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Knowledge, Skills, and Perceived Competency in Handling Medical Emergencies among Dental House Officers and General Dentists

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ABSTRACT

Dental practitioners frequently encounter medical emergencies due to the nature of their work and the inherent stress within a dental office. Adequate preparation and confidence in handling such emergencies are very important for patient safety. **Objectives:** To assess the knowledge, skills and perceived competency of house officers and general dentists in managing medical emergencies in dental practice. **Methods:** A cross-sectional survey was conducted in Lahore among house officers and general practitioners. The survey included a pre-valid questionnaire on medical history documentation, attendance at medical emergency workshops, confidence in performing cardiopulmonary resuscitation, administering intravenous drugs, and managing common emergencies like syncope and hypoglycemia. Statistical analysis was performed with Chi-square and Fisher's exact tests applied to assess associations. **Results:** The majority of participants demonstrated adequate knowledge of medical emergency protocols, with 68% aware of the need to record medical history and 73% familiar with universal precautions. However, 45% reported being trained in administering cardiopulmonary resuscitation and 29% in administering intravenous drugs. Confidence in handling emergencies such as syncope (p=0.004) and unconscious hypoglycemic patients (p=0.03) was significantly higher among dentists with more experience. **Conclusions:** It was concluded that while dental practitioners generally possess knowledge about medical emergency protocols, there is a gap in training and confidence particularly in administering lifesaving procedures. More experienced dentists demonstrated higher confidence compared to house officers.

INTRODUCTION

A medical emergency is a sudden acute injury or illness that presents an immediate risk to a person's life or long-term health. Early detection and prompt intervention are essential in preserving the patient's life and averting irreversible damage. This is particularly true in dental settings where dentists often serve as the first responder during emergencies that can arise unexpectedly during routine treatments [1]. Perceived competency is defined as an individual's assessment of their ability in a given situation, plays a significant role in managing emergencies. Boekaerts describes it as the belief that one's skill and abilities match the demands of the situation. It is an internal confidence in the statement "I Can" [2]. In the context of medical emergencies, it is crucial for dental professionals to respond to high-pressure situations. The use of local anesthesia with vasoconstrictor can elevate heart rate and blood pressure increasing the likelihood of a medical emergency, especially in a patient with other comorbidities[3]. Medical emergencies in dental practices such as vasovagal syncope, angina, hypoglycemia, seizures, choking, asthma, anaphylaxis, and cardiac arrest are not uncommon [4]. Studies suggest that a general dentist may encounter a medical emergency at least once every two years with vasovagal syncope being the most common emergency encountered. The frequency of such emergencies tends to decline as practitioners gain

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professional experience [5]. Moreover, medical emergencies are 5.8 times more likely to happen in dental practices [6]. The higher risk is attributed to the fact that dental patients often have complex medical histories, particularly elderly or with multiple conditions. As the population ages and the prevalence of chronic conditions increases, the patient cohort in dental clinics becomes medically more complicated. The challenge for dental practitioners lies in being clinically and intellectually prepared to recognize and manage these medical emergencies in the dental office [7, 8]. Global surveys indicate that medical emergencies occur in dental offices two to four incidents per year on average. According to a 2018 survey by the American Dental Association, more than 30% of participants reported experiencing syncope, adrenaline reactions, or postural hypotension in the previous 12 months [9]. Despite the focus on the oral cavity, dentists must recognize that their responsibilities extend to the overall health of their patients. However, a lack of knowledge about medical emergencies among dental students often leads to anxiety and a limited understanding of their broader professional duties [10]. The responsibility for effectively managing medical emergencies in dental clinics ultimately falls on the dentist. Insufficiently trained and the inability to handle medical emergencies can result in tragic outcomes and potential legal repercussions. Therefore, dentists must be well trained in basic life support (BLS), the most fundamental and lifesaving intervention in emergencies [11]. Despite formal education and training, many dentists struggle to apply this knowledge in real-life scenarios even after certified training during their undergraduate and postgraduate studies [12]. Continuous education, including BLS courses and specialized workshops, is crucial. Dental Associations like the European Resuscitation Council (ERC) and the American Heart Association (AHA) recommend that dentists refresh their knowledge every two years to maintain confidence and competence [13].

This study aims to evaluate the current level of knowledge, skills, and perceived competency of dental practitioners in managing medical emergencies. By understanding these aspects, we can identify the areas for improvement in both training and practical application to ensure that dental professionals are prepared to handle any emergency with confidence and competence.

