

REVIEW

Medical Emergencies in the Dental Office: Challenges and Solutions

Emergencias Médicas en el Consultorio Odontológico: Retos y Soluciones

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ABSTRACT

Introduction: medical emergencies, although infrequent, represent a challenge in the dental setting due to their potential risk to the patient's life and the need for an immediate response. In Latin America, the aging population and associated comorbidities, such as hypertension and diabetes, increased the probability of these events in dental offices. Anamnesis and professional preparation were essential to identify risks and prevent complications during dental procedures.

Development: the management of medical emergencies in dentistry focused on two key aspects: prevention and intervention. Prevention included the collection of a detailed medical history and constant monitoring of vital signs. On the other hand, immediate intervention, based on protocols such as Basic Life Support (BLS), was essential to avoid serious complications. The most frequent emergencies included syncope, hypoglycemia, seizures and hypertensive crises. The studies underlined the importance of continuous training of dental personnel and the availability of emergency kits, especially in rural areas.

Conclusion: effective management of medical emergencies in dentistry depended on the theoretical and practical training of dentists, as well as the implementation of standardized protocols. The availability of adequate equipment and medications in dental offices significantly improved outcomes. This comprehensive approach ensured a safe environment, minimized risks and strengthened confidence in the dental care system.

Keywords: Medical Emergencies; Dentistry; Prevention; Clinical Protocol; Training.

RESUMEN

Introducción: las emergencias médicas, aunque poco frecuentes, representaron un desafío en el ámbito odontológico debido a su potencial riesgo para la vida del paciente y la necesidad de una respuesta inmediata. En América Latina, la población envejecida y las comorbilidades asociadas, como hipertensión y diabetes, aumentaron la probabilidad de estos eventos en consultorios dentales. La anamnesis y la preparación profesional fueron esenciales para identificar riesgos y prevenir complicaciones durante los procedimientos odontológicos.

Desarrollo: el manejo de emergencias médicas en odontología se centró en dos aspectos clave: la prevención y la intervención. La prevención incluyó la recopilación de una historia clínica detallada y el monitoreo constante de los signos vitales. Por otro lado, la intervención inmediata, basada en protocolos como el Soporte Vital Básico (SVB), resultó fundamental para evitar complicaciones graves. Entre las emergencias más frecuentes destacaron el síncope, la hipoglucemia, las crisis convulsivas y las crisis hipertensivas. Los estudios subrayaron la importancia de la capacitación continua del personal odontológico y la disponibilidad de kits de emergencia, especialmente en áreas rurales.

Conclusión: la gestión efectiva de emergencias médicas en odontología dependió de la formación teórica y práctica de los odontólogos, así como de la implementación de protocolos estandarizados. La disponibilidad

de equipos y medicamentos adecuados en consultorios mejoró significativamente los resultados. Este enfoque integral aseguró un entorno seguro, minimizó riesgos y fortaleció la confianza en el sistema de atención odontológica.

Palabras clave: Emergencias Médicas; Odontología; Prevención; Protocolo Clínico; Capacitación.

INTRODUCTION

Medical emergencies are acute clinical situations that can pose a risk to the patient's life and cause permanent damage to their health. Despite their low prevalence, they can occur in dental practice, and therefore, dentists must respond immediately and accurately.^(1,2,3,5,6,7,8,9)

Currently, several risk factors increase the likelihood that dentists will have to respond to a medical emergency. Argentina, like many other Latin American countries, has an aging population, which is directly related to the presence of various comorbidities, such as high blood pressure, diabetes, and cardiovascular disease. This factor, combined with the increase in patients taking multiple medications due to advances in modern medicine, requires the detailed collection of the patient's medical history.^(2,3,9,11,12,13,14,15,16)

In addition, the current need for dental treatment among this age group and the prolonged consultation time require a more careful and preventive approach by healthcare professionals. A holistic view of the patient could prevent a medical emergency caused by a pharmacological action or interaction or an episode of stress generated by dental procedures.^(17,18,19,20,21,22)

If the acute clinical situation cannot be prevented, dentists' ability to recognize the problem and provide primary care will determine the development of the medical emergency and define its morbidity or mortality.^(4,5,23,24,25,26,27,28)

Therefore, healthcare professionals must be trained and efficient in the speed and quality of their responses. Only with qualified theoretical and practical training can dentists feel confident and competent in their ability to act. In addition, the entire clinical team responsible for providing medical care must have practical training and be familiar with the predefined medical emergency protocol.^(5,10,11,23,30,31,32)

To ensure that professionals perform more adequately, clinics must have all the necessary equipment and drugs to act according to the guidelines for each medical emergency. However, the lack of studies on the prevalence of medical emergencies in dental practices makes it difficult to develop guidelines on which drugs and equipment should be available in dental offices.^(7,31,32,33)

DEVELOPMENT

Medical emergency

A medical emergency is a situation in which care must be provided immediately, within a short period, without the possibility of delay. When these situations are delayed, they pose serious risks to the patient's health and may even lead to death. Initial care is provided by a person trained to maintain the patient's vital signs and prevent the condition from worsening until specialized medical services arrive. These procedures are part of first aid measures.^(33,34,35)

According to Williams, prevention is the best way to manage a medical emergency. This is achieved by obtaining detailed information about the patient's risks, which may be possible through a well-prepared medical history. It is essential that the patient feels comfortable during the interview so that they can provide information about pre-existing systemic diseases, history of allergies to medications and anesthetics, and current use of drugs. After prevention, the second priority in managing a medical emergency is the professional's preparedness to respond.

Silver⁽³⁶⁾ pointed out that medical emergencies have been little discussed and valued in the dental field. This lack of emphasis is partly because medical emergencies are rare in dentistry. However, although rare, they constitute real risks and have been experienced by various professionals, as previous studies have shown.

Dentists and dental students should be aware that when a patient is under their care, attention should not be limited to the oral cavity.⁽³⁷⁾ The patient should be considered holistically, paying special attention to their health