



Experience and Preparedness of Medical Emergency among Dentists of Private Dental Teaching Hospitals of Lahore

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Abstract

Objective Handling medical emergency in a dental clinic requires skill and specialized equipment, without which a patient's life can be in jeopardy. This study aimed to evaluate the prevalence of medical emergencies in dental teaching hospitals and assess the preparedness of dental professionals with regard to the handling of emergency and the equipment available for that.

Materials and Methods This is a cross-sectional study employing nonprobability sampling. Data were collected from dental surgeons working in clinical specialties of five dental teaching hospitals of Lahore, Pakistan. A validated questionnaire was adopted from another study evaluating emergency prevalence and preparedness. Chi square test was used to assess significant associations among categorical variables while independent samples *t*-test and one-way analysis of variance were used to compare mean values among different groups.

Results Prevalence of medical emergencies encountered was 7.9%. About 45% of emergency events occurred during treatment. Hypoglycemia was reported to be the most encountered medical emergency, 83 (37%). Equipment that were available in most departments were stethoscope (81.8%), sphygmomanometer (79.7%), and oxygen cylinder (74.0%). Medications that were readily present were epinephrine (88.1%), glucose (83.2%), and aspirin (76.2%). Seventy-six (53.1%) respondents were not very well prepared to manage a presenting emergency. Twenty-two (85.3%) respondents suggested hands-on courses to improve their skills. About 56 (39.2%) respondents revealed that their departments were not well equipped to handle medical emergencies.

Conclusion Most dentists will get to experience an emergency event during their practice for which they may be underprepared and lack appropriate skill and certainty in management. It also portrays serious lack of preparedness in the supporting staff as well as clinics being deficient in important emergency medication and equipment.

Keywords

- ▶ dentistry
- ▶ emergencies
- ▶ hospitals
- ▶ teaching

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Introduction

In the current era, with improvements in delivery of health care services and increased expectancy of life, dentists treat a greater count of senile as well as medically challenged patients. Medical issues that a dentist may face during practice include cardiac abnormalities, diabetes mellitus, bleeding disorders, neurological disorders, and respiratory problems among other diseases. Obtaining detailed medical history is, henceforth, a prerequisite in this regard as each labeled medical condition is capable of affecting dental treatment in a different way.¹ Moreover, multiple drug interactions if not handled carefully may lead to unnecessary morbidity and mortality. To execute safe management of patients with underlying medical history, dentists should be equipped with not only knowledge about basic life support (BLS) but latest evidence-based treatment options as well. Also, honing of skills associated with delivery of first aid should be vital.² A recent study reported that most of the patients who experienced medical emergencies during dental treatment did not have any significant medical history.³ This can, similarly, be potentially challenging for a dentist as not all patients with a history of medical comorbidity are at a risk of medical emergency during dental invasive procedures. It is also noteworthy that emergencies can occur at any time, often with no prior warning.⁴ Therefore, assessing the onset of such an emergency and having skills to manage it must be a prerequisite for dental practitioners.⁵

Although multiple factors account for the level of readiness required to manage medical emergencies in a particular dental setup, all dental practices must be equipped at basic level.⁶ Fortunately, most of the severe medical emergencies that can occur during dental practice are rare.² Although uncommon in dentistry but serious fatal emergencies can befall. Literature shows that a medical emergency is faced, at least once every year by most dentists.^{7,8} Even if this unfortunate event occurs, it is most likely to take place in the department of oral and maxillofacial surgery.³ As far as types of emergencies are concerned, the most common emergencies reported were syncope and cardiac events.^{3,9} Their initial management, though not complex, requires knowledge and practice. Hence, to cover all the aspects of preparedness in dental teaching hospitals, insight of current situation is mandatory. Thus, the study aims to assess the prevalence of medical emergencies encountered along with level of preparedness of dentists and dental teaching hospitals as well.

