Annals Journal of Dental and Medical Assisting
2023, Volume 3, Issue 1, Page No: 20-25

Available online at: www.tsdp.net

ISSN: 3062-3510

Cross-Sectional Study

Perceived Competence of Dental Students in Managing Medical Emergencies: A Cross-Sectional Study

Berit Hackenberg[1], Maximilian-Niclas Schlich[2], Haralampos Gouveris[1], Christopher Seifen[1], Christoph Matthias[1], Guglielmo Campus[3,4], Thomas Gerhard Wolf[3], Muthuraman Muthuraman[5], James Deschner[2*]

[1]Department of Otorhinolaryngology, Head and Neck Surgery, University Medical Center Mainz, 55131 Mainz, Germany.
[2]Department of Periodontology and Operative Dentistry, University Medical Center of the Johannes Gutenberg-University Mainz, 55131 Mainz, Germany.
[3]Department of Restorative, Preventive and Pediatric Dentistry, School of Dental Medicine, University of Bern, 3010 Bern, Switzerland.
[4]Department of Surgery, Microsurgery and Medicine Sciences, School of Dentistry, University of Sassari, 07100 Sassari, Italy.
[5]Neural Engineering with Signal Analytics and Artificial Intelligence (NESA-AI), Department of Neurology, University Clinic Würzburg, 97080 Würzburg, Germany.

***E-mail** ✉ james.deschner@uni-mainz.de

Received: 07 January 2023; **Revised:** 12 May 2023; **Accepted:** 20 May 2023

ABSTRACT

In this study, dental students' perceptions regarding handling medical emergencies were assessed using a cross-sectional questionnaire. Descriptive analysis was performed for questions of knowledge, attitude, practice, and self-perceived competence. Using the Post Hoc test, Spearman correlation, and analysis of variance (ANOVA), data with P-value < 0.05 were considered. There was a 100% response rate. Based on the ANOVA, students' knowledge, attitude, practice, and self-perceived competence were significantly correlated with the academic year. Post hoc analysis showed that there was a statistically significant difference between 4th BDS and postgraduates in terms of knowledge, attitude, practice, and self-perceived proficiency. Spearman correlation showed that knowledge (+0.263), attitude (+0.294), practice (+0.190), and self-perceived competency (+0.692) were positively correlated with the years of study. It is necessary to take measures to enhance students' knowledge, attitude, practice, and self-perceived competencies. Classroom lectures, workshops, continuing dental education (CDE) programs, practical/real-time situations training, and medical emergency management education courses like basic life support (BLS) and C.

Keywords: Cross-sectional studies, Dental office, Dental students, Medical emergency

How to Cite This Article: Hackenberg B, Schlich MN, Gouveris H, Seifen C, Matthias C, Campus G, et al. Perceived Competence of Dental Students in Managing Medical Emergencies: A Cross-Sectional Study. Ann J Dent Med Assist. 2023;3(1):20-5. https://doi.org/10.51847/SlNUqaRTG2

Introduction

Although not very common, the incidence of medical emergencies in dental practices is not negligible. Dentistry is a branch of the medical sciences that involves active clinical practices that may be invasive, including injections, surgeries, extractions, and some long-standing tedious procedures. However, there is a chance that some complications leading to a medical emergency could be discovered during these procedures [1]. Stress associated with dental procedures may result in medical emergencies; aging and a decline in general health may also be contributing factors [2]. Syncope, foreign-body airway obstruction, heart attack, allergic response, convulsions, asthma

attack, and in rare cases, rapid cardiac death are among the medical crises that may occur in a dental setting [3]. Medical urgencies can occur at any moment, in any setting, such as a dental office. Averagely, Every two years, at least one medical emergency occurs for a dentist [4], with Anders *et al*. reporting that there are 164 medical emergencies for every million dental visits [5]. A study by Atherton *et al*. found that a dentist with 40 years of experience will encounter nine to 11 emergency events throughout their career [6, 7].

Because of this, dentists must be able to recognize and treat medical emergencies in their early stages. However, the majority of dental students, including recent graduates, lack the skills, confidence, and readiness necessary to handle such situations. This might be because they would not have had medical emergency management training, or it might not have been sufficiently effective. Even though students have received medical emergency management training in a variety of methods and approaches worldwide, the students' knowledge has varied and is insufficient [8-11].

Undergraduate and graduate students are required to receive basic life support (BLS) at a dentistry teaching hospital located in the northern regions of Karnataka state, India. Therefore, this study used a questionnaire to find out how dentistry students felt about handling medical situations.

