

Knowledge level assessment of Dentistry undergraduate students about medical emergencies

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ABSTRACT

Medical emergencies are unpredictable and the dental surgeon must be prepared to recognize and act upon these cases. However, there seems to be insecurity before such situations, probably due to difficulties in diagnosing and conducting these events. Thus, this study is justified by the need to assess the knowledge of dental students before medical emergencies. The aim of this research was to evaluate the knowledge level of undergraduate dentistry students about medical emergencies. This quantitative, descriptive and exploratory research was performed with students from the Dentistry Course at the Dentistry School of the Federal University of Juiz de Fora, from the sixth to the tenth course terms. Data collection was accomplished through the application of a test with nine objective questions on medical emergencies. The data were analysed and the results were expressed as percentages, means and standard deviations. The results showed that out of a sample of 100 students, 21% men and 79% women, 99% are interested in participating in a medical emergency course; 4% consider themselves prepared to act in these cases, 10% consider themselves capable of performing cardiopulmonary resuscitation and 79% obtained a score considered as insufficient in the test. It was concluded that the students did not seem prepared to act in cases of medical emergencies.

Descriptors: Education, Dental. Dental Offices. Emergencies.

1 INTRODUCTION

Emergencies are unexpected situations which require immediate actions to save life and can occur anytime, anywhere and with any individual¹. The urgencies differ from the emergencies in terms of the time to perform such action, not needing an immediate response from the practitioner. This professional, when faced with an emergency situation, can even prepare themselves and remember the protocol indicated to act². In a dental practice environment, the dental surgeon (DS) has the responsibility to recognize and initiate primary emergency management procedures, in an effort to reduce morbidity and mortality when these adverse events arise³.

Among the most common emergency situations which occur in dental offices are syncope, allergic reactions, seizures, hypoglycemia, airway obstruction, angina pectoris, myocardial infarction and asthma crisis⁴⁻⁷. Such conditions are generally associated with previous episodes of fear, anxiety and stress preceding dental care, and occur more commonly before surgical procedures, endodontic treatments and during or shortly after the use of local anaesthetics⁸.

DSs must have training in medical urgencies and emergencies (MUE), as well as mastery of the guidelines presented in the protocols established by the Advanced Cardiovascular Life Support (ACLS) and cardiopulmonary resuscitation (CPR)⁹, which needs recycling every two years¹⁰. However, in undergraduate and graduate courses, in general, it is observed that, when offered, training is directed to basic life support maneuvers (which according to current protocols are directed to laypeople, presenting a different approach from individual training) and, in addition, training is realized in a short or deficient way. Thus, DSs should seek such knowledge by themselves, since Law 5081/6623, which regulates the practice of Dentistry in Brazil, states that the practitioner must

prescribe and apply emergency medication in cases of serious accidents that compromise life, and the Brazilian Penal Code determines that omitting help to accident victims or people in imminent danger, when one is able to do so, can be considered a crime¹.

MUEs are more and more frequently present in DSs' daily life, mainly due to the gradual increase in the proportion of systemically committed patients who use dental services, which highlights the lack of training and negligence regarding the arsenal necessary to reverse emergency situations¹¹. Many DSs are more concerned with improving their technique and forget to look at the patient as a whole, revealing a qualification full of technicalities of the class¹.

Academicians and professionals seem unsafe to diagnose and treat medical emergencies^{2,4,12,13}. The unpreparedness to act in cases of cardiopulmonary arrest is also evident, requiring the continuous review of techniques so as to avoid forgetting them^{14,15}.

Hence, this study aimed to assess the level of knowledge about medical emergencies of undergraduate Dentistry students.

2 MATERIALS AND METHODS

This work is a quantitative, descriptive and exploratory study, approved by the Research Ethics Committee of the Federal University of Juiz de Fora (UFJF), in Minas Gerais state (Brazil), under report number 2,491,649. The survey instrument was developed by the researchers based on questionnaires applied in previous studies^{1,2,4,6,7,10,11,17}, answered in person, without prior notice. As respondents, students from the sixth to the tenth terms participated, all of whom had already worked on the content of medical emergencies, a topic which is addressed in the fifth term of the course, in the discipline of Anesthesiology.

