

Knowledge of Emergency Drugs and Competence Level of Usage Among Dental Healthcare Providers at a Tertiary Health Facility in the South-South of Nigeria

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ABSTRACT

Background: Medical emergencies occur infrequently in dental clinics but can occur when they are least expected. Effective and successful management of medical emergencies in the dental clinic includes adequate education of the dentist and other oral healthcare providers, emergency drug kits in the dental office, proper education of the chair side assistant, and a close-by referral healthcare center. This study aimed to assess dentists' knowledge of emergency drugs and their competence levels in using such drugs during medical emergencies in the dental office.

Methods: A self-administered close-ended questionnaire consisting of sections A-E was distributed among the study participants. Section A: Sociodemographic characteristics of respondents, Section B: Awareness of Essential Drugs Recommended in the Emergency Drug Kit. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. P set at ≤ 0.05

Results: A total of 67 respondents participated in the study. Of the 67 respondents, approximately half (50.7%) were aged 21 – 30 years, and 35 (52.2%) were male. Cumulatively, 52 (77.6%) respondents had a good awareness of the emergency kit-recommended essential drugs, while 15 (22.4%) did not. The occupation of respondents and their awareness of essential drugs in the emergency kit was statistically significant. Cumulatively, 46 (68.7%) of the 67 respondents had good knowledge of medications used in various emergency conditions. Generally, more than half of the respondents could administer all the emergency medications.

Conclusion: The present study has exposed the deficiencies in the undergraduate training of dental students in medical emergencies and management. While the study reported good knowledge and awareness of emergency drug kits, the overall practice and competency level of dental health providers is not satisfactory.

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INTRODUCTION

Although medical emergencies occur infrequently in the dental clinic, they can occur when they are least expected. A medical emergency is usually described as an unwanted, unexpected reaction or complication that usually requires urgent and immediate attention or

intervention (Fasoyiro et al., 2019). Generally, medical emergencies are seen as being rare in the dental office. However, recent studies have reported that medical emergencies do indeed occur more on a more regular basis (Sopka et al., 2012). It has been reported that

medical emergencies are 5.8 times more likely to occur in dental clinics than in medical clinics (Mukherji et al., 2019). These emergencies have been linked to the stressful environment and procedures in the dental clinic (Fleck, 2012). Dentists are responsible for identifying the emergency and immediately commencing the management protocol (Wilson et al., 2009). This is made easy by taking a detailed history from the patient to help the dentist anticipate and prepare for any potential adverse events that can lead to a medical emergency (Balmer & Longman, 2008). Effective and successful management of medical emergencies in the dental clinic includes adequate education of the dentist and other oral healthcare providers, emergency drug kits in the dental office, proper education of the chair side assistant, and a close-by referral healthcare center.⁷ Emergency drug kits should be provided in all dental clinics to handle any unexpected life-threatening situations or conditions in the dental clinic. It is even more important for dentists and other dental assistants to be well-trained in the use of these emergency drugs. Common medications contained in emergency drug kits include adrenaline, aspirin, glucagon, glyceryl trinitrate, salbutamol, glucose, and midazolam (Shampaine, 1999). Certain medical emergencies have been reported to commonly occur in dental clinics. They include anaphylaxis, suspected heart attack, severe hypoglycemia, hypoglycemia, angina, acute seizure, and severe asthma. Dental practitioners are expected to be able to identify these conditions and respond accordingly. They are expected to be familiar with the resuscitation drugs as well as the other emergency equipment that are available and which may be modified for dental use. Few studies in Nigeria have examined the knowledge and competence level in the use of emergency drugs during medical emergencies in dental clinics. Previous studies have dwelt more on recognizing medical emergencies rather than the drug management of such emergencies by dental practitioners and dental assistants. Therefore, this study aimed to assess dentists' knowledge of emergency drugs and their competence levels in using such drugs during medical emergencies in the dental office.