Materials and Methods

This is a cross-sectional questionnaire study that was carried out amongst the final year BDS students, interns, and postgraduates at a dental teaching hospital, in Karnataka. Twenty questions to check the knowledge, attitude, practice, and self-perceived competency in the management of medical emergencies were framed. Face validity and content validity of the questionnaire were checked. The reliability of the questionnaire was checked. Cronbach Alpha value of 0.80 was obtained, which is good. The sample size was calculated using G*Power3.1.9.4 software (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany). With an effect size of 0.3 and an alpha error of 5%, the sample size was estimated to be 220. However, a total of 300 subjects were recruited. The study duration was of two months. Before participating in the study, the subjects were informed about the study details regarding the purpose of the study, the procedure followed, and the extent of anonymity and confidentiality and were asked to provide voluntary written informed consent.

Statistical analysis

An Excel data sheet was then created using the information gathered from these research participants (Microsoft, Inc., Redmond, Wash). The Statistical Package for the Social Sciences (SPSS) software, version 21.0 (IBM; Chicago, IL), was used to statistically analyze the data. For the questionnaires' knowledge, attitude, practice, and self-perceived competency dimensions, frequency, and percentages were computed. The mean was used to represent self-perceived competency, practice, attitude, and general knowledge. To show the relationship between the academic year and the students' knowledge, attitude, practice, and self-perceived competency, an analysis of variance (ANOVA) was conducted. A post-hoc analysis was carried out. Spearman to determine whether there's any substantial connection between the students' self-perceived proficiency, total knowledge, attitude, and practice and their academic years, correlation analysis was used. A p-value of less than 0.05 was considered statistically significant.

Results and Discussion

There was a 100% response rate. Males made up 34% of the study population, although women made up 66% of the population overall. **Figure 1** shows the answers to the knowledge surveys about handling medical emergencies in a dental setting. More people were knowledgeable about managing syncope than about any other medical emergency technique. This could be because syncope is the most frequent medical emergency [12, 13], which may have also given the students more hands-on experience and improved their understanding.

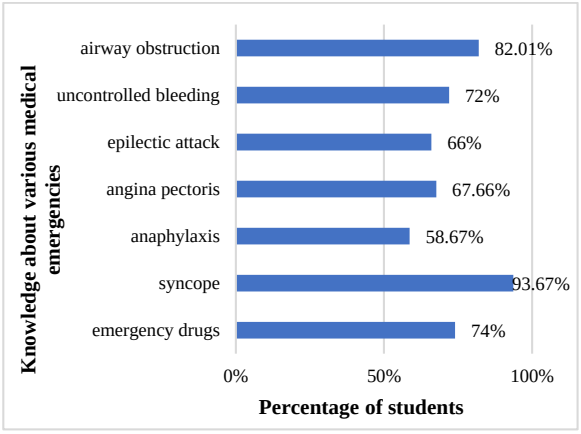

Figure 1. Questions related to knowledge

Eighty-nine percent of respondents said they had gotten some kind of training in medical emergency management, with 80.29% receiving both theoretical and practical training, 7.88% receiving only theoretical

instruction, and 11.83% receiving practical training. In compliance with the Dental Council of India (DCI) curriculum, the institute offers both theoretical and practical training. The BLS training program is required to be taught to students as part of the college curriculum to attain the competency as mentioned by DCI, and **Figure 2** shows the causes why some students choose not to receive any training, which may be further connected to absenteeism. Therefore, it should be taken into consideration that no student is denied any kind of medical emergency management training, given the necessity and significance of this instruction.