The questionnaire addressed eight questions aimed at sociodemographic aspects, being multiple choice, of the “yes or no” type, concerning preoccupation with training in MUE and self-perception of skills for diagnosis and treatment (figure 1). Regarding knowledge about medical emergencies, nine multiple-choice questions were applied, based on diagnosis (3 questions) and treatment of MUE (6 questions) (figure 2). Along with the questionnaire, participants were given a Free and Informed Consent Form, explaining about

the research and ensuring the privacy and confidentiality of the data provided.

The collected data were tabulated in an Excel® spreadsheet (Microsoft Corp., Redmond, WA, USA) and statistically analysed by using SPSS® software (IBM, Armonk, NY, USA), using means and standard deviations to categorize the descriptive data. The Student's t test was used to compare the mastery of the topic by the students of the sixth term, immediately after the conclusion of the discipline, with students from other terms.

1. Term: _____	2. Gender: () Male () Female	3. Age: __ years old
4. Self-declared skin color: () White (Caucasian) () Brown () Yellow (Asian) () Black () Indigenous		
5. Do you participate or have you participated in an extracurricular course on medical emergencies? () Yes () No		
6. Would you like to participate in a course on medical emergencies in Dentistry? () Yes () No		
7. Do you feel prepared to act in a medical emergency situation? () Yes () No		
8. Do you think you are able to perform cardiopulmonary resuscitation? () Yes () No		

Figure 1. Sociodemographic questionnaire

3 RESULTS

Among the 192 students enrolled in the specified terms, 100 (52.1%) agreed to participate in the survey (seven did not answer the questionnaire in full), 21 (21%) of whom were male and 79 (79%), female. The age of the participants varied between 19 and 28 years old, with an average of 22.47 years.

An amount of 28% of students declared to have already participated in an extracurricular course on MUE. Still, 99% of the survey participants expressed the wish to participate in a course on medical emergencies; only 4% of respondents feel prepared to work in a MUE case and 10% consider themselves capable of performing cardiopulmonary resuscitation maneuvers.

Among the participants, 7% did not declare their course term; with a greater representation of the ninth term, with 25

students. The eighth term was the one with the lowest number of participants, with 15 students. The sixth, seventh and tenth ones had, respectively, 18, 17 and 18 respondents.

Students who obtained nine correct answers were considered to have very good performances. The performance was considered good by those who answered eight questions correctly, and those who reached a number of correct answers below this number were classified as regular and below expectations, respectively. Only two participants reached the maximum value of nine correct answers; 9% obtained eight; 10% had seven correct answers and the remaining 79 respondents were below what was considered ideal. Results are shown in table 1. Table 2 indicates how many participants answered each question correctly and in which term of the course they are.

