

High-fidelity simulation as a teaching method in medical emergencies in dental practice: experience report

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ABSTRACT

Dentists should be prepared to manage eventual medical emergencies that occur in the dental practice. However, many dentists are not fully prepared to manage these situations and have insufficient experience training in medical emergencies. The aim of this paper is to report the experience of educational activities using a high-fidelity simulator in different scenarios in order to prepare dental professionals for medical emergencies in the dental clinic. This methodology allows discussion in the debriefing room regarding the main techniques and procedures to be performed in clinical practice in cases of emergencies and training of dentists to meet these situations. It can be concluded that high-fidelity simulation represents an innovative learning scenario and it is an effective educational method to prepare dental professionals for medical emergencies.

Descriptors: Dental Education. Dental Care. Emergencies. Computer Simulation.

1 INTRODUCTION

Medical advances, as well as the resulting increase in the population's life expectancy, have triggered the diversity of patients seeking

for dental services¹ exposing the dentist to handle complications that are often not only related to dental procedures, but also to the preexisting systemic alterations of his

patients².

In addition, Brazilian Law 5081/663, which regulates the practice of Dentistry, presents in its article 6, section VIII, that it is the duty of the dentist "to prescribe and apply urgency medication in the case of serious accidents which compromise the patient's life and health."

Although the subject matter is of utmost importance, studies have shown that the dentist does not always feel prepared and confident to deal with a medical emergency. A recent study by Alkandari et al⁴. showed that the dentists evaluated had inadequate knowledge regarding cardiopulmonary resuscitation (CPR) maneuvers, and only 36% of the study participants have shown adequate knowledge about the subject. Arsati et al⁵. have interviewed 498 Brazilian dentists regarding their preparation to deal with medical emergencies in a dental environment. The authors have found that 79.7%, 72.9% and 85.7% of the professionals did not feel able to deal with serious situations such as myocardial infarction, anaphylaxis, and stroke, respectively. In addition, almost 60% of the sample stated that they did not know how to perform the CPR maneuvers, either due to the lack of learning of the technique during the undergraduate course or to up-to-date information on the subject.

This subject has also been studied with undergraduate Dentistry students in order to assess knowledge and skills regarding basic life support and CPR. A study by Le et al⁶. has emphasized the need to incorporate periodic simulation exercises in order to increase the skills of the graduate student to handle medical emergencies. Breuer et al⁷. have pointed out the dental student's difficulties on the subject and concluded that training for basic life

support on a regular basis is necessary and should be inserted as well as standardized in the course content of medical emergencies for Dentistry students.

The National Curricular Guidelines (NCG) for Dentistry Courses states, in Article 4, that "the work of health professionals must be based on the decision-making regarding the appropriate use, efficacy, and cost-effectiveness of the workforce, as well as medicines and equipment related to procedures and practices"⁸. The NCG also recommend for the teaching-learning process the organization of contents and insertion of innovative methodologies.

New strategies and resources have been presented and made available in educational institutions with the aim of improving student learning regarding medical emergencies in Dentistry. Among them, the use of realistic high-fidelity simulation methods is highlighted. A paper by Newby et al⁹. has shown that realistic training in the management of medical emergencies for Dentistry students can be an effective method for learning. Besides that, this training could benefit students if inserted in their undergraduate courses.

Concerning the simulation of realistic high fidelity, few studies have evaluated this methodology and resource for the teaching of medical emergencies in dental practice. The results have indicated that the simulation of high fidelity is effective in the teaching-learning process as well as for the students' management of medical emergencies¹⁰⁻¹².

Although the subject is of utmost importance, the realistic high fidelity simulation as a teaching strategy is still recent in Brazil, motivating its planning and accomplishment in dental courses. Based on

the above, the aim of this article is to report the experience of a simulation activity with different scenarios of medical emergencies in dental practice.

2 EXPERIENCE REPORT

This is an experience report of a teaching activity developed by a multidisciplinary team composed of physicians, dentists, and a nurse so as to teach and improve competencies on the management of emergency medical situations in a dental environment. In October 2016 periodic meetings among professional focused on improving the theoretical and practical approach of medical emergency simulations in a dental environment considering the current legal

recommendations. In April and May 2017, tests were carried out for final adjustments and the activities were developed during June and August, 2017.