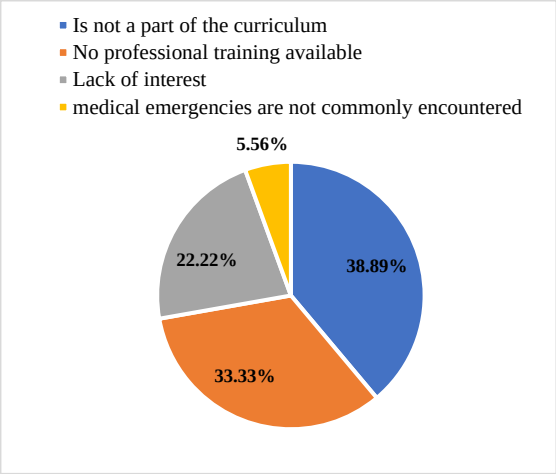

Figure 2. Reasons for not receiving the training in a medical emergency

All of the students (100%) thought that keeping a good case history could help avoid medical emergencies. It's generally preferable to avoid problems than to treat them. Similarly, it's crucial to be ready. In the clinical operatory, any medical emergency could happen at any time. Therefore, it is crucial to document a thorough and accurate medical history since it may reveal any underlying issues and the necessity of anticipating medical emergencies and being ready for them. Furthermore, 75.70% of respondents said they would be reluctant to conduct any medical emergency procedure, despite 96.67% believing they were skilled in handling a medical emergency in a dental office. The different reasons why they are reluctant to conduct any medical emergency surgery are illustrated in **Figure 3**. This suggests that dentistry students require further instruction in handling medical emergencies.

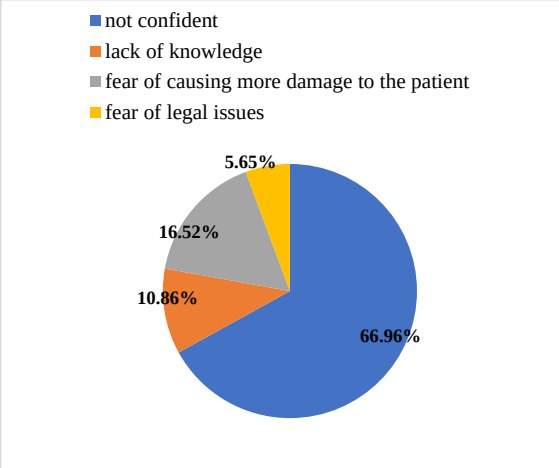

Figure 3. Reasons for reluctance

Table 1 displays self-perceived proficiency in performing several medical emergency procedures. The results imply that the students require additional instruction and that their proficiency in carrying out the different emergency procedures has to be regularly evaluated. The ANOVA is displayed in **Table 2**, post-hoc analysis, as well as the general median for self-perceived competency, knowledge, attitude, and practice in connection to the academic years. According to **Table 3**, there is a positive Spearman relationship between academic years and self-perceived knowledge (+0.263), attitude (+0.294), practice (+0.190), and competency (+0.692).

Table 1. Distribution of percentages of competency in executing various medical emergency procedures

Sl. No.	Procedure	Very well	Not very well	Not at all
1	Give artificial respiration	41%	43%	16%
2	Perform a heimlich manoeuvre	19.01%	38.66%	42.33%
3	Give cardiac compressions	34.33%	44.67%	21%
4	Give an IV injection	29.33%	29.33%	36.99%
5	Give an IM injection	29.33%	38%	32.67%
6	Give a subcutaneous injection	34.67%	34.67%	28.6%
7	Use a defibrillator	5.68%	35.45%	58.86%

Table 2. Tabulation of the study subjects' averages, ANOVA test, and Post Hoc test according to their academic years, as well as their general knowledge, attitude, practice, and self-perceived competency

Questions based on	Mean			Anova		Post Hoc test		
	4th BDS	Interns	Postgraduates	F-value	P-value	U vs I	U vs P	I vs P
Knowledge	4.80	4.95	5.67	11.92	0.000*	1.00	< 0.001, S	< 0.001, S
Attitude	2.03	2.24	2.34	13.37	0.000*	0.003, S	< 0.001, S	0.005, S
Practice	1.67	1.71	1.97	4.64	0.010*	1.00	0.01, S	0.04, S
Self-perceived competency	4.12	8.60	10.44	151.22	0.000*	< 0.001, S	< 0.001, S	< 0.001, S

Where, U = 4th year BDS; I = Interns; P = Post graduates; S = Significant

Table 3. Spearman correlation is used to tabulate the relationship between the study subjects' academic years and their general knowledge, attitude, practice, and self-perceived proficiency.

		Spearman correlation	P-value
Academic year (4th BDS, Interns & PGs)	Knowledge	0.263	< 0.001, S
	Attitude	0.294	< 0.001, S
	Practice	0.190	< 0.001, S
	Self-perceived competency	0.692	< 0.001, S

Where, S = Significant (2-tailed)

In contrast to interns (4.95) and fourth-year BDS students (4.80), postgraduate students had the highest overall mean on the knowledge surveys (5.67). ANOVA revealed statistically significant results. Spearman's correlation showed that academic years and knowledge were positively correlated. According to post-hoc analysis, knowledge about handling medical emergencies in a dental setting increased from the internship to post-graduation and from the fourth year of BDS to post-graduation, whereas it declined from the fourth year of BDS to internship. It can be clarified through the fact that as the academic year rises the knowledge regarding any subject would expand in the related fields. Additionally, since proper and methodical training can increase knowledge on any topic, this may be related to the training given [14]. Interns and postgraduate students receive greater training than final-year students. In general, the research demonstrated that the student's understanding of how to handle medical emergencies in a dental setting is sufficient. Knowledge varied among the available studies [9, 15-21]. Except for one study that indicated that interns' knowledge was superior to that of other lower academic years and that different percentages of each procedure were known, the majority of research did not assess the association between knowledge and academic year [9].

