

Knowledge, Attitude and Perception of Private Dental Practitioners Towards Medical Emergencies in Klang Valley, Malaysia

Nor Azura Binti Ahmad Tarmidzi^{1*}, Nalisha Binti Mohamed Ramli¹, Norashikin Amran²,
Husna Najihah Binti Norazmi³, Nur Saniah Binti Mohd Arifin³

1. Department of Oral & Maxillofacial Surgery, Medical and Pathology. Faculty of Dentistry, Universiti Sains Islam Malaysia, 55100, Kuala Lumpur.
2. Department of Oral & Maxillofacial Surgery, Medical and Pathology. Faculty of Dentistry, Universiti Sains Islam Malaysia, 55100, Kuala Lumpur.
3. Faculty of Dentistry, Universiti Sains Islam Malaysia, 55100, Kuala Lumpur.

Abstract

Medical emergencies in dental practice is not uncommon and it can be alarming to any clinician but it managed well with proper preparation beforehand.

This study is aimed to evaluate private dental practitioner's knowledge in dealing with medical emergencies in dental practice, to assess perceived level of competency of private dental practitioners in dealing with medical emergencies in dental practice and to determine private dental practitioners need for further improvement in medical emergencies training. A standardised questionnaire form consisting of demographic data, experience, knowledge and perceived competency in management of medical emergencies in dental practice was used. Most respondent answer correctly regarding medication indicated in angina attack (92.6%), meanwhile the question on first action in dealing with unresponsive patient got the least correct answer (25%). Most of the respondent felt incompetent in conducting certain procedures especially in administration of intravenous drugs where. Majority of the practitioners (66.2%) felt competent in performing measurement of vital signs. Nonetheless, all respondents showed the desire to obtain further knowledge in medical emergencies management.

The results of this study can provide an insight for further improvement in medical emergencies management including the necessary skills and knowledge required by dental practitioners in order to deliver a safe and reliable dental practice.

Clinical article (J Int Dent Med Res 2022; 15(2): 649-655)

Keywords: Medical emergencies, dental practitioner, dental education.

Received date: 16 March 2022

Accept date: 17 April 2022

Introduction

As health professionals, dental practitioners are expected to handle any medical emergency while a patient is under their care. Emergency cases in dental clinic can either be dental emergency¹ or medical emergency and both needed to be addressed competently by the dental practitioner. Due to an ascending trend in non-communicable diseases prevalence such as hypertension and diabetes mellitus globally, dental practitioners can expect to be treating an

increasing number of medically compromised dental patients². These factors escalate the risk of medical emergencies occurring in dental settings³. Other common causes of medical emergencies in dental setting are allergies towards dental materials and fear of surgical treatment (anxiety) that sometimes resulted in hyperventilation, syncope and cardiac complications⁴. The competence and knowledge of dental practitioners in diagnosing and managing medical emergency play a crucial role for patient's safety while receiving dental treatment.

Risk assessment of a patient's condition may draw the dental practitioner's attention to any potential medical emergencies that may arise during their dental visits⁵. Thorough medical history and vital signs monitoring are also deemed important as a precaution in preventing occurrence of medical emergencies in the dental

*Corresponding author:

Nor Azura Binti Ahmad Tarmidzi
Department of Oral & Maxillofacial Surgery,
Medical and Pathology. Faculty of Dentistry,
Universiti Sains Islam Malaysia, 55100, Kuala Lumpur.
E-mail: norazura@usim.edu.my

office.

Life threatening medical emergencies in dental settings are rare, however the less serious medical emergencies are not uncommon⁶. Table 1 shows the previous literature on incidence of medical emergencies in dentally setting. The most commonly medical emergencies are noted to be syncope, hypoglycaemia, seizure and foreign body aspiration⁷. These unwanted events may occur either in the treatment room, waiting area or even after the patient's arrival at home⁷. During such emergency situation, dental practitioners and their teams need to be skillful and confident in managing their patient in order to initiate an effective initial emergency treatment. Lack of training, inability to cope and identify medical emergencies during dental visits can lead to tragic consequences and sometimes legal action. Medical emergencies can be alarming to any clinician, but these situations can be managed well if proper preparation has been made. Handling of medical emergencies is not considered as a simple procedure that could be gain by solely attending lectures. Indeed, it requires hands on experience in order to achieve an appropriate level of competency.