1. During an appointment, a patient presented the following signs and symptoms: temporary and momentary loss of consciousness, hypotension, pallor, tachycardia, dimming of vision and drowsiness. What is the diagnosis?
a) Lipothymia; b) Vasovagal syncope; c) Hypertensive crisis; d) Hypoglycemia.
2. What is the conduct to deal with the case presented in the question above?
a) Give the patient simple carbohydrates (soft drinks, sweets, ...) or glucose gel (15-24 mg). If there is no improvement or if the patient is unconscious, administer 50 ml of 50% aqueous glucose solution (dextrose) intravenously for two to three minutes;
b) Start cardiopulmonary resuscitation techniques;
c) Stop dental care, put the patient in a comfortable position, monitor vital signs, calm them and administer captopril (25 to 50 mg) sublingually;
d) Place patient in a supine position with the lower limbs slightly elevated in relation to the head (10 to 15 degrees) and tilt the head backwards, waiting for 2 or 3 minutes. If no improvement occurs, oxygen (2 to 4 liters / minute) should be administered and vital signs monitored while waiting for medical assistance, previously requested.
3. After anesthesia, during the surgical procedure, your patient experienced headache, dizziness, uneasiness, mental confusion, visual disruption and gingival hemorrhage after manipulation. What is the diagnosis?
a) Hypertensive crisis; b) cerebrovascular accident; c) Angina *pectoris*; d) Myocardial infarction
4. What is the medication of choice to treat anaphylactic shock?
a) Captopril; b) Midazolam; c) Dexamethasone; d) Adrenaline.
5. What is the right clinical conduct before a seizure crisis episode?
a) Place the patient in a supine position with lower limbs slightly elevated in relation to the head (10 to 15 degrees) and tilt the head backwards, waiting for 2 or 3 minutes. If there is no improvement, oxygen should be administered (3 to 4 liters / minute), and vital signs monitored while waiting for medical assistance, previously requested.
b) Stop dental care, put the patient in a comfortable position and administer oxygen. After that, administer 5 mg of isosorbide dinitrate sublingually. If symptoms do not subside, a second dose should be administered;
c) Stop dental care, remove objects from the patient's mouth, place them in a supine position and tilt their head to the side. Monitor vital signs and wait for the crisis to end. If necessary, administer midazolam and diazepam (0.2 and 0.3 mg per kilogram intramuscularly or 5 to 10 mg intravenously);
d) Start cardiopulmonary resuscitation techniques.
6. How would you help a patient, in your office, with hypoglycemia?
a) Stop dental care, give the patient simple carbohydrates, if he is conscious. But if he is unconscious, 50 milliliters of 50% aqueous glucose solution should be administered intravenously for 2 to 3 minutes;
b) End the procedure as soon as possible; give the patient polysaccharides, if he is conscious. But, if he is unconscious, 50 milliliters of 70% aqueous glucose solution is administered intravenously for 5 to 7 minutes;
c) Stop dental care; give the patient polysaccharides, if he is conscious. But if he is unconscious, 50 milliliters of 70% aqueous glucose solution should be administered intravenously for 5 to 7 minutes;
d) Interrupt dental care; give the patient simple carbohydrates, if he is conscious. But, if he is unconscious, 100 milliliters of 50% aqueous glucose solution should be administered intravenously for 2 to 3 minutes;
7. What is the most common medical emergency in a dental office?
a) Angina *pectoris*; b) Lipothymia / syncope; c) Hypertensive crisis; d) Hypoglycemia
8. What is the most important resource in an emergency medical kit?
a) Oxygen; b) Diazepam; c) Adrenaline; d) Dexamethasone.
9. What is the second most important resource in an emergency medical kit?
a) Oxygen; b) Diazepam; c) Adrenaline; d) Dexamethasone.

Figure 2. Questionnaire to assess students' knowledge of medical emergencies in a dental office

Table 1. Distribution of number of correct answers for each question, by term

Number of correct answers	6th	7th	8th	9th	10th	Not declared	Students' percentage
1	-	-	-	1	-	-	1%
2	1	-	-	-	-	1	2%
3	-	1	2	2	1	-	6%
4	-	3	3	5	4	1	16%
5	5	4	2	6	5	3	25%
6	7	5	4	6	5	2	29%
7	3	2	2	2	1	-	10%
8	2	1	1	3	1	-	9%
9	-	1	1		1	-	2%
Total	18	17	15	25	18	7	100%

Table 2. Total of students who answered each question correctly

Question	6th	7th	8th	9th	10th	Not declared	Percentage of right answers/question
1	5	9	4	10	3	1	32
2	12	11	12	16	15	5	71
3	12	13	11	17	16	5	74
4	16	13	11	18	10	5	73
5	18	16	15	23	18	7	97
6	14	15	8	19	16	6	78
7	6	9	12	16	11	3	57
8	14	5	4	5	5	1	34
9	9	5	5	7	4	-	30

The question with the highest success rate was number 5 with 97%, which referred to the clinical conduct to be performed before a seizure crisis. The ninth question, which referred to the knowledge related to the contents of the medical emergency kit, was the one with the least success, since only 30 people answered correctly.

The sixth term was used as a basis for comparison with the others, since it was the

period closest to the content taught. Thus, greater mastery over the topic was expected, which did not prove to be true, as the Student t test did not show any significant performance difference among groups ($p > 0.05$).

4 DISCUSSION

MUEs are not frequent occurrences in dental offices. Nevertheless, factors such as the

increase in elderly people seeking dental care, therapies used, longer dental appointments and the new drugs used in Dentistry can lead to an increase in the probability of such complications' occurrence¹⁶, making a greater knowledge on the topic, by Dentistry professionals, necessary.

In this regard, the study in question is justified by assessing how the subject is inserted in the institution where it was applied and by comparing its results to other educational institutions, in order that, based on the results obtained, strategies can be developed for the application of a better methodology and exposure of the theme, such as the requirement of a specific discipline or periodic short-term courses, providing a more complete training to students, in addition to ensuring greater aptitude and security for future professionals before MUE situations.