Materials and Methods

It was a questionnaire-based cross-sectional study done from October 2019 to March 2020 at five different private dental teaching hospitals of Lahore, Pakistan. Participants were selected through nonprobability sampling and included dentists working in clinical departments of these institutions. Study was initiated after ethical approval was obtained from the Ethical Review Board of the University College of Dentistry (Ref.: UCD/ERCA/19/08ab). Identifiable information such as name, email, and phone number were

not inquired from the respondents. Two researchers were involved in data collection process. Information pertaining to aim and objective of the study were provided to the respondents and informed consent was sought prior to proforma distribution.

The questionnaire was adopted from a similar study done by Atherton et al in the UK, which evaluated emergency preparedness among private dental practitioners and practices.¹⁰ The questionnaire consisted of three parts, which evaluated (i) prevalence of the medical emergencies, (ii) knowledge of the faculty members, and (iii) preparedness of the institutes (availability of emergency equipment such as oxygen cylinders, and emergency medicines such as epinephrine, nitroglycerin, salbutamol) in cases of emergency. The minimum required sample size was calculated to be 66 for this study, using 80% study power, 95% level of significance, and 4.5% prevalence of at least two medical emergencies in dentistry per year.¹¹ The data were entered and analyzed by using IBM SPSS (version 23.0) software. The descriptive statistics were reported as frequency and percentages for categorical variables while mean, along with standard deviation, was reported for continuous variables. Chi-square test was used to assess significant associations among categorical variables while independent samples *t*-test and one-way analysis of variance were used to compare mean values among different groups. A *p*-value of less than or equal to 0.05 was considered significant in this study.

Results

The initial response rate was low; thus, it was distributed to more faculty and more colleges. In the second round, good response was received; hence, they were included for analysis. So, a total of 143 participants were included in the survey. Most of the respondents were female (55.9%), working as a demonstrator (45.5%) and had working experience of 1 to 5 years (60.1%). Demographic information is summarized in ►Table 1.

A total of 654 medical emergencies were reported by 143 dental health professionals over 8,255 months of practice. Therefore, the rate of occurrence of medical emergencies was calculated to be 7.9% (654/8,255). It was declared that most of the emergencies occurred inside department, that is, 79 (55.25%). Similarly, it was reported by 67 (46.9%) dental professionals that most of the emergencies occurred during the procedure. ►Table 2 recapitulates the type of medical emergencies and site/time of occurrence of such emergencies.

Significantly higher number of emergencies were reported from surgery and operative department as compared with all others ($p=0.006$). About 33 (13.3%) dental professionals acknowledged that they were not trained to manage medical emergencies in their undergraduate training, while remaining 110 (76.9%) were trained in either cardiopulmonary resuscitation (CPR), intravenous (IV) access, or emergency drug use. Similar numbers of respondents were trained for managing emergency situations in post-graduate training. On the other hand, 84 (58.7%) professionals were trained in at least one program including BLS,

Table 1 Demographic characteristics of study responders

Characteristics	N = 143 n (%)
Gender	
• Male	63 (44.1)
• Female	80 (55.9)
Designation	
• PG trainee	56 (39.2)
• Demonstrator	65 (45.5)
• Assistant professor	7 (4.9)
• Associate professor	1 (0.7)
• Registrar	14 (9.8)
Qualification	
• BDS	46 (32.3)
• FCPS	20 (14.0)
• MCPS	10 (7.0)
• MDS	9 (6.3)
• PGT	58 (40.6)
Departments	
• Prosthodontics	24 (16.8)
• Orthodontics	19 (13.3)
• Periodontic	22 (15.4)
• Operative	43 (30.1)
• Surgery	30 (21.0)
• Diagnostics	5 (3.5)
Working experience	
• < 1 year	14 (9.8)
• 1–5 years	86 (60.1)
• 6–10 years	36 (25.2)
• 11–15 years	6 (4.2)
• > 15 years	1 (0.7)
Number of emergencies reported by dentists	
• < 10	124 (86.7)
• 11–30	15 (10.5)
• > 30	4 (2.8)
Site of emergency occurrence	
• Waiting area	14 (9.8)
• Department	79 (55.2)
• Both	19 (13.3)
• Other	11 (7.7)