METHODS

This cross-sectional observation study was conducted among 200 registered dental practitioners in Lahore, Pakistan. Ethical approval for the study was obtained from the Institutional Review Board of the University College of Dentistry, The University of Lahore with reference number UCD/ERCA/24/179. The study was conducted over 4 months after the approval and informed consent was obtained from all the participants. The study included an equal number of house officers (fresh graduates with ≤1 year of experience) and general dentists (with ≥2 years of experience). Dental practitioners who were not engaged in clinical practice for more than one year and dental students or those in training who had not yet completed their degrees were excluded. A sample size of 197 participants was calculated with a 90% confidence level, a 5.8% margin of error, and by taking the expected knowledge level regarding medical emergencies among dental interns as 41.5% [6]. The following formula was used to calculate the sample size. $n=Z21-\alpha/sP(1-P)/d2$. Data were collected using a pre-validated questionnaire designed to evaluate the awareness levels regarding protocols for managing a medical emergency. The questionnaire consisted of a total of 14 questions, categorized into three sections: 5 knowledge questions, 4 skills questions, and 5 perceived competency questions. Each question was designed as a Likert-type item, with response options ranging to indicate the frequency (e.g., "Always", "Sometimes", "Never") or confidence(e.g., "Very confident", "Fairly confident", "Not at all"). Statistical analysis was performed on SPSS version 25.0. Descriptive statistics were used to summarize the data. Chi-square, and Fisher exact tests were applied to assess significant associations. p-value≤0.05 was considered statistically significant.

RESULTS

Results reveal that 94% of house officers were between the age of 20-25. Among general dentists, the largest age group was 26-30 years (37%) followed by those aged 31-35 years(32%). Females were a major chunk in both the groups with 76% among house officers and 72% of general dentists(Table 1).

Table 1: Demographic of Study Participants

Variable		House Officers	General Dentists
		n (%)	n (%)
Age	20-25 Years	94 (94%)	11 (11%)
	26-30 Years	6 (6%)	37 (37%)
	31-55 Years	0 (0%)	32 (32%)
	36-40 Years	0 (0%)	18 (18%)
	>40 Years	0 (0%)	2 (2%)
Gender	Male	24 (24%)	28 (28%)
	Female	76 (76%)	72 (72%)

The statistical analysis revealed significant differences in the awareness and training of house officers and general dentists regarding medical emergencies. Both house officers and general dentists demonstrated similar proficiency in recording medical histories, with 74% being able to do so. The adherence to stress reduction protocols was also comparable, though slightly lower among general dentists (56%) than house officers (60%). Similarly, universal precautions guidelines were followed by 74% of general dentists, slightly higher than the 62% of house officers. A significant difference emerged in awareness and management of syncope, a critical emergency in dental practice. While 90% of general dentists were fully aware of syncope symptoms, only 54% of house officers reported the same level of awareness ($p<0.001$). Confidence in managing a patient going into syncope was

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higher among general dentists with 69.2% feeling prepared compared to 41.7% of house officers. General dentists had significantly more training across various procedures compared to the house officers. This includes higher training rates in measuring blood pressure, administering cardiopulmonary resuscitation (CPR), and intravenous (IV) drugs, and performing Heimlich manoeuvres with statistically significant differences in all these areas. General dentists felt more confident in measuring blood pressure and administering CPR although both groups showed similar understanding of CPR techniques (Table 2).

Table 2: Knowledge, Skills, and Perceived Competency in Medical Emergency Preparedness Between House Officers and General Dentists