Author, year and country	Sample	Findings	
		Incidence of Medical Emergencies (ME)	Common ME
Smereka et al. ⁸ , 2019 Poland	422	Within 12 months, 1 out of 5 dental practitioner experience ME.	Vasovagal syncope, orthostatic hypotension, hyperventilation crisis, mild allergic reaction, hypoglycaemia, seizure.
Šoštarič, M., & Umek, N. ⁹ , 2018, Slovenia	289	Within 12 months 67.5% 1 ME 39.8% 2 ME 26.3% 3-10 ME	Syncope, hypoglycaemia, anaphylaxis, hypertensive crisis, seizure, airway obstruction, acute coronary syndrome
Mohamed Ramli et al. ⁷ , 2019 Malaysia	90	1 out of 3 dental practitioners experienced ME	Syncope, epilepsy, hypoglycaemia, inhaled foreign body, myocardial infarction, anaphylaxis
Alhamad et al. ⁸ 2015 Saudi Arabia	145	67% of dental practitioners encountered ME in the previous 3 years	Vasovagal syncope, orthostatic hypotension, adverse drug reaction, asthma attack, foreign body aspiration, seizures
Muller et al. ¹⁰ 2008 Germany	620	57% 3 ME in one year 36% 10 ME annually	Vasovagal syncope, hypertensive crisis, seizure, hypoglycaemia, asthma, acute coronary syndrome, anaphylaxis, airway obstruction
Girdler et al. ¹¹ , 1999 Northern England	302	0.7 ME per dental practitioners per year	Vasovagal syncope, angina, epileptic fit, hypoglycaemia, asthma, choking, anaphylaxis, cardiac arrest
Atherton et al. ¹² , 1999 Great Britain	1093	ME frequency of between one in 3.6 and 4.5 practice years, or, on average, between 9 and 11 emergency events per practising lifetime of 40 years	Seizures, swallowed object, asthma, diabetic events, angina, drug reactions, cardiac arrest, myocardial infarction, Stroke

Table 1. Previous research findings on incidence of medical emergency in dental settings.

Table 1 highlights the most common medical emergencies that can occur in the dental settings, which are vasovagal syncope,

hypoglycaemia, seizure, asthma attack, hypertensive crisis and swallowing of foreign body. Most of the medical emergencies are non-life threatening, while life-threatening events such as cardiac arrest and myocardial infarction are considered very rare^{6,7,9}. It was reported that most of the emergency events (70%) occurred during tooth extraction¹⁴.

Basic life support courses mainly focused on the initial resuscitation of cardiac arrest victim which includes airway, breathing and circulation support without the use of any equipment¹⁵. Cardiopulmonary resuscitation (CPR) courses, skills assessment and, if required, a skills refresher should be undertaken to update the proficiency¹⁶.

To date, there are only few studies conducted in the past concerning medical emergencies during dental practice in Malaysia. In addition to that, there is still no available standardized national guideline for dental practitioners to refer to regards to medical emergencies⁷. The only current available guideline and training are focusing on Basic Life Support (BLS) procedure; a foundation for saving lives of cardiac arrest patients which rarely occur in dental settings¹⁷. More common medical emergencies such as syncope, orthostatic hypertension or hypoglycemic patient management does not often been addressed.

Objectives: This study aimed to get further insights on the knowledge, attitude, and perception of private dental practitioners in the Klang Valley, Malaysia towards the management of medical emergencies in dental settings. Specifically, it was aimed to evaluate private dental practitioners' knowledge in dealing with medical emergencies in dental practice and to assess their perceived level of competency of private dental practitioners in dealing with medical emergencies in dental practice. The information gathered will serve as an initial step for future development and improvement in dental practice pertaining to medical emergencies management.

Materials and methods

This descriptive study has been conducted from the end of November 2020 until early February 2021. A total of 2524 private dental practitioners who worked in private sector was listed based on the Malaysian Dental

Council (MDC) website. From the list, random sampling was used to obtain the total sample. The sample size in this study was determined using EPI-info version 7.2.3.1 statistical package based on previous published studies according to our objectives. Confidence level was set at 95% with a 5.0% margin of error. Expected frequency of the second objective was set at 96% due to time constraint, low response rate and load of work. Based on this input, the final sample size required for this study were 59 dental practitioners.