MATERIALS AND METHODS

A cross-sectional analytic survey was conducted from January to April 2023 to evaluate the knowledge and competence level of emergency drugs in the dental clinic among dental health providers. The data were collected in the Dental Clinic of the University of Benin Teaching Hospital, Benin City, Edo state, which serves as a tertiary center in the south-south Zone in Nigeria. The participants were aware of the aim of the study, and they were informed that participation was voluntary and that the data would be confidential. Verbal consent was obtained before data collection.

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The participants were informed that the data would be anonymous and confidential and that the information would be for scientific research only.

The sample size was based on all dentists in UBTH and 600-level dental students who were all sampled.

A self-administered close-ended questionnaire consisting of sections A-E was distributed among the study participants. Section A: Sociodemographic characteristics of respondents, Section B: Awareness of Essential Drugs Recommended in the Emergency Drug Kit

Section C: Knowledge of Medications Administered in Emergency Conditions Section D: Level of Confidence and Competence of Dental Health Providers in Administering Emergency Drugs

Section E was Availability and Practice of Emergency Drug Administration in the Dental Clinic.

The data collected were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were used to obtain the frequency and percentage of independent and dependent variables. The Pearson test was used to compute the correlation between sociodemographics and knowledge, sociodemographics and awareness of emergency drugs, and competence level of respondents and occupation and years of practice of respondents. For all comparative analyses, the level of significance was set at $p \leq 0.05$.

RESULTS

A total of 67 respondents participated in the study. Of the 95 questionnaires shared, 67 were completed and returned, representing a response rate of 70.5%. The table shows the surveyed sociodemographic characteristics of the respondents. Of the 67 respondents, approximately half (50.7%) were aged 21-30 years, 35 (52.2%) were male and the larger proportion (73.1%) were dentists; others (26.9%) were students. Of the 49 dentists, 19 (38.8%) had been practicing less than 4 years, 8 (16.3%) had been practicing for 4 – 7 years, 11 respondents had been practicing for 8 –11 years, and another set of 11 respondents had been practicing for over 11 years (Table 1).

Over 80% of the respondents knew that glucose and adrenaline were essential emergency kit medications, 53 (79.1%) of the respondents knew that salbutamol was a component of the kit, and less than 65% of the respondents knew that aspirin, midazolam, glucagon, and glyceryl trinitrate were essential drugs in the emergency drug kit (Figure 1).

Cumulatively, 52 (77.6%) respondents had a good awareness of the emergency kit-recommended essential drugs, while 15 (22.4%) did not (Figure 2). The relationship between the occupation of respondents and their awareness of essential drugs in the emergency kit was statistically significant, as most of the respondents (85.7%) who were dentists had a good awareness of the essential drugs, while only slightly above half the respondents (55.6%) who were students had a good awareness. However, the duration of practice among the dentists statistically did not influence their awareness (Table 2). The above table shows the proportion of respondents who chose the right or wrong medications to be used in the specified emergency conditions (Table 3).

Cumulatively, 46 (68.7%) of the 67 respondents had good knowledge of medications used in various emergency conditions (Figure 3). The above table shows the relationship between the sociodemographic characteristics of respondents and their knowledge of medications used in various emergency conditions. The age, gender, occupation, and years of practice of respondents were not statistically significant in determining their level of knowledge of medications for emergency health conditions (Table 4). Generally, all emergency medications could be administered by more than half of the respondents, and over 70% of the respondents were confident in administering glucose, adrenaline, and salbutamol (Table 5).

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (n=67)	Percent
Age in years		
21 – 30	34	50.7
31 – 40	24	35.8
41 – 50	8	11.9
51 – 60	1	1.5
Gender		
Male	35	52.2
Female	32	47.8
Occupation		
Dentist	49	73.1
Student	18	26.9
Years of Practice (n=49)		
0 – 3	19	38.8
4 – 7	8	16.3
8 – 11	11	22.4
≥ 12	11	22.4

Of the 67 respondents, 61 (91.0%) were competent in using a glucometer, 54 (80.6%) were competent in administering an intramuscular injection, 53 (79.1%) were competent in administering intravenous medications, and only 37 (55.2%) were competent in using an ambu bag/bag valve mask (Figure 4). The above table shows the relationship between occupation as well as the length of practice and the competence of respondents in administering intravenous medications, administering intramuscular medications, using Ambu bags, and using a glucometer. The dental practice was shown to be statistically significant in influencing competence in administering intravenous and intramuscular medications, as 89.8% and 87.8% of the dentists could competently administer intravenous and intramuscular medications, while only 50.0% and 61.1% of the students could competently carry these out. However, among dentists, the duration of practice did not statistically influence competence in these medical procedures.