Variables		House Officers n=100 n (%)	General Dentists n=100 n (%)	p-value
Record medical history adequately	Always	74 (74.0%)	74 (74.0%)	-
	Sometimes	26 (26.0%)	26 (26.0%)	
Follow stress reduction protocol while performing the patient	Always	60 (60.0%)	56 (56.0%)	0.529[b]
	Sometimes	39 (39.0%)	40 (40.0%)	
	Never	1 (1.0%)	4 (4.0%)	
Follow Universal precaution guidelines when performing the patient	Always	62 (62.0%)	74 (74.0%)	0.164[b]
	Sometimes	35 (35.0%)	24 (24.0%)	
	Never	3 (3.0%)	2 (2.0%)	
The emergency contact number of the patient's guardian before starting the procedure?	Yes	24 (24.0%)	45 (45.0%)	0.004[a,*]
	No	71 (71.0%)	49 (49.0%)	
	Don't Know	5 (5.0%)	6 (6.0%)	
Awareness of the symptoms of syncope?	Fully Aware	54 (54.0%)	90 (90.0%)	<0.001[b,*]
	Aware	44 (44.0%)	10 (10.0%)	
	Unaware	2 (2.0%)	0 (0.0%)	
Trained in measuring BP?	Yes	84 (84.0%)	94 (94.0%)	0.007[b,*]
	No	8 (8.0%)	6 (6.0%)	
	Don't Know	8 (8.0%)	0 (0.0%)	
Trained in administering CPR?	Yes	42 (42.0%)	75 (75.0%)	<0.001[a,*]
	No	40 (40.0%)	14 (14.0%)	
	Don't Know	18 (18.0%)	11 (11.0%)	
Trained in the administration of IV drugs?	Yes	25 (25.0%)	38 (38.0%)	0.040[a,*]
	No	64 (64.0%)	46 (46.0%)	
	Don't Know	11 (11.0%)	16 (16.0%)	
Trained in Heimlich manoeuvres?	Yes	37 (37.0%)	54 (54.0%)	0.042[a,*]
	No	49 (49.0%)	33 (33.0%)	
	Don't Know	14 (14.0%)	13 (13.0%)	
Confident in handling a patient going into syncope?	Very Confident	29 (29.0%)	40 (40.0%)	0.269[a]
	Fairly Confident	64 (64.0%)	53 (53.0%)	
	Not At All	7 (7.0%)	7 (7.0%)	
Confident in handling an unconscious, hypoglycemic patient?	Very Confident	28 (28.0%)	42 (42.0%)	0.084[a]
	Fairly Confident	66 (66.0%)	51 (51.0%)	
	Not At All	6 (6.0%)	7 (7.0%)	
Confident in measuring BP?	Very Confident	54 (54.0%)	74 (74.0%)	0.009[b,*]
	Fairly Confident	42 (42.0%)	23 (23.0%)	
	Not At All	4 (4.0%)	3 (3.0%)	
Confident in the administration of CPR?	Very Confident	20 (20.0%)	39 (39.0%)	<0.001[a]
	Fairly Confident	40 (40.0%)	48 (48.0%)	
	Not At All	40 (40.0%)	13 (13.0%)	
Confident in the administration of IV drugs?	Very Confident	10 (10.0%)	20 (20.0%)	0.042[a,*]
	Fairly Confident	31 (31.0%)	37 (37.0%)	
	Not At All	59 (59.0%)	43 (43.0%)	

(a) Chi-Square test, (b): Fisher exact test, (*) p-value<0.05 (Statistically significant)

When comparing general dentists with less than five years of experience with more than five years, the results showed slight variations in some areas. For example, those with more than 5 years of experience were more likely to record medical histories adequately (75% vs 72.9%), follow stress reduction protocols (61.5% vs 50%), and adhere to universal precaution guidelines (75% vs 72.9%). However, these differences were not statistically significant. A notable finding was that those with more than five years of experience were more likely to be trained in the Heimlich manoeuvres (57.7% vs 50%, p=0.016) and to be more confident in administering IV drugs (25% vs 14.6%) (Table 3).

Table 3: Impact of Clinical Experience on Knowledge, Skills, and Perceived Competency in Medical Emergency Preparedness among General Dentists

Variables		General Dentist's Experience <5 Years n=48 n (%)	General Dentist's Experience >5 Years n=52 n (%)	p-value
Record Medical History Adequately	Always	72.9%)(35)	39 (75.0%)	0.684
	Sometimes	27.1%)(13)	12 (23.1%)	
Follow Stress ReductionProtocol While Performing the Patient	Always	50.0%)(24)	32 (61.5%)	0.500
	Sometimes	22 (45.8%)	18 (34.6%)	
	Never	2 (4.2%)	2 (3.8%)	
Emergency Contact Number of the Patient's Guardian Before Starting the Procedure?	Yes	20 (41.7%)	25 (48.1%)	0.190
	No	27 (56.3%)	22 (42.3%)	
	Don't Know	1 (2.1%)	5 (9.6%)	
Awareness of the Symptoms Of Syncope?	Fully Aware	45 (93.8%)	45 (86.5%)	0.322
	Aware	3 (6.3%)	7 (13.5%)	
	Unaware	0 (0.0%)	0 (0.0%)	
Trained In Measuring BP?	Yes	45 (93.8%)	49 (94.2%)	0.919
	No	3 (6.3%)	3 (5.8%)	
	Don't Know	0 (0.0%)	0 (0.0%)	
Trained In Administering CPR?	Yes	37 (77.1%)	38 (73.1%)	0.197
	No	4 (8.3%)	10 (19.2%)	
	Don't Know	7 (14.6%)	4 (7.7%)	