The inclusion criteria for this study was the resident dentists from all private dental clinics located at the area of Klang Valley, Malaysia. Dental specialists were excluded from the study to ensure equality between samples. This was due to the assumption that dental specialists may have more knowledge and skills in dealing with medical emergencies in comparison to general dental practitioners.

An adopted questionnaire from Stafuzza et al¹⁸ was developed to achieve each component of the research's objectives. The questionnaire comprises of five sections with several closed ended questions and several multiple-choice questions. The first section of the questionnaire gathered the demographic information of the dental practitioners. The second section of the questionnaire focused on the assessment of dental practitioners experienced in handling medical emergencies and information regarding basic life support training and their opinion on the importance of knowledge in medical emergencies management. Subsequently, the third section evaluated the dental practitioners' knowledge about medical emergencies management in dental practice. The fourth section assessed the perceived level of competency of the dental practitioners in dealing with medical emergencies events in their dental practices using a four-scale rating on the listed procedure provided. The final section of the questionnaire identified the need for further improvement in medical emergencies training. The adopted questionnaire was pre-tested to evaluate its credibility and to assess respondents' comprehension to the questions given. Several changes were made to the questionnaire to facilitate the samples' responses and upon advice from content expert Basic Life Support (BLS) instructor and Oral & Maxillofacial Surgeons. The questionnaire was then

distributed among the respondents through google form including the information of the study and a consent form.

Prior to the commencement of this study, an ethical approval was obtained from the Medical Ethics Committee, Universiti Sains Islam Malaysia (USIM/JKEP/2020-111) All the data obtained were analysed descriptively using Statistical Programme for Social Science (SPSS) version 22.0 (SPSS Inc., 1999). Categorical variables were calculated as mean, frequency and percentages.

Results

68 private dental practitioners who practice in the region of Klang Valley, Malaysia were contacted and personally approached to participate in this study. A 100% response rate were received which may be due to the small number of the sample size.

Data Information		n (%)
Gender	Male	29.4 (20)
	Female	70.6 (48)
Years of practice	0-2 years	10.3 (7)
	2-5 years	48.5 (33)
	5-10 years	29.4 (20)
	10-20 years	5.9 (4)
	>20 years	5.9 (4)
Experience in medical emergencies in dental practice	Never	29.4 (20)
	1	32.4 (22)
	2	19.1 (13)
Last time attending BLS course	3	19.1 (13)
	Within 6 months	11.8 (8)
	1-2 years ago	25.0 (17)
	2-3 years ago	19.1 (13)
	>3 years	44.1 (30)

Table 2: Demographic Data (N=68)

Demographic data

Majority of the participants were female practitioners (64.0%) and only 26.7% of them are male practitioners. Almost half of the participating dentists had been practicing dentistry for a period of 2 to 5 years (44.0%), 26.7% for 5 to 10 years, 5.3%, for 10 to 20 years, 5.3% for more than 20 years and 9.3% had less than 2 years of experience. 29.3% only encountered one medical emergencies event in their professional practice. Meanwhile, 26.7% of the respondents have never experienced any medical emergencies throughout their career. A total of 40.0% of the practitioners had their last Basic Life Support

(BLS) training more than 3 years previously. Only 10.7% had a recent BLS training within 6 months period. The data mentioned were shown in Table 2.

Knowledge in medical emergencies management

Five questions were asked under this section to specifically assess the knowledge of practitioners on several medical emergencies management of syncope, unresponsive patient, anaphylaxis, hypoglycemia and angina attack. The performance of the respondents for each question are tabulated in Table 3. Most of the questions were answered correctly. The question with the most correct answer was regarding the management of angina attack (92.6%). Question about the immediate management of unresponsive patient got the least correct answers with 75% incorrect answers. The total score for knowledge were shown in Figure 1. It was shown that only 10.3% answered all questions correctly. Most of them answered 4 out of 5 questions correctly (39.7%).

Question	Correct answer (n)
What is the position for patients suffering from syncope on dental chair?	69.1% (47)
What is the first action in dealing with unresponsive patients?	41.2% (28)
Which of the following is the first drug in case of anaphylaxis?	66.2% (45)
During performing scaling on a diabetic patient, suddenly the patient start sweating and trembling. What is your management?	85.3% (58)
What is the first suitable medication to administer if patient suspected to have angina attack during dental treatment?	92.6% (63)

Table 3. Performance on Knowledge for Each Questions.