Abbreviations: BDS, Bachelor of Dental Surgery; FCPS, Fellowship of College of Physicians and Surgeons; MCPS, Member of College of Physicians and Surgeons; MDS, Master of Dental Surgery; PGT, Post-graduate Trainee.

advanced cardiovascular life support, and advanced trauma life support, while 35 (24.5%) were trained in all three. ► **Fig. 1** displays results associated with emergency preparedness of respondents. Out of 143, 122 (85.3%) and 9

Table 2 Frequency and time of medical emergency occurrences

Conditions	No. of occurrences: n (%)		Time of occurrences			
	1–5	6–10	> 10	Before procedure	During procedure	After procedure
Fits/seizures (N = 39)	38 (26.6%)	1 (0.7%)	-	15 (38.4%)	13 (33.3%)	11 (7.7%)
Hypoglycemia (N = 83)	72 (50.3%)	9 (6.3%)	2 (1.4%)	25 (30.1%)	37 (44.5%)	21 (25.3%)
Respiratory distress (N = 27)	25 (17.5%)	1 (0.7%)	1 (0.7%)	6 (22.2%)	17 (62.9%)	4 (14.8%)
Cardiac arrest (N = 5)	5 (3.5%)	-	-	-	5 (100%)	-
Stroke (N = 2)	2 (1.4%)	-	-	-	1 (50.0%)	1 (50%)
Syncope (N = 22)	20 (14.0%)	1 (0.7%)	1 (0.7%)	6 (27%)	5 (23%)	11 (50%)
Angina pectoris (N = 19)	19 (13.3%)	-	-	4 (21.0%)	10 (52.6%)	5 (26.3%)
Myocardial infarction (N = 4)	4 (2.8%)	-	-	-	2 (50.0%)	2 (50.0%)
Drug reaction (N = 25)	23 (16.1%)	1 (0.7%)	1 (0.7%)	2 (8.0%)	12 (48.0%)	11 (44.0%)

(6.3%) professionals declared that hands-on courses and lectures should be provided to improve their level of preparedness, respectively; 7 (4.9%) said other means should be used to improve level of preparedness while 5 (3.5%) said no further training was required.

It was reported by 84 (58.0%) respondents that no staff members were assigned with specific duties in case of emergency in their departments. Moreover, 56 (39.2%) respondents said their departments were not equipped enough to tackle medical emergencies and 36 (25.2%) declared that no emergency contact information was displayed at their institutes. ► **Tables 3 and 4** summarize the availability and type of medical equipment available for handling emergency situations in various departments. It was found that

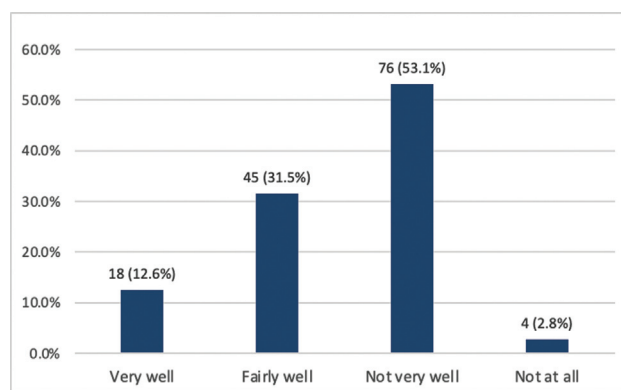


Fig. 1 Self-reported preparedness of respondent.