Additionally, the general means of the attitude questionnaires were nearly identical across the three academic years, with the postgraduates having the highest mean (2.34) compared to the interns (2.24) and fourth-year BDS students (2.03). ANOVA revealed statistical significance. The attitude and the academic years have a positive link (0.294) according to the Spearman correlation. According to post-hoc analysis, students' attitudes about handling medical emergencies in a dental setting improved as the academic year went on, from fourth-year BDS to internship, internship to post-graduation, and fourth-year BDS to post-graduation. The most obvious explanation for this could be that students tend to learn more during the academic year, which improves and improves their attitude towards it.

In terms of academic years, the averages of the practice/training questionnaire were nearly identical, with postgraduates (1.97) having somewhat higher means than interns (1.71) when compared to fourth-year BDS students (1.67). The results of the ANOVA test were statistically significant. The academic years and the practice/training questionnaires showed a

positive association (0.190) according to the Spearman correlation. The results of the Post Hoc test indicated that while there was no statistical significance between the interns and the fourth BDS students, there was between the interns and postgraduates. In other words, training and practice increase in tandem with the length of the school year. The statistical significance among the interns and postgraduates may have been influenced by the fact that the likelihood of being exposed to the training more than once increases with the number of academic years.

However, postgraduate students had the highest overall mean (10.44), followed by interns (8.60) and final-year BDS students (4.12), according to the questionnaires on self-perceived competency. ANOVA revealed statistical significance. Academic years and self-perceived competency had a positive association (0.692) according to Spearman correlation. Post-hoc analysis revealed that students' self-perceived competency in handling medical emergencies in a dental setting improved as the academic year progressed, from fourth-year BDS to internship, internship to post-graduation, and fourth-year BDS to post-graduation. Since knowledge and attitude both improved with the length of the academic year, even the overall self-perceived competency must have increased considerably.

All of the survey participants (100%) said that they needed more thorough instruction on how to handle medical emergencies in a dental setting. Every dentist should periodically update their knowledge and training in this field because it is an ongoing process. Numerous writers have emphasized in their studies the necessity of reinforcing this training and providing a refresher program [9, 15-19, 22-24]. Since most dental students undergo identical instruction, this study can be applied to students nationwide. An intriguing area for future study would be to comprehend and evaluate how teaching and non-teaching faculty members view the handling of medical emergencies at dental schools and how this might affect dental students' perceptions.

Conclusion

The student's general understanding of how to handle medical emergencies in a dental setting is sufficient. Additionally, the students have an optimistic mindset. Students had a very high self-perceived skill in handling medical emergency procedures. However, it is important to ensure that their knowledge, attitude, and self-perceived proficiency in handling medical emergencies continue to develop. To ensure that all students benefit from the training, both theory and practice must be required in the curriculum. In addition to classroom lectures, workshops, continuing dental education (CDE) programs, and practical/real-time situations training, medical emergency management training programs such as basic life support (BLS) and cardiopulmonary resuscitation (CPR) training should be repeated regularly and skills assessments should be conducted. To ensure that they are evaluated, updated, and trained in the subject, as well as to further educate and instill the same in dentistry students, teacher training programs should be conducted on an institutional basis regularly.

Acknowledgments: The authors are grateful to Dr. Ravi Shirahatti, Professor, Department of Public Health Dentistry, SDM College of Dental Sciences and Hospital, Dharwad, Karnataka, India for his valuable insight and guidance.

Conflict of Interest: None

Financial Support: None

Ethics Statement: The study participants provided written informed consent before the start of the study and the data regarding the knowledge, attitude, practices, and self-perceived competencies was kept confidential among the participants.