Perceived level of competency of dental practitioner in dealing with medical emergencies in dental practice.

The perceived competency level of the respondents in dealing with medical emergencies are shown in Table 4. Most of the respondents were really confident in measuring vital signs (66.2%) compared to other procedures. Meanwhile, the highest rate response for the procedure that they were not confident at all to perform was administration of intravenous medication (26.5%). Few of the respondents were not sure whether they were competent in

performing procedures of intramuscular medication administration (27.9%), handling of foreign body aspiration (29.4%), administration of intravenous medication (30.9%) and to use automated external defibrillators (AED) (33.8%). The highest perceived level of competence that they may be able to perform was cardiopulmonary resuscitation (CPR) which accounts for 55.9%.

Skills	Yes, I can perform confidently (n)	Maybe I am able to perform (n)	Not sure (n)	No confident at all (n)
Cardiopulmonary resuscitation (CPR)	23.5% (16)	55.9%(38)	13.2% (9)	7.4% (5)
Measuring vital signs	66.2% (45)	26.5% (18)	5.9% (4)	1.5% (1)
Handling situation of aspiration of a foreign body	22.1% (15)	45.6% (31)	29.4 (20)	2.9% (2)
Heimlich maneuver	26.5% (18)	45.6% (31)	19.1 (13)	8.8% (6)
Administration of intramuscular medication	25.0% (17)	32.4% (22)	27.9% (19)	14.7% (10)
Administration of intravenous medication	5.9% (4)	36.8% (25)	30.9% (21)	26.5% (18)
To use automated external defibrillators (AED)	11.8% (8)	35.3% (24)	33.8% (23)	19.1% (13)

Table 4. Perceived level of competency of dental practitioner in dealing with medical emergencies in dental practice.

The need for further improvement in medical emergencies training.

In this study, all the respondents revealed an interest in improving their medical emergencies training and all of them agreed that a course specifically designed for medical emergencies in dental practice is needed. This indicates a positive response on the necessity to establish a standardized national guideline of medical emergencies as a reference document for all dental professionals.

80% of the respondents agreed that administration of intravenous drugs, recognizing early signs and symptoms of medical emergency (hypoglycemic, syncope, chest pain), management of foreign body aspiration (dental material), management of epilepsy, management of airway and a guide on automated external defibrillators (AED) to be added in the future course for management of medical emergencies in dental practice. 63% suggested to include management of bleeding and more than three quarter suggested the need to include administration of intramuscular medication and emergency trolley in dental settings.

Discussion

Medical emergencies in dental clinic are not rare, thus it cannot be taken lightly because if it does happen, it can be life threatening^{8,9}. Dental practitioner must acknowledge that any patient may experiences medical emergency during dental treatment which can actually ranges from simple manageable cases such as syncope to a more serious life threatening condition such as myocardial infarction.

Recognition of high-risk patient during history taking is a significant start point. There are several factors that need to be considered in preparing for a safe environment for patients in the dental clinic including an emergency action plan along with a standard recommended procedure, equipment for basic airway rescue as well as oxygen apparatus, availability of an automated external defibrillator and a well-trained dental team.

This study has a relatively high response rate of 100% and the total number of sample size achieved exceeded the minimum number needed. However, it should be noted that our sample size is significantly far smaller than in other reported studies. From this research, majority of the respondent have experienced medical emergencies in their career (70.6%) and most of them had less than 10 years of working experience (88.2%). Recent studies found that the prevalence of medical emergencies in dental practice varies from one country to another¹⁹. It must also be acknowledged that every dentist should expect to be play a role in the chain of event in medical emergencies management at some point of their career. One fifth of the respondents had encountered medical emergencies events more than three times throughout their professional career (mean=2.49 years of working experience). This should indeed be an eye opener to all practicing dentists that knowledge and skills in managing medical emergencies is crucial in all settings.

On the other hand, it is quite a concern that most of the practitioners in this study had attended their BLS course more than 3 years previously. The European Resuscitation Council reported that depreciation in knowledge and skills will occur rapidly after initial resuscitation training if it is not being revived and practice²⁰. This was also supported by Cooper et al which stated that skills such as BLS, airway management and

defibrillation will deteriorate significantly within six months of initial training²¹. Simulation education in medical emergencies such as team training have been proven to improves knowledge and skills in managing such situation²².