Table 3 Level of preparedness in terms of availability of medical equipment among various dentistry departments

Level of preparedness	Dentistry departments						p-Value
	Prosthodontics	Orthodontics	Periodontics	Operative	Surgery	Diagnostic	
Equipment							
Oxygen cylinder	14 (58.3%)	8 (42.1%)	18 (81.8%)	36 (83.7%)	29 (96.7%)	1 (20.0%)	0.001
Nasal cannula	7 (29.2%)	4 (21.2%)	7 (31.8%)	15 (34.9%)	18 (60.0%)	1 (20.0%)	0.062
Nonrebreathing mask with oxygen reservoir	2 (8.3%)	3 (15.8%)	4 (18.2%)	2 (4.7%)	3 (10.0%)	–	0.491
Nasal hood	3 (12.5%)	–	5 (12.8%)	20 (46.5%)	10 (33.3%)	1 (20.0%)	0.002
Bag-valve-mask device with oxygen reservoir	2 (8.3%)	–	–	11 (25.6%)	21 (70.0%)	2 (40.0%)	0.001
Oropharyngeal airways	9 (37.5%)	–	3 (13.6%)	16 (37.2%)	20 (66.7%)	1 (20.0%)	0.001
Magill forceps	3 (12.5%)	1 (5.3%)	1 (4.5%)	–	2 (6.7%)	–	0.340
Automated external defibrillator	2 (8.3%)	1 (5.3%)	1 (4.5%)	3 (7.0%)	5 (16.7%)	1 (20.0%)	0.558
Stethoscope	20 (83.3%)	10 (52.6%)	15 (68.2%)	38 (88.4%)	29 (96.7%)	5 (100.0%)	0.001
Sphygmomanometer	20 (83.3%)	10 (52.6%)	16 (72.7%)	34 (79.1%)	29 (96.7%)	5 (100.0%)	0.007

Table 4 Level of preparedness in terms of availability of medicines among various dentistry departments

Level of preparedness	Dentistry departments						p-Value
	Prosthodontics	Orthodontics	Periodontics	Operative	Surgery	Diagnostic	
Medicines							
Epinephrine (1:1,000 inj.)	22 (91.7%)	14 (73.7%)	18 (81.8%)	40 (93.0%)	29 (96.7%)	3 (60.0%)	0.038
Diphenhydramine (50 mg)	13 (54.2%)	8 (42.1%)	14 (63.6%)	22 (51.2%)	24 (80.0%)	1 (20.0%)	0.034
Hydrocortisone (100 mg IV)	13 (54.2%)	7 (36.8%)	14 (63.6%)	29 (67.4%)	28 (93.3%)	1 (20.0%)	0.001
Diazepam (10 mg inj.)	13 (54.2%)	4 (21.2%)	13 (59.1%)	35 (81.4%)	28 (93.3%)	1 (20.0%)	0.001
Nitroglycerin	12 (50.0%)	9 (47.4%)	15 (68.2%)	36 (83.7%)	28 (93.3%)	1 (20.0%)	0.001
Albuterol/salbutamol	11 (45.8%)	4 (21.1%)	10 (45.5%)	24 (55.8%)	23 (76.7%)	1 (20.0%)	0.004
Glucose	19 (79.2%)	12 (63.2%)	17 (77.3%)	41 (95.3%)	29 (96.7%)	1 (20.0%)	0.001
Aspirin	18 (75.0%)	11 (57.9%)	14 (63.6%)	39 (90.7%)	26 (86.7%)	1 (20.0%)	0.001
Aromatic ammonia	5 (20.8%)	2 (10.5%)	5 (22.7%)	17 (39.5%)	19 (63.3%)	1 (20.0%)	0.001

Abbreviation: IV, intravenous.

stethoscope (81.8%), sphygmomanometer (79.7%), oxygen cylinder (74.0%), nasal cannula (36.4%), and oropharyngeal airways were the most common equipment, while epinephrine (88.1%), glucose (83.2%), aspirin (76.2%), glyceryl trinitrate (70.6%), and diazepam (65.7%) were the most common life-saving drugs present in various departments.