The results obtained in the present study suggest restricted knowledge of students on the subject, since the analysis of the results presented shows that the average percentage of correct answers among all participants was 61.54%, revealing poor knowledge on the subject. This result was close to that found by Queiroga *et al.*⁴, who observed a percentage of 60.27% of correct answer in the researched sample. In the present study, students from the ninth term were the ones who had the lowest achievement rate (58.3%), while those from the tenth term showed the best performance (60.4%). These achievement rates are close to those presented by Queiroga *et al.*⁴, but with an inversion between the ninth and tenth terms (54.5% and 66%, respectively).

Comparing the percentages of correct answers of this study with those of Queiroga *et al.*⁴, they are, respectively, 65.4% and 55.6% for the sixth terms, 62.8% and 58% for the seventh and 60.8 % and 65.3 for the eighth terms. A study by Somaraj *et al.*³ found that 39.89% of trainees in Dentistry had knowledge about MUE

below average. Such results demonstrate the need for a more effective approach to the theme in Dentistry courses.

The insecurity of students concerning performance in MUE cases was observed by Queiroga *et al.*⁴, as 70.3% of the students did not feel prepared to act in a MUE situation. In the present study, 96% of students did not consider themselves able to act in emergency situations. In the study by Albelaihi *et al.*¹² only 37% of participants were confident to handle any medical emergency in the dental office.

The students participating in this study did not receive CPR training during graduation. When asked how they perceived their ability to perform CPR, 89.8% said they did not feel capable and 2% did not respond. Chapman¹⁷ noted that 64% of students had received CPR training at university, however 77% did not feel prepared to perform it. Al-Iryani *et al.*¹⁵ reported that 62% of participants were not confident about performing CPR. In contrast, Albelaihi *et al.*¹² found that 71% of students and interns knew where the correct anatomical location for chest compression was. The conflict regarding the teaching availability, followed by the proximity of data related to confidence in acting, may perhaps be justified by the lack of continuous practical training, suggesting the deficiency of efficient training for such a situation, which makes its curricular insertion essential.

In the first question, it was observed that 32% of the students recognized the signs and symptoms described for vasovagal syncope and that 49% of them answered that it was a lipothymia. Hanna *et al.*⁵ found similar results, with 35.7% of the interviewees correctly indicating that it was a vasovagal syncope case. This result may suggest an error presented by the students due to the similarity and proximity of the concepts, requiring, perhaps, the adoption of strategies allowing to differentiate them clearly.

Despite the difficulty shown by these pupils to differentiate syncope and lipothymia, 71% knew the correct way to proceed before the situation, which can be attributed to the fact that the treatment protocol adopted for both is the same¹⁸. On the contrary, Silva¹⁹ highlighted that only 28.1% of the sample knew how to handle the case. Albelaihi *et al.*¹² recognized syncope as the most reported medical emergency (28%). However, less than half of the participants were aware of the correct management of the patient.

In a hypertensive crisis case description, 74% of the students knew how to recognize the episode, differing from what was stated by Hanna *et al.*⁵, who found a 21.9% correctness rate for the same case, but with nine alternatives. The reduction to four alternatives increases the chance of success by intuition.

As for the medication of choice to treat anaphylactic shock, 73% correctly answered that it was adrenaline, while the results found by Hanna *et al.*⁵ showed 52.4%. Again, the variation in the questionnaire may have been responsible for the differences in results. In this research, only which medication to use was enquired, whereas Hanna *et al.*⁵, in two alternatives, differentiated the amount of adrenaline to be used. The combination of the two alternatives approaching adrenaline as the first choice would lead to an index of 80%, closer to the result of this study. Albelaihi *et al.*¹² found that only 33% would use adrenaline.

The assessment of conduct before a seizure crisis, the highest success rate question in this study, revealed that 97% of students know how to handle the case, which was also present in the study by Hanna *et al.*⁵, with 80.2%. Such findings are considered a positive factor, since the occurrence of a seizure during dental treatment must be controlled by the DS, as they are able to perform primary steps, such as the immediate interruption of the procedure and positioning of the patient in lateral decubitus so as to decrease the chance of

aspiration of secretions or dental materials²⁰.