Being a dentist did not statistically influence the use of an Ambu bag and glucometer among the respondents (Table 6). Out of the 67 respondents, 26 (38.8%) affirmed having emergency kits and drugs in their place of practice, 23 (34.3%) affirmed not having emergency kits or drugs in their place of practice, and the remaining 18 (26.9%) were unsure. Of the 26 who affirmed having an emergency kit in practice, one respondent (3.8%) responded to making use of it as frequently as at least once per week, 4 respondents (15.4%) used it once per month and 4 respondents (15.4%) also used it only approximately once in a year, while 17 respondents (65.4%) had never seen it being used. Twenty (87.0%) of the respondents who affirmed not having emergency kits or drugs in the facility thought it was because it had not been planned for, 2 (8.7%) of the respondents thought it was because nobody had thought of it yet and one of the respondents felt it was because they couldn't administer the care.

Forty-one (61.2%) of the respondents responded to giving emergency treatment in events of emergency, and 13 (19.4%) of the respondents thought to refer the

patients; the few others thought to either remove the patient's clothing, give coke or pour water on the patient (Table 7).

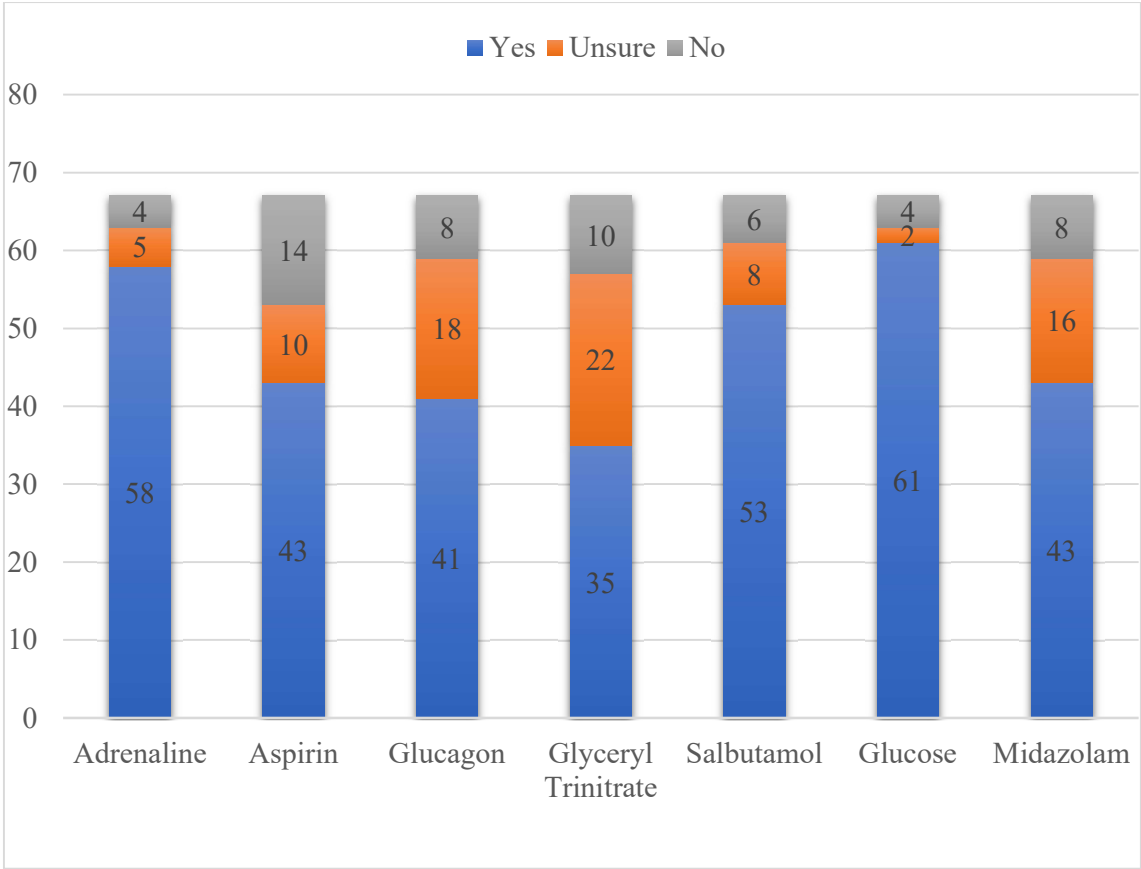


Figure 1: Awareness of emergency kit recommend essential drugs among the respondents

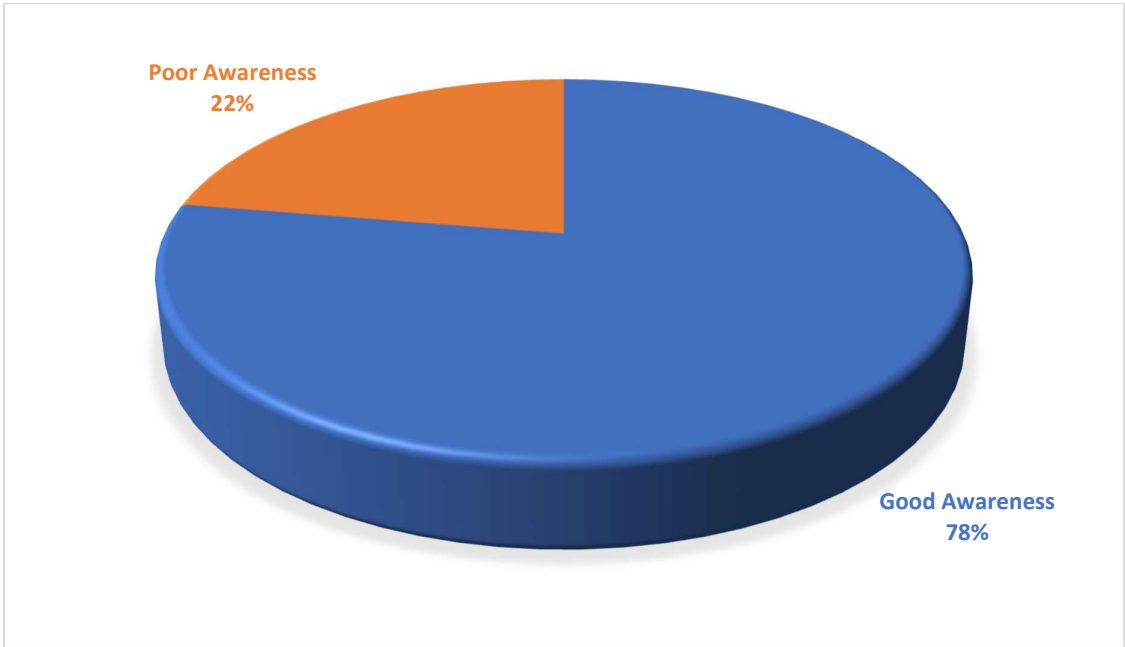


Figure 2: General level of awareness of emergency kit-recommended essential drugs among the respondents

Table 2: The relationship between the sociodemographic characteristics of the respondents and their awareness of the essential drugs in an emergency kit