Discussion

Total of 654 emergency events were reported to have been experienced by the respondents from the dental teaching hospitals of Lahore with prevalence estimated at 7.9%. Most of the medical emergencies were encountered during the treatment. As stress and anxiety is an initiator of various physiologic responses in our body, events such as anesthesia induction and use of instruments in mouth can trigger reactions while treating the patient.¹² This could possibly explain why more events are reported occurring during the treatment. Hypoglycemia was the most encountered medical emergency reported, followed by seizures and respiratory distress. On the contrary, most studies reported syncope being the most prevalent medical emergency faced by practitioners, with hypoglycemia being the second.^{13,14} It is important to note that such events can be minimized by giving preoperative instructions to the patient with regard to dietary restrictions and treatment expectations.

Many respondents described being trained in their undergraduate course of studies to perform CPR while only few were trained in IV access and use of emergency drugs. Almost same response was recorded from responders who had a postgraduate degree. On the contrary, another study reported that only about half of the respondents were trained in emergency management such as BLS.¹⁵ This points toward the need to revise curriculum to equip new graduates with basic life-saving proficiencies.

Many respondents felt relatively prepared for managing medical emergencies; however, majority felt that they were not adequately prepared. On the contrary, it was observed in another study that majority (69%) of the responders were confident that they could manage a medical emergency.¹¹ Since many of the respondents in the sample were postgraduate trainees and had been working for 1 to 5 years, it is quite likely that they felt somewhat diffident due to still being in the learning process. Furthermore, respondents thought that their preparedness could be improved by hands-on courses. Such workshops are a need of time, especially for new graduates, and should be conducted as a part of continuing professional development activity. It is because inadequate training is provided at the undergraduate level, which is more focused on theoretical part rather than the clinical.

The respondents also informed that no staff member in their clinic was assigned specific duty if any emergency were to arise. This reflects on disorganized management on the part of the institution where no such policy exists or is active, where guidelines are provided with responsibilities appointed to relevant staff.

Most of the emergencies are benign in nature and often can be managed by altering the posture of the patient. Along

with that, medication plays an important role in an effort to stop the condition from further aggravating. Hence, it is vital that the practice be equipped with necessary emergency drugs until definitive treatment can be ascertained, especially in case of serious events such myocardial infarction, epilepsy. Emergency drugs that were present in all departments were epinephrine followed by glucose, aspirin, and nitroglycerin. A study conducted in Saudi Arabia concluded that aspirin was the most commonly available medicine in the dental clinics followed by glucose and nitroglycerin.¹⁶ As far as emergency equipment is concerned, stethoscope was the apparatus followed closely by sphygmomanometer, oxygen cylinder, and nasal cannula. The fact that oxygen cylinder was deficient in quantity and not available in departments in dental hospitals is worrisome as oxygen administration is suggested in almost all emergency situations.¹⁷

Limitations

Information relating to number of events experienced can be subjected to recall bias as it involved recollection of occurrences over a long period of time. Moreover, the results could have been better analyzed if more representation was attained from few departments.

Future Recommendations

In the light of inadequacy in management of unforeseen circumstances, more studies can be performed focusing on the frequency of each medical emergency to get a data that may follow appropriate setup for effective management. Extent of preparedness in government dental teaching hospitals can also be surveyed owing to a greater patient flow and hence more chances of experiencing medical emergencies. Similar surveys can also be performed among ancillary staff to ascertain the preparedness and availability of necessary equipment at their level, not to underestimate the necessity of well-prepared dental staff.

Conclusion

There is an immediate need of training and enhancing emergency management skills of dentists so that they are able to handle such situations assertively. Also, every clinical specialty needs to ensure availability of equipment and medication to avoid an unfavorable outcome.

Disclaimer

Manuscript has been read and approved by all authors. The dataset used in the current study is available on request from Dr. Khaloud Tariq at khaloud.tariq@ucd.uol.edu.

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Conflict of Interest

The authors declare no conflict of interest.

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