A hypoglycemia case was also proposed in the questionnaire and 78% knew how to answer the conduct to be followed to reverse the situation. In his research, Silva¹⁹ observed that 59.5% knew how to manage a case like the one mentioned.

One question was about which MUE was more prevalent in the dental office. Among the participants, 57% said it was syncope / lipothymia. Soramaj *et al.*³ obtained as correct answers: syncope (93.98%), seizures (2.73%), anaphylactic reaction and allergic reactions (0.53%). Oliveira²¹ conducted a survey in Portugal and observed a success rate of 37%, since a large part of the interviewees (31.1%) opted for hyperventilation and another group (28.6%) for allergic reactions. Hence, the way of exposing the question may have interfered in the process of choice, as both are also common situations in MUEs in a dental office and were not included in this article's questionnaire.

The availability of emergency drugs in the dental office is extremely important, therefore the preparation of a kit composed of essential drugs⁸ is needed. The last two questions of the present study were directed to assess the knowledge regarding the most important pharmacological resources of this kit in the dental office. According to Oliveira²¹, it should be adrenaline, which was recognized by 59.3% of students. In the present study, only 34% of respondents answered the question correctly. The last question, in which the lowest rate of correct answers was obtained, showed that 30% of participants indicated oxygen as the second most important resource in the kit. Bearing in mind that oxygen, adrenaline, nitroglycerin, injectable antihistamines, salbutamol, aspirin, oral carbohydrates and the important equipment that must be present in the office, such as sphygmomanometer, stethoscope, syringes and needles, are given as essential resources and, as far as possible, an automatic external

defibrillator⁸, the results found show little knowledge of students on the assembly of emergency kits.

Another aspect not addressed in this study was related to child care. Taking into account that most of the literature produced is related to adult patients, the DSs who assist children and adults should be concerned with keeping resources for both audiences in the office. Structural, as well as psychological, respiratory, cardiovascular and immune system differences must be taken into consideration in order to avoid material and theoretical unpreparedness to help a patient²².

The need for specific preparation to act in MUE is visible, as it is also the desire of academicians, since 99% of the sample said they were interested in taking a course on the topic. This rate is close to that found by Silva¹⁹ (99.2%) and Somaraj *et al.*³ (98.36%). In this respect, the results obtained in the present study corroborate those of other researches, highlighting the need that the themes of basic life support and emergencies in offices must be mandatory and transversal in the curriculum of dental education^{12,15}.

5 CONCLUSION

Even after the content of MUE was taught, students did not have enough knowledge to act before medical emergency situations, a fact that can pose a serious risk for those who seek their services and, perhaps, face such a situation. Thus, a reflection on the most appropriate way to approach the subject lies: a specific discipline and / or periodic short-term courses.

RESUMO

Avaliação do nível de conhecimento de acadêmicos de Odontologia sobre emergências médicas

Emergências médicas são imprevisíveis e o cirurgião-dentista deve estar preparado para reconhecer e atuar frente a esses casos. No

entanto, parece existir uma insegurança diante de tais situações, provavelmente devido às dificuldades de diagnosticar e conduzir esses eventos. Assim, esse estudo se justifica pela necessidade de avaliar o conhecimento dos acadêmicos frente a emergências médicas. O objetivo dessa pesquisa foi avaliar o nível de conhecimento sobre emergências médicas de graduandos em Odontologia. Esta pesquisa de natureza quantitativa, descritiva e exploratória, foi realizada com acadêmicos do Curso de Odontologia da Faculdade de Odontologia da Universidade Federal de Juiz de Fora, do sexto ao décimo períodos. A coleta de dados foi realizada por meio da aplicação de um teste com nove questões objetivas sobre emergências médicas. Os dados foram analisados e os resultados expressos em percentagens, médias e desvios-padrão. Os resultados mostraram que de uma amostra de 100 estudantes, sendo 21% homens e 79% mulheres, 99% têm interesse em participar de um curso de emergências médicas; 4% se julgam preparados para atuar nestes casos, 10% se consideram capazes de fazer uma reanimação cardiopulmonar e 79% obtiveram pontuação considerada como insuficiente no teste. Concluiu-se que os alunos não se mostraram preparados para atuar em casos de emergências médicas.

Descritores: Educação em Odontologia. Consultórios Odontológicos. Emergências.

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