Variables	Awareness		Test Statistics	p-value
	Good (n = 52) n (%)	Poor (n = 15) n (%)		
Age in years				
21 – 30	25 (73.5)	9 (26.5)	5.246	0.137
31 – 40	19 (79.2)	5 (20.8)		
41 – 50	8 (80.0)	0 (0)		
51 – 60	0 (0)	1 (100)		
Gender				
Male	27 (77.1)	8 (22.9)	0.009	0.923
Female	25 (78.1)	7 (21.9)		
Occupation				
Dentist	42 (85.7)	7 (14.3)	6.891	0.009*
Student	10 (55.6)	8 (44.4)		
Years of Practice (n=49)				
0 – 3	26 (74.3)	9 (25.7)	1.711	0.674
4 – 7	7 (70.0)	3 (30.0)		
8 – 11	10 (90.9)	1 (9.1)		
≥ 12	9 (81.8)	2 (18.2)		

*Statistically significant

Table 3: Knowledge of medications administered in emergency conditions

Variables	Right Drug	Wrong Drug
Anaphylaxis	50 (74.6)	17 (25.4)
Suspected Heart Attack	25 (37.3)	42 (62.7)
Hypoglycemia	47 (70.1)	20 (29.9)
Severe Hypoglycemia	36 (53.7)	31 (46.3)
Angina	48 (71.6)	19 (28.4)
Acute Seizure	54 (80.6)	13 (19.4)
Acute Asthma	63 (94.0)	4 (6.0)

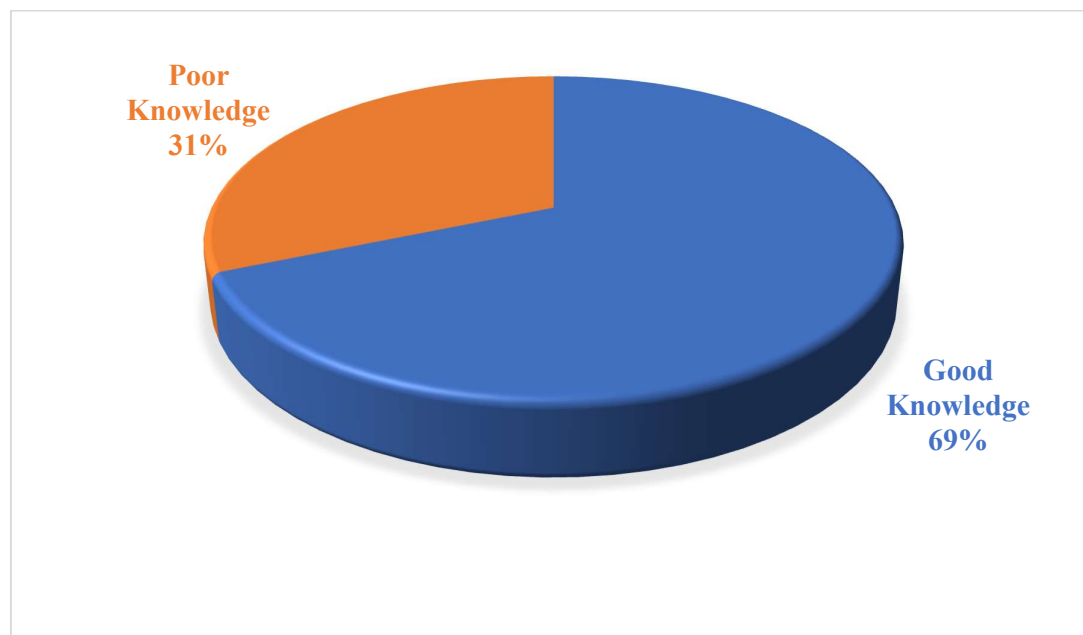


Figure 3: Knowledge Level of medications used in various emergency conditions among the respondents

Table 4: The relationship between the sociodemographic characteristics of the respondents and knowledge of the medications used in various emergency conditions