From this study, the knowledge scores from the respondents were noted to be below average as only 10.3% of them answered all five questions of the knowledge section correctly. However, it is comparable to other previous studies which showed prominent deficiency in the knowledge scores among dental practitioner in other parts of the world^{23,24,25}. One of the questions asked was regarding the respondent's knowledge on immediate action in dealing with unresponsive patients which involves the activation of the emergency response system (ERS). This is the core concept in the management of medical emergencies especially in life threatening event such as cardiac arrest. More than half of the respondents in this study were not able to utilize this concept. Dental practitioners must be knowledgeable in the management of common medical emergencies events and this should be one of the important objectives to be incorporated in undergraduate dental education. Superficial knowledge can be a barrier for a successful medical emergencies management especially in diagnosing at-risk patient. Inadequate knowledge on the management of common medical emergencies may lead to insecurity or limited appreciation of responsibilities among dental practitioners²⁶. It is also important to recognise the importance of maintaining the knowledge and awareness of medical emergencies throughout their career. Management of medical emergencies requires initial education and retraining at a later period²⁰.

With regards to competency level of dental practitioners in dealing with medical emergencies in dental practice, only quarter of the respondents judged themselves confident in performing cardiopulmonary resuscitation (CPR). This result may be associated with the fact that 25% of the respondents had attended Basic Life Support (BLS) course within 1 to 2 years previously. In a similar study by Mohan et al.²⁷, even though dental practitioner has been exposed to CPR during undergraduate training, they were still not confident in performing it. This can be associated with less attention given for CPR training during undergraduate curriculum teaching and the perception that this procedure is

too complex for dental student. It is important that a structured instructional manual for BLS to be incorporated in the dental curriculum right from the first year with regular assessments of their skills in BLS throughout the clinical years²⁸. BLS knowledge and practical competency deteriorated over time and it is necessary to update the training periodically¹⁶.

Most of the dental practitioner seems to be confident in performing vital signs measurement compared to other skills. This may be due to vital signs measurement is a simple procedure that is being done repeatedly and the dental practitioner feels competent performing it. Simulation and routine implementation is important to all dental practitioners as it has been highlighted in order to maintain the required skills¹⁹. It was surprising that only one quarter of the dental practitioner displayed confidence to administer intramuscular medication even though this procedure is considered less complex than administration of intravascular medication. All practitioners must be familiar with intramuscular drug administration as it is the recommended management for unconscious hypoglycaemic patient in dental setting³⁰.

Automated external defibrillator (AED) is one of the most important emergency equipment strongly recommended for every dental clinic to have³¹. It is an easy-to-use medical device which help in cases of sudden cardiac arrest. A previous study by Breuer et al.³² showed that majority of dental practitioners did not use AED in a situation when it was indicated. Similarly, in this study most of the respondent were not confident in using AED. It has been documented that early defibrillation in an event of cardiac arrest can improve patient survival rate³³.

All the respondent showed interest in the need for further improvement in medical emergencies training. It was recommended that dental practitioners update their BLS knowledge and skills periodically at least every 2 years³⁴. In a research done in India, majority of the dental practitioner did not know where to go for training in handling emergency cases³⁵. It is important for dental and medical educators to offer such specific training for dental practitioners to gain or retain knowledge as well as important skills as many of them feel unprepared for such events. Some of the authors even suggested for advanced Cardiovascular Life Support to be part of medical emergencies curriculum for dental

undergraduate students³². Realistic simulation has been proven to be effective in the training of medical emergencies management as an adjunct to the traditional style lectures³⁶. Frequent refresher course is also recommended to sharpen the skills obtained. Among topics that dental practitioner feels the need for further improvements are administration of intravenous and intramuscular drugs, recognising early signs and symptoms of medical emergencies as well as how to use AED and emergency trolley in dental settings.

