirin and nitroglycerin	28 (32.2%)
<b>If a patient has sudden chest pain on the dental chair, what is your first step?</b>	Call for emergency help	37 (42.5%)
	a lie down position	19 (21.8%)
	I put the patient in	3 (3.4%)

### **The level of preparedness for emergencies within dental clinics**

Table (6) shows the distribution of dentists and their assistants according to the level of preparedness of the dental clinics in which they work, and the duration of the availability of tools and medicines needed in emergency cases. Where we note that the most available tools and medicines in dental clinics to deal with emergencies are: oxygen cylinders with a rate of 87.1%, a blood pressure monitor with a rate of 86.4%, albuterol/ salbutamol 83.1%, epinephrine 82.3%, nitroglycerin 81.6%, diphenhydramine 81.3%, nasal cannula 81%, glucose 81%, non-renewable mask with oxygen tank 80.7%, nose cap 80.5%, Hydrocortisone 80.5%.

Table 6

Are the following tools and instruments available in the clinic where you work?	Yes	No
	N(%)	N(%)
Oxygen cylinder	74 (87.1%)	13 (14.9%)
The blood pressure Measuring device	70 (86.4%)	17 (19.5%)
Albuterol / salbutamol	64 (83.1%)	23 (26.4%)
Epinephrine	65 (82.3%)	22 (25.3%)
Nitroglycerin	62 (81.6%)	25 (28.7%)
Diphenhydramine	61 (81.3%)	26 (29.9%)
Nasal cannula	68 (81.0%)	19 (21.8%)
Glucose	64 (81.0%)	23 (26.4%)
Mask not Renewed with a tank oxygen	67 (80.7%)	20 (23.0%)
Bag-valve-mask device with oxygen reservoir	67 (80.7%)	20 (23.0%)
Nasal hood	66 (80.5%)	21 (24.1%)
Hydrocortisone	62 (80.5%)	25 (28.7%)
Tract aerobic pharyngeal	51 (65.4%)	36 (41.4%)
Tongs Magill	58 (72.5%)	29 (33.3%)
Automated external fibrillation Remover	56 (70.0%)	31 (35.6%)
The doctor Earphone	59 (73.8%)	28 (32.2%)
Diazepam	55 (73.3%)	32 (36.8%)
Aspirin	59 (78.7%)	28 (32.2%)
Aromaticammonia ammonia	59 (78.7%)	28 (32.2%)

## Discussion

in dental treatment many factors such as dental phobia, the patient's response to dental materials, and the invasiveness of the dental procedure, can increase the chance of medical emergencies (Obata et al., 2021). some of those medical emergencies may be life-threatening or may cause permanent harm to the patient (Al-Sebaei et al., 2015), so dental practitioners must have sufficient knowledge on how to deal with these cases, and clinics must be equipped to deal with emergencies. Hence this study aimed to investigate the ability of dentists and dental assistants to manage the medical emergencies in dental clinics in the Najran region, Saudi Arabia. Our study included 87 individuals one-third of them are dentists, and two-thirds are dental assistants.

In the present study, there was a high prevalence of medical emergencies in dental clinics, since the majority of participants (78.2%) had an emergency situation at their dental clinic, about (82.8%) of our participants reported that they encountered more than 10 emergency cases at their clinics. This ratio is higher than what Alhamad et al. found in their study in in the Eastern Province of KSA that 67% of the dentists encountered medical emergencies in dental clinics (Alhamad et al., 2015). And what ŠOŠTARIČ and UMEK found in Slovenia that 67.5% of dentists reported one medical emergency during 12 months (ŠOŠTARIČ & UMEK, 2018). As well as what Joshi and Acharya found in Nepal that 37.1% of their respondents encountered at least one emergency situation (Joshi & Acharya, 2015). In US also, Anders et al. reported that in 2010 there were 164 medical emergencies per million dental appointments (Anders et al., 2010). The prevalence of medical emergencies in dental offices in different countries is varied. However, findings in mentioned studies is contrary to common belief that the medical emergencies in dental practice are uncommon. However, it worth to remind that when an emergency does occur it can be life-threatening.