Variables	Level of Knowledge		Test Statistics	P-value
	Good (n = 46) n (%)	Poor (n = 21) n (%)		
Age in years				
21 – 30	24 (70.6)	10 (29.4)	1.935	0.679
31 – 40	17 (70.8)	7 (29.2)		
41 – 50	4 (50.0)	4 (50.0)		
51 – 60	1 (100)	0 (0)		
Gender				
Male	21 (60.0)	14 (40.0)	2.552	0.110
Female	25 (78.1)	7 (21.9)		
Occupation				
Dentist	34 (69.4)	15 (30.6)	0.045	0.831
Student	12 (66.7)	6 (33.3)		
Years of Practice (n=49)				
0 – 3	27 (77.1)	8 (22.9)	5.002	0.158
4 – 7	4 (40.0)	6 (60.0)		
8 – 11	7 (63.6)	4 (36.4)		
≥ 12	8 (72.7)	3 (27.3)		

Table 5: Confidence of respondents in administering emergency medications

Emergency Medication	Confident n (%)	Not Confident n (%)
Adrenaline	50 (74.6)	17 (25.4)
Aspirin	43 (64.2)	24 (35.8)
Glucagon	37 (55.2)	30 (44.8)
Glycerin Trinitrate	35 (52.2)	32 (47.8)
Salbutamol	49 (73.1)	18 (26.9)
Glucose	55 (82.1)	12 (17.9)
Midazolam	41 (61.2)	26 (38.8)

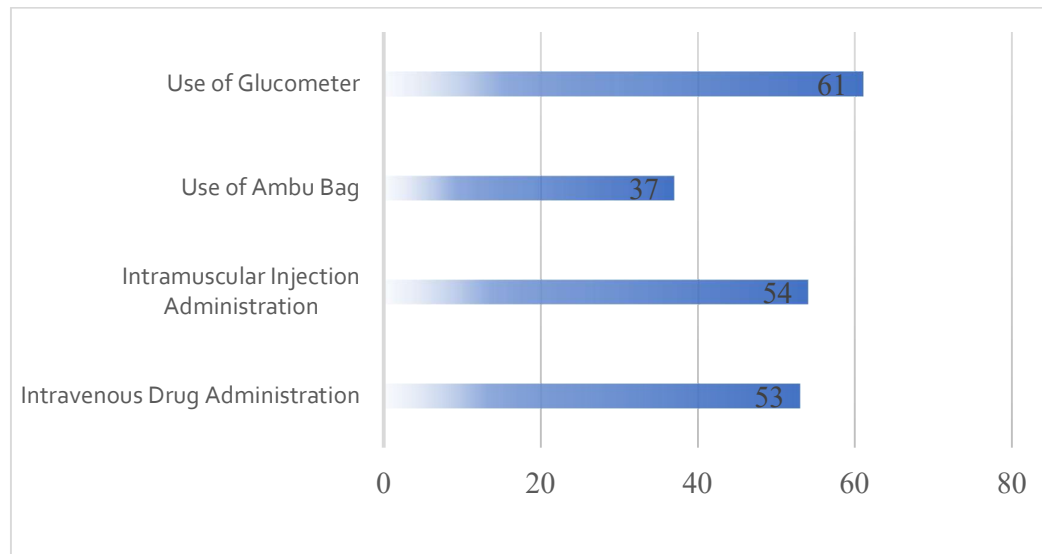


Figure 4: Proportion of respondents competent in administering selected emergency care

Table 6: The relationship between the competence of respondents and their occupation and years of practice