References

1. Vaughan M, Park A, Sholapurkar A, Esterman A. Medical emergencies in dental practice - management requirements and international practitioner proficiency. A scoping review. Aust Dent J. 2018;63(4):455-66.
2. Huang CL, Yeh IJ, Lin YC, Chiu CF, Du JK. Analysis of adult dental emergencies at a medical center in southern Taiwan. J Dent Sci. 2022;17(3):1314-20.
3. Smereka J, Aluchna M, Aluchna A, Szarpak Ł. Preparedness and attitudes towards medical emergencies in the dental office among polish dentists. Int Dent J. 2019;69(4):321-8.
4. Jevon P. Medical emergencies in the dental practice poster: revised and updated. Br Dent J. 2020;229(2):97-104.
5. Anders PL, Comeau RL, Hatton M, Neiders ME. The nature and frequency of medical emergencies among patients in a dental school setting. J Dent Educ. 2010;74(4):392-6.
6. Atherton GJ, McCaul JA, Williams SA. Medical emergencies in general dental practice in Great Britain. Part 1: their prevalence over a 10-year period. Br Dent J. 1999;186(2):72-9.

7. Obata K, Naito H, Yakushiji H, Obara T, Ono K, Nojima T, et al. Incidence and characteristics of medical emergencies related to dental treatment: a retrospective single-center study. Acute Med Surg. 2021;8(1):e651.
8. Atherton GJ, McCaul JA, Williams SA. Medical emergencies in general dental practice in Great Britain. Part 3: perceptions of training and competence of GDPs in their management. Br Dent J. 1999;186(5):234-7.
9. Broadbent JM, Thomson WM. The readiness of New Zealand general dental practitioners for medical emergencies. N Z Dent J. 2001;97(429):82-6.
10. 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. J Int Soc Prev Community Dent. 2017;7(6):364-9.
11. Collange O, Bildstein A, Samin J, Schaeffer R, Mahoudeau G, Féki A, et al. Prevalence of medical emergencies in dental practice. Resuscitation. 2010;81(7):915-6.
12. Hutse I, Coppens M, Herbelet S, Seyssens L, Marks L. Syncope in dental practices: a systematic review on aetiology and management. J Evid Based Dent Pract. 2021;21(3):101581.
13. Sorenson AD, Marusko RM, Kennedy KS. Medical emergencies in the dental school setting. J Dent Educ. 2021;85(7):1223-7.
14. Dweck C. Mindset-updated edition: changing the way you think to fulfil your potential: Hachette UK; 2017.
15. Mohideen K, Thayumanavan B, Krithika C, Nazia R, Murali B, Pravda C, et al. The knowledge and awareness of medical emergencies and management among dental students. J Pharm Bioallied Sci. 2021;13(Suppl 1):S741-7.
16. 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 Maced J Med Sci. 2018;6(2):402-5.
17. Alhamad M, Alnahwi T, Alshayeb H, Alzayer A, Aldawood O, Almarzouq A, et al. Medical emergencies encountered in dental clinics: a study from the eastern province of Saudi Arabia. J Family Community Med. 2015;22(3):175-9.
18. Al Ghanam MA, Khawalde M. Preparedness of dentists and dental clinics for medical emergencies in Jordan. Mater Sociomed. 2022;34(1):60-5.
19. Azad A, Talattof Z, Deilami Z, Zahed M, Karimi A. Knowledge and attitude of general dentists regarding common emergencies in dental offices: a cross-sectional study in Shiraz, Iran. Indian J Dent Res. 2018;29(5):551-5.
20. Gazal G, Aljohani H, Al-Samadani KH, Nassani MZ. Measuring the level of medical-emergency-related knowledge among senior dental students and clinical trainers. Int J Environ Res Public Health. 2021;18(13):6889.
21. Nagarajappa R, Mahapatra I, Satyarup D, Mohanty S. Appraisal of awareness on medical emergencies and its management among dentists in Bhubaneswar, India. Rocz Panstw Zakl Hig. 2021;72(2):193-201.
22. Chamberlain D, Smith A, Woollard M, Colquhoun M, Handley AJ, Leaves S, et al. Trials of teaching methods in basic life support (3): comparison of simulated CPR performance after first training and at 6 months, with a note on the value of re-training. Resuscitation. 2002;53(2):179-87.
23. Solanki C, Geisinger ML, Luepke PG, Al-Bitar K, Palomo L, Lee W, et al. Assessing readiness to manage medical emergencies among dental students at four dental schools. J Dent Educ. 2021;85(9):1462-70.
24. Greenwood M. Medical emergencies: risk assessment and management. Prim Dent J. 2018;7(3):46-56.