Conclusions

Dental practitioner in this study showed moderate level of knowledge in medical emergencies and large number of them have low to moderate level of perceived competency in medical emergencies management. All of the respondent agree with the need for further improvement in medical emergencies training. Considering the aforementioned discussion, the result of this study alerts the dental community for the need of improvement in the emergencies management skills and knowledge among dental practitioners. Hence, dental practitioners are required to gain sufficient knowledge and training either during undergraduate or postgraduate training in order to avoid possible technical, ethical and judicial demands associated with medical emergencies in dental practice. A standardized national guideline which includes all the common medical emergencies in dental setting can be useful in ensuring the preparedness of all practicing dentists upon encountering unfortunate emergency situations.

Declaration of Interest

The authors report no conflict of interest.

References

1. Ersin N, Ertugrul F, Oncag O, Menderes M, Uzel I. Evaluation of high risk university students'knowledge about dental trauma and emergency procedures. *Journal of International Dental & Medical Research*. 2013 Dec 1;6(3): 100-104.
2. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases> . Access February 20, 2022.
3. Clough S, Shehabi Z, Morgan C. Medical risk assessment in dentistry: use of the American Society of Anesthesiologists Physical Status Classification. *British dental journal*. 2016 Feb;220(3):103-8.
4. Albelaihi HF, Alweneen AI, Ettish A, Alshahrani FA. Knowledge,