Medical Procedure	Variables	Competence of Respondents (n = 67)		Test Statistics	P- value
		Competent n(%)	Not Competent n(%)		
Administering Intravenous Medications	Occupation				
	Dentist	44 (89.8)	5 (10.2)	12.613	< 0.001*
	Student	9 (50.0)	9 (50.0)		
	Years of Practice(n=49)				
	0 – 3 years	25 (71.4)	10 (28.6)	4.182	0.247
	4 – 7 years	8 (80.0)	2 (20.0)		
Administering Intramuscular Injection	8 – 11 years	9 (81.8)	2 (18.2)		
	≥ 12 years	11 (100.0)	0 (0.0)		
	Occupation				
	Dentist	43 (87.8)	6 (12.2)	5.976	0.015*
	Student	11 (61.1)	7 (38.9)		
	Years of Practice (n=49)				
Use of Ambu bag	0 – 3 years	25 (71.4)	10 (28.6)	3.080	0.411
	4 – 7 years	9 (90.0)	1 (10.0)		
	8 – 11 years	10 (90.9)	1 (9.1)		
	≥ 12 years	10 (90.9)	1 (9.1)		
	Occupation				
	Dentist	30 (61.2)	19 (38.8)	2.656	0.103
Use of Glucometer	Student	7 (38.9)	11 (61.1)		
	Years of Practice (n=49)				
	0 – 3 years	17 (48.6)	18 (51.4)	2.385	0.497
	4 – 7 years	5 (50.0)	5 (50.0)		
	8 – 11 years	8 (72.7)	3 (27.3)		
	≥ 12 years	7 (63.6)	4 (36.4)		
Use of Glucometer	Occupation				
	Dentist	46 (93.9)	3 (6.1)	1.795	0.180
	Student	15 (83.3)	3 (16.7)		
	Years of Practice (n=49)				
	0 – 3 years	31 (88.6)	4 (11.4)	1.262	0.857
	4 – 7 years	9 (90.0)	1 (10.0)		
	8 – 11 years	11 (100)	0 (0)		
	≥ 12 years	10 (90.9)	1 (9.1)		

*Statistically significant

DISCUSSION

This study was conducted to evaluate the knowledge of emergency drugs in the dental clinic and the competence level of usage of such drugs by dental health care providers. Dental health providers are expected to be knowledgeable and required to possess the relevant skills in the administration of emergency drugs in case of emergency in the dental clinic. Generally, medical emergencies are considered rare occurrences in dental clinics. However, adequate preparations should be put in place to effectively handle them if they do occur. Every dentist is expected to have the basic knowledge to recognize, assess, and manage every potential life-threatening medical emergency in the dental office until the case can be transferred or referred to a medical facility for further management.

The present study reported good awareness by the majority (78%) of respondents of the content of emergency drug kits in the dental clinic. In a study conducted in Bangalore City (Paul et al., 2019). poor

awareness of emergency drug kits was reported. This may be because the study focused on dental interns alone, although they are dentists but lack adequate experience. There was a statistically significant association between the respondents' occupation and awareness of essential drugs, with a p-value of 0.009 in the present study. This shows that occupation may influence the level of awareness of essential drugs. Dentists, for instance, are expected to have better awareness of emergency drugs in the dental clinic following the kind of training they receive in both undergraduate and postgraduate studies.

Our current study reported good knowledge (69%) of emergency drugs by the respondents. This report is consistent with another study that reported good knowledge of emergency drugs.⁹ (Mukherji et al., 2019) The good knowledge reported in this study may not be unconnected to the fact that dentists and dental students in this study were well-taught in medical emergencies during their undergraduate days.

Table 7: Use of emergency drugs among the respondents

Variables	Frequency (n=67)	Percent
Do you have Emergency kit/drugs in your practice?		
Yes	26	38.8
No	23	34.3
I do not know	18	26.9
If Yes, how often do you administer emergency treatment in your practice? (n = 26)		
Once a week	1	3.8
Once a month	4	15.4
Once a year	4	15.4
I have never	17	65.4
If No, what do you think is responsible? (n = 23)		
It was not planned for	20	87.0
Nobody has thought about it	2	8.7
I don't know how to administer emergency drugs	1	4.3
What do you do when there is an emergency in the dental clinic		
Refer Patient	13	19.4
Give Coke	4	6.0
Pour water on patient	1	1.5
Remove patient cloth	7	10.4
Give emergency treatment	41	61.2
Others	1	1.5