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Trained in the Administration Of IV Drugs?	Yes	13 (27.1%)	25 (48.1%)	0.097
	No	26 (54.2%)	20 (38.5%)	
	Don't Know	9 (18.8%)	7 (13.5%)	
Trained In Heimlich Maneuver?	Yes	24 (50.0%)	30 (57.7%)	0.016*
	No	13 (27.1%)	20 (38.5%)	
	Don't Know	11 (22.9%)	2 (3.8%)	
Confident in Handling a Patient Going Into Syncope?	Very Confident	18 (37.5%)	22 (42.3%)	0.861
	Fairly Confident	27 (56.3%)	26 (50.0%)	
	Not At All	3 (6.3%)	4 (7.7%)	
Confident in Handling an Unconscious, Hypoglycemic Patient?	Very Confident	17 (35.4%)	25 (48.1%)	0.277
	Fairly Confident	26 (54.2%)	25 (48.1%)	
	Not At All	5 (10.4%)	2 (3.8%)	
Confident in Measuring BP?	Very Confident	36 (75.0%)	38 (73.1%)	0.873
	Fairly Confident	11 (22.9%)	12 (23.1%)	
	Not At All	1 (2.1%)	2 (3.8%)	
Confident in the Administration of CPR?	Very Confident	18 (37.5%)	21 (40.4%)	0.577
	Fairly Confident	22 (45.8%)	26 (50.0%)	
	Not At All	8 (16.7%)	5 (9.6%)	
Confident in the Administration of IV Drugs?	Very Confident	14.6%) (7)	(25.0%) (13)	0.385
	Fairly Confident	41.7%) (20)	(32.7%) (17)	
	Not At All	43.8%) (21)	(42.3%) (22)	

*Significant p values

DISCUSSION

A comprehensive medical history helps the dentist better prepare for any potential medical emergencies and it may even help prevent them. In the current study, 74% of house officers and dental practitioners reported consistently documenting a thorough medical history before any dental procedure. These results are consistent with an Indian study in which 77.5% of participants obtained a sufficient medical history before starting a dental procedure [11]. However, results showed a higher positive response as compared to a local study in Punjab twin cities, where 57.5% of participants obtained a sufficient medical history before beginning a procedure [14]. In our study, 50% of house officers and 67% of dental practitioners attended medical emergency workshops, a figure closely aligned with Gupta *et al.*, (55.8%) [15]. However, Muller *et al.*, in Germany (92%) and Al-Iryani *et al.*, in KSA (95%) reported significantly higher positive response rates [16, 17]. Although more than half of the participants had attended workshops on medical emergencies, only 31% of House Officers and 56% of general practitioners felt adequately prepared to handle such situations This response is consistent with similar findings by Gupta *et al.*, (49.6%), and Fernandes *et al.*, (46.67%) [15, 1]. However, Khattak *et al.*, reported a significantly higher figure with 77.5% of their respondents feeling well-prepared to manage medical emergencies [14]. Despite the fundamental role of CPR, only 20% of house officers and 39% of general dentists in the present study were confident in performing CPR. These findings are by a local study conducted in Lahore (35.5%) but contrast with the findings of Javed *et al.*, and Alazmi *et al.*, study in Saudi Arabia (48%) [18, 19]. This contrasts with the findings of Raffee *et al.*, in Jordan (54%) and Gonzaga *et al.*, in Brazil (51.3%) [20, 21]. In the present study, only 10% of house officers and 20% of general practitioners were very confident in administering IV drugs which is significantly lower than the 64.5% reported by Khattak *et al.*, [14]. Syncope, a common medical emergency in dental settings, is often triggered by pre-existing cardiovascular illness, hypoglycemia, or psychological factors such as fear, discomfort, or the sight of blood [22]. In the current study, while 54% of house officers knew all the symptoms of syncope, only 29% felt highly confident in managing it. Meanwhile, 90% of general dentists were fully aware of its symptoms, yet only 40% were confident in handling a syncope episode. Mohideen *et al.*, and Oliveira *et al.*, reported 80% symptom awareness and 58%) confidence in handling syncope respectively [23, 24]. The study's limitations include a small sample size, and the use of self-reported data may introduce bias. Future research should target a larger, more diverse population. Additionally, longitudinal studies are recommended to assess the effectiveness of ongoing training programs in medical emergency preparedness among dental professionals.

CONCLUSIONS

It was concluded that general dentists exhibited a higher level of training awareness and confidence in managing medical emergencies compared to house officers, especially in areas such as syncope recognition and CPR administration. Nonetheless, gaps remain in both groups urging the need for enhanced training programs for all dental practitioners, particularly in procedures like CPD and IV drug administration urging the need for enhanced training programs for all dental practitioners.

Authors Contribution

Conceptualization: MAA, IUR
Methodology: MAA, IUR, TS, SS, KA
Formal analysis: IUR, TS, SS, KA
Writing review and editing: MAA, FK, HK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

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