The proposal of the realistic simulation of high fidelity is to enable training in a simulated scenario with guided activities, which aim to reproduce aspects and details of real situations, in an interactive way. The fidelity of the activity depends on how close it can approach clinical practice in real situations. Given this context and in order to help the student to feel in a real dental environment, hypothetical clinical cases were elaborated as well as equipment, dental stool and clinical instruments were provided so that the dental scenario could be reproduced (Figure 1).

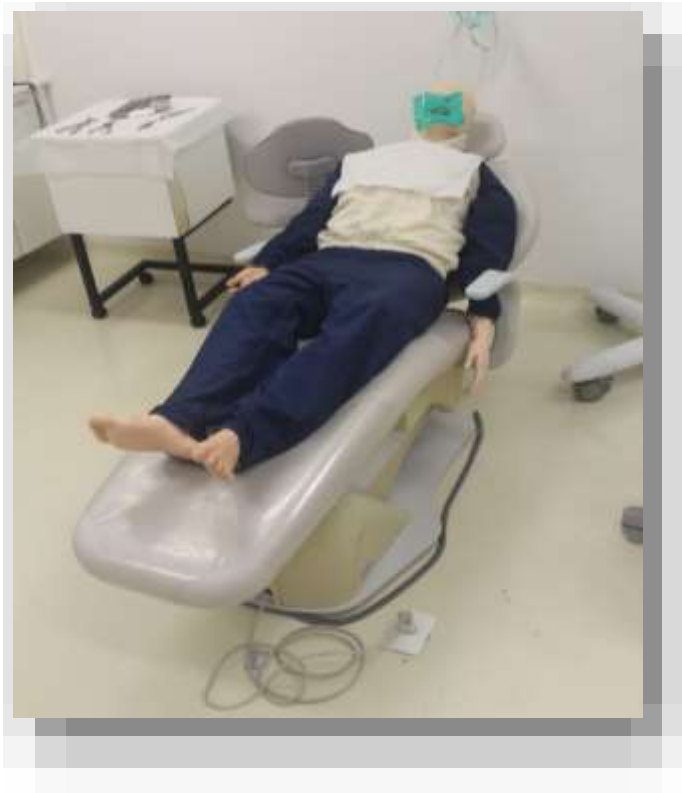


Figure 1. Simulation robot positioned in the dental chair

Activity location

The activity was developed and carried out in the Laboratory of Simulation of the Medicine Course of São Leopoldo Mandic, based in the city of Campinas, São Paulo State, Brazil. This unit is equipped with simulation robots, manikins, audiovisual resources and two debriefing rooms, which allow the

discussion of each simulation scenario performed with the students. Furthermore, these rooms are provided with an audiovisual system integrated with the simulation rooms allowing students who are not in the simulation scenario to watch the entire sequence of each simulated clinical case through different shooting angles (figure 2).



Figure 2. Visualization of the simulation scenario through the debriefing room monitor to follow the simulations

Participants

Dentists from different specialties, in a total of 12, divided in pairs, participated in each simulation session. In all, 6 simulation scenarios were performed involving possible clinical interferences in the dental chair.

Instructors

Three physicians participated in the activity as instructors together with one nurse and two dentists accompanied the other students in the debriefing room. One instructor remained in the same simulated scenario in all cases

proposed, while another instructor remained in the audiovisual resource control room (figure 3).

The third instructor followed the pairs in the presentation of each proposed case.



Figure 3. Audiovisual resource control room

Simulations

Each session was performed in one day, with theoretical classes in the morning and simulation activities in the afternoon. The theoretical classes were composed of topics related to the pre-clinical evaluation of the dental patient, as well as the prevention and management of possible medical emergencies in dental care.

For the simulation activities, different scenarios were used with a high fidelity simulator (Resusci Anne Simulator, Laerdal® Gatesville, Texas, USA). Each scenario involved the dental care of a patient with different systemic

characteristics (diabetic, hypertensive or asthmatic, for example), as well as different clinical procedures (implant surgery, extractions or endodontic treatment, for example). Although these scenarios presented different hypothetical situations in a dental environment (such as an acute asthma crisis), they all followed the same basic proposals:

- a. To identify the patient's possible dental care risks through a rigorous and accurate pre-clinical evaluation;
- b. To analyze the individual competencies of each participant through a simulated emergency medical situation in a dental

- environment;
- c. Provide individual monitoring for each participant's performance for later discussion in a debriefing scenario;
 - d. Discuss the procedures performed by the participants as well as identify their possible failures and difficulties in the simulated scenario;
 - e. Emphasize the appropriate practice performed by the participants;
 - f. Suggest improvements for similar cases presented while relating them to possible real cases of the participants.