- attitude, and perceived confidence in the management of medical emergencies in the dental office: A survey among the dental students and interns. *Journal of International Society of Preventive & Community Dentistry*. 2017 Nov;7(6):364.
5. Omar Y. Avoiding medical emergencies. *British dental journal*. 2013 Mar 8;214(5):255.
 6. Alhamad M, Alnahwi T, Alshayeb H, Alzayer A, Aldawood O, Almarzouq A, Nazir MA. Medical emergencies encountered in dental clinics: A study from the Eastern Province of Saudi Arabia. *Journal of family & community medicine*. 2015 Sep;22(3):175.
 7. Ramlii NM, Tarmidzi NA, Samsuddin AD, Idaham NI, Ibrahim AZ. A Pilot Study of Preparedness for Medical Emergencies in Urban Private Dental Practices in Malaysia. *Archives Of Orofacial Science*. 2019: 99–111.
 8. Smereka J, Aluchna M, Aluchna A, Szarpak Ł. Preparedness and attitudes towards medical emergencies in the dental office among Polish dentists. *International Dental Journal*. 2019 Aug 1;69(4):321-8.
 9. ŠOŠTARIČ M, UMEK N. Medical emergencies in dental offices in Slovenia and readiness of dentists to handle them. *Signa vitae: journal for intensive care and emergency medicine*. 2018 Jun 1;14(1):43-8.
 10. Müller MP, Hänsel M, Stehr SN, Weber S, Koch T. A state-wide survey of medical emergency management in dental practices: incidence of emergencies and training experience. *Emergency Medicine Journal*. 2008 May 1;25(5):296-300.
 11. Girdler NM, Smith DG. Prevalence of emergency events in British dental practice and emergency management skills of British dentists. *Resuscitation*. 1999 Jul 1;41(2):159-67.
 12. Atherton GJ, McCaul JA, Williams SA. Medical emergencies in general dental practice in Great Britain Part 1: their prevalence over a 10-year period. *British dental journal*. 1999 Jan;186(2):72-9.
 13. Chapman PJ. Medical emergencies in dental practice and choice of emergency drugs and equipment: a survey of Australian dentists. *Australian dental journal*. 1997 Apr;42(2):103-8.
 14. Joshi S, Acharya S. Medical Emergencies in Dental Practice-A Nepalese study. *Orthodontic Journal of Nepal*. 2015 Dec 1;5(2):33-7.
 15. Basic Life Support Training Manual 1st Edition, Malaysia in December 2017, Medical Development Division Ministry of Health Malaysia.
 16. Kim SY, Shin D, Kim HJ, Karm MH. Changes of knowledge and practical skills before and after retraining for basic life support: Focused on students of Dental School. *International journal of medical sciences*. 2020;17(18):3082.
 17. Somaraj V, Shenoy RP, Panchmal GS, Jodalli PS, Sonde L, Karkal R. Knowledge, attitude and anxiety pertaining to basic life support and medical emergencies among dental interns in Mangalore City, India. *World journal of emergency medicine*. 2017;8(2):131.
 18. Stafuzza TC, Carrara CF, Oliveira FV, Santos CF, Oliveira TM. Evaluation of the dentists' knowledge on medical urgency and emergency. *Brazilian oral research*. 2014 Aug 18;28:1-5.
 19. Vaughan M, Park A, Sholapurkar A, Esterman A. Medical emergencies in dental practice—management requirements and international practitioner proficiency. A scoping review. *Australian dental journal*. 2018 Dec;63(4):455-66. doi: 10.1111/adj.12649
 20. Laurent F, Augustin P, Youngquist ST, Segal N. Medical emergencies in dental practice. *Médecine Buccale Chirurgie Buccale*. 2014 Jan 1;20(1):3-12.
 21. Cooper S, Johnston E, Priscott D. Immediate life support (ILS) training: Impact in a primary care setting?. *Resuscitation*. 2007 Jan 1;72(1):92-9.
 22. Hadfield A, Thompson S, Hall J, Diaz-Navarro C. Perception of simulation training in emergencies for dental sedation practitioners. *The Clinical Teacher*. 2018 Feb;15(1):52-6.
 23. Khami MR, Yazdani R, Afzalimoghaddam M, Razeghi S, Moscowchi A. Medical emergency management among Iranian dentists. *The journal of contemporary dental practice*. 2014 Nov 1;15(6):693-8.
 24. Al-Iryani GM, Ali FM, Alnami NH, Almashhur SK, Adawi MA, Tairy AA. Knowledge and preparedness of dental practitioners on management of medical emergencies in Jazan Province. *Open access Macedonian journal of medical sciences*. 2018 Feb 15;6(2):402.
 25. Jaber L, Al-Qarni F, Alsaati M, Al-Nefaeie M, Shetty AC, Shaban S, Zarka R, Aljundi A, Jaber B. Perspectives of Dental Practitioners Regarding Their Readiness for Medical Emergencies: A Study in Saudi Arabia. *The Open Dentistry Journal*. 2021 Dec 31;15(1).
 26. Narayan DP, Biradar SV, Reddy MT, Bk S. Assessment of knowledge and attitude about basic life support among dental interns and postgraduate students in Bangalore city, India. *World journal of emergency medicine*. 2015;6(2):118.
 27. Mohan M, Sharma H, Parolia A, Barua A. Knowledge, attitude and perceived confidence in handling medical emergencies among dental practitioners in Dakshina Kannada, India. *Oral Health Dent Manag*. 2015 Jan;14(1):27-31.
 28. Banerjee A. Basic life support in undergraduate dental curriculum. *International Journal of Students' Research*. 2016 Jul 1;6(2):16-17.
 29. Marks LA, Van Parys C, Coppens M, Herregods L. Awareness of dental practitioners to cope with a medical emergency: a survey in Belgium. *International dental journal*. 2013 Dec 1;63(6):312-6.
 30. Kurt-Gabel C. Medical emergency drugs in the dental practice setting. *Dental Nursing*. 2012 Feb;8(2):86-9.
 31. Mohideen K, Thayumanavan B, Balasubramaniam AM, Vidya KM, Rajkumari S, Bharkavi SI. Basics of management of medical emergencies in dental office and emergency drug kit. *IJSS*. 2017 Jul 1;5:273-8.
 32. Breuer G, Knipfer C, Huber T, Huettl S, Shams N, Knipfer K, Neukam FW, Schuettler J, Stelzle F. Competency in managing cardiac arrest: A scenario-based evaluation of dental students. *Acta Odontologica Scandinavica*. 2016 May 18;74(4):241-9.
 33. Stokes NA, Scapigliati A, Trammell AR, Parish DC. The effect of the AED and AED programs on survival of individuals, groups and populations. *Prehospital and disaster medicine*. 2012 Oct;27(5):419-24.
 34. Nogami K, Taniguchi S, Ichiyama T. Rapid deterioration of basic life support skills in dentists with basic life support healthcare provider. *Anesthesia progress*. 2016;63(2):62-6.
 35. Kumarswami S, Tiwari A, Parmar M, Shukla M, Bhatt A, Patel M. Evaluation of preparedness for medical emergencies at dental offices: A survey. *Journal of International Society of Preventive & Community Dentistry*. 2015 Jan;5(1):47.
 36. Newby JP, Keast J, Adam WR. Simulation of medical emergencies in dental practice: development and evaluation of an undergraduate training programme. *Australian dental journal*. 2010 Dec;55(4):399-404.