The level of competence in the usage of emergency drugs by the participants in our study was evaluated, and it was found that more than half of the respondents had good confidence in administering emergency drugs, although this was in selected drugs. Notably, over 70% of the respondents displayed more confidence in administering glucose, adrenaline, and salbutamol. Furthermore, 91.0% of the respondents were more competent in using a glucometer, 80.6% were more competent in administering intramuscular injections and 79.1% were more competent in administering intravenous medications. Only 55.2% showed competence in the use of Ambu bag/bag valve masks. These findings are slightly different from a study (Hashim et al., 2021) that reported that 55.2% of respondents had a lower level of competence, while 44% of the respondents reported adequate competence in the use of emergency drug management of patients in the dental clinic. The high level of confidence and competence reported in the present study may be due to the training received on undergraduate days and the fact that the participants worked in a tertiary health center. A study by (Alhamad et al., 2015) reported low competence levels in the use of emergency drugs among a third of its study participants. Similar to the findings of the present study, previous studies by Paul et al. (2019) and Haas et al. (2006) also reported higher knowledge of glucose and adrenaline in emergency drug kits by the majority of respondents. There was a reported better confidence by respondents in the use of glucose and adrenaline in our study. A study by Ehigiator et al. (2014) and (Newby et al., 2019) reported that

Ambu bags, bronchodilator spray, and pocket facemasks are part of emergency drug kits. In contrast to our study, only the Ambu bag was considered by the respondents as being part of the emergency drug kit.

In the relationship between the competence level of respondents and occupation and years of practice, our study found a statistically significant association between occupation and competence in administering IV medications ($P=0.001$) and IM ($p=0.015$) injections. Occupation is therefore considered an important factor in the respondent's ability to administer IV and IM injections. Being a dentist with the relevant training is an advantage in the use of such drugs compared to those lacking the same similar training. In a previous study conducted in Bangalore by Paul et al (2019), a low competency level was reported in the administration of IV, IM injections, use of an ambu bag, and a glucometer. This is in contrast to the report of the current study. (Ehigiator et al., 2014) However, again, the lack of adequate relevant training by the dental professionals in the above study may be responsible for the low competency level in carrying out such procedures.

The availability and practice of emergency drug administration in the dental clinic were evaluated. When respondents were asked if they had emergency drug kits in their dental clinics, only 26 (28.8%) of the 67 respondents affirmed they had, while others were unsure or did not have one. This is unsatisfactory, as one expects every dental facility to have well-equipped emergency drug kits in place. The repercussions and implications of not having emergency drug kits in the dental office can be catastrophic. More worrisome is the fact that 17

of the 26 respondents who affirmed having emergency drug kits had never seen them being used. It may also be deduced from this that many oral healthcare providers may lack the right skills to administer such drugs when the need arises. This may be ascribed to the fact that those who are unable to administer undergraduate days. This finding can be corroborated by a study carried out in New Zealand, in which more than 50% of dentists were not satisfied with undergraduate training in medical emergencies (Atherton et al. 1999). the dentist must identify and judiciously manage the emergency and prevent any possible morbidity and mortality. There is a need for training and retraining of the dental health team in the appropriate use of these drugs to always be prepared for medical emergencies in the dental clinic. It is essential to have an emergency drug kit at every dental clinic because patients visiting the dental clinic may have some underlying medical conditions. For example, a study conducted by GJ Atherton et al found that 94.8% of the respondents had undergone medical emergency and basic life support training in their undergraduate days.¹⁵ It is heartwarming to know from the present study that a greater percentage, 61.2%, of the respondents responded to knowing how to give emergency treatment during a medical emergency in the dental clinic. Others would rather refer the patients or simply give them a bottle of Coke. This may not suffice in saving the patient. The emergency treatment given in the dental clinic is expected to stabilize the patient until he or she is transported to a medical facility for further care. Giving a bottle of coke may be adequate for patients with syncope, but other emergency types will require other forms of treatment.

CONCLUSION

The present study has exposed the deficiencies in the undergraduate training of dental students in medical emergencies and management. It has also shown the lack of adequate attention to the possible medical emergencies that can occur in the dental clinic. While the study reported good knowledge and awareness of emergency drug kits, the overall practice and competency level of dental health providers is not satisfactory. The teaching of medical emergencies and management should be made an integral part of the undergraduate dental curriculum.

CONFLICT OF INTEREST

No known conflict of interest by the authors of this study was declared

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