A procedure checklist was performed and evaluated by the instructor who remained in each scenario evaluated and any doubts and difficulties presented were noted for later on the discussion in the debriefing room.

The instructor who remained in the audiovisual resources control room followed each scenario in order to reproduce the patient's voice and the possible systemic manifestations of each scenario (respiratory distress, for example). The third instructor followed each pair effectively, either to clarify any doubts about the patient's clinical profile or to act as a fictitious member of the patient's family to answer possible questions about their medical history. The instructors did not pass any technical information during the simulation, so as not to compromise the performance of each student.

Each scenario was scheduled to last up to 10 minutes, and after each simulation, a 20-minute discussion in the debriefing room was held. The team developed differently standardized checklists in order to facilitate each discussion, with each pair describing the scenario and any difficulties presented so that discussion dynamics could be provided by the instructors with the other students.

At the end of the day, a final general

discussion about the proposal was presented, and each participant could report his/her perception regarding the activity. Some different professionals' experience opinions are reported and detailed below:

"An activity that takes us back to the clinical reality of a medical emergency situation in a real way. More simulations of other clinical situations could have been performed. I deeply suggest this activity to other professionals. "

"The activity was far beyond expectations once the focus is on daily routine clinical practice, blending the medical and the dental area experiences. The simulation is undoubtedly a differential since the application of what has been learned is immediate; the tips and information have made the difference. Every dentist should often perform this excellent activity."

"I had the opportunity to experience decision-making resulting from signs and symptoms evaluated from a clinical simulation of intercurrent. After this activity, I was able to ascertain the dentist's greatest need towards acquiring the necessary knowledge to attend emergency medical situations in a dental environment. "

3 FINAL CONSIDERATIONS

Simulation activities can be considered theoretical and practical methodologies which also represent innovative teaching and learning scenarios bringing positive aspects for Dentistry training while committed to the fundamental principles of the Curricular Guidelines of the Dentistry Course.

According to one of the principles of the extended clinic^{13,14}, it is essential that the health professional develops an essential and unique commitment to the sick individual; assume responsibility for the users of health services; seek multidisciplinary help in other sectors. Furthermore, health professionals need to perceive the limits of the knowledge and technologies employed in clinical practice.

The present report may infer that high fidelity simulation is an effective strategy for training individuals and teams in technical capacities (knowledge and skills), in addition to benefiting communication, attitudes and teamwork. This methodology is also valued by students towards increasing their self-confidence, cognitive and psychomotor perception for the management of medical emergencies in the dental office that can lead to situations of great apprehension.

Despite the growing trend of simulation centers and laboratories in Brazil, limitations such as the high costs for the creation of the physical infrastructure and training of the professionals for the use of these technological resources can be found.

Based on the above, it can be concluded that realistic high fidelity simulation methods for the teaching of medical emergencies in dental practice represent an innovative scenario for the teaching and learning process, with students and teachers as protagonists.

RESUMO

Simulação de alta fidelidade realística para o ensino de emergências médicas na prática odontológica: relato de experiência

Os cirurgiões-dentistas devem estar preparados para eventuais situações de emergências médicas que podem ocorrer durante o atendimento odontológico. Entretanto, muitos profissionais não se sentem preparados para executar estes

procedimentos e têm pouca experiência em treinamentos práticos. Desta forma, o objetivo deste artigo é relatar a experiência de uma atividade de simulação em diferentes cenários de emergências médicas na prática odontológica. Esta metodologia envolve o uso de um simulador de alta fidelidade e permite a discussão na sala de *debriefing* sobre os principais procedimentos e treinamento prático para o manejo de emergências médicas. A simulação de alta fidelidade realística para o ensino de emergências médicas na prática odontológica representa um cenário inovador e é eficaz para o processo de ensino e aprendizagem.

Descritores: Educação em Odontologia. Assistência Odontológica. Emergências. Simulação por Computador.

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