The present study confirms that the most critical clinical situations such as cardiac arrest is uncommon (1.1%) in dental clinics, this similar to Joshi and Acharya (Joshi & Acharya, 2015). About a quarter of the medical emergencies reported in our study were diabetes problems (hypoglycemia/ hypoglycemia), while Vasovagal syncope represented about 17.2% , and Epileptic insult was about 12.6% of medical emergencies in dental clinics. This confirm previous studies regarding medical emergencies in dental clinics, in KSA, Alhamad et al. reported that vasovagal syncope was the most common medical emergency (Alhamad et al., 2015). In *Nepal*, Joshi and Acharya found that vasovagal

syncope, hypoglycemia, seizures and allergic reaction were the most common medical emergencies. In Poland Smereka et al. found that vasovagal syncope was the most frequently medical emergency, followed by orthostatic hypotension, hyperventilation crisis, mild allergic reaction, hypoglycaemia and seizures by 19.85%,18.61%,16.23%, 15.99%, and 11.21% respectively (Smereka et al., 2019). In Germany, Muller et al. reported that vasovagal syncope, hypertension, epilepsy and hypoglycaemia were the most frequent medical emergencies (Muller et al., 2008). In Belgium, Marks et al. suggested that the most common emergencies were vasovagal syncope, epilepsy and diabetic problems, anaphylactic shock and cardiac arrest by 34.3%, 8.4%, 3.8% and 0.4% respectively.

The majority of our participants (86.2%) have undergone emergency medical training and/or basic life support training, and (83.9%) thought that they can handle any emergency situation, but indeed our participants showed insufficient level of knowledge regarding the management of emergency medical situations. Alhamad et al. also found in KSA that almost one-third of the dentists were unable to handle emergency situations(Alhamad et al., 2015). In our study only 66.7% were Very confident about their ability to perform CPR. The present result is in accordance with other studies where dental graduates felt incompetence in handling medical emergency and perform CPR (Gupta et al., 2008; Joshi & Acharya, 2015; Obata et al., 2021). The lack of competence in performing CPR among Saudi dentist, and the lack of knowledge regarding the management of emergency medical situations could be because most Saudi dentists had their undergraduate dental qualifications from outside KSA. It is very likely that they had various levels of medical courses and emergency training in their educational institutions, and the

same for those trained at various dental schools in KSA. But it's worth to mention that it is mandatory for a dentist practicing in KSA to take a CPR course once every 2 years. Despite such events are rare, it is important for dentists to stay updated on the latest information and to practice the clinical skills needed to treat life-threatening incidents in the dental office, in order to decrease the adverse outcomes from medical emergencies. Some factors were suggested for the lack of preparation to deal with medical emergencies such as; lack of learning during undergraduate education, the lack of continuing education post-graduation, and disinterest (Obata et al., 2021). Therefore, it's necessary to perform training in emergency care for dentists.

There should be professional guidelines to direct all dental practitioners to get a set of essential drugs and equipment to deal with emergencies (Joshi & Acharya, 2015). Especially, oxygen cylinder must be available in breathing difficulty cases or in situations where the patient is unconscious and not ventilating properly (Rosenberg, 2010). Regarding the level of preparedness for emergencies within dental clinics, in terms of tools and instruments. The present study revealed a high level of preparedness in dental clinics to face any emergency situation. Our results here similar to the results obtained by Muller et al. that the majority of the dentists maintained emergency kits in their dental clinics (Müller et al., 2008). Atherton et al., also reported that that 80% of the general dental practitioners in the UK had emergency equipment and drugs (Atherton et al., 1999).

The number of participants in this study was limited, this may be because dentists were busy and did not fill out the questionnaire. Therefore, we hope that more studies will be done on the same issue, including larger number of participants and larger regions of Saudi Arabia.

## Conclusion

This study showed that there is a high prevalence of medical emergencies in dental clinics in Najran region, Saudi Arabia. Diabetes problems (hypoglycemia/ hypoglycemia) is the most common medical emergency, followed by Vasovagal syncope represented and then Epileptic insult. There is a common belief among dentists and dental assistants that they can handle with emergencies, but in reality they showed insufficient level of knowledge regarding the management of emergency medical situations. The required equipment and drugs in emergency cases are available in most dental clinics in Najran region, Saudi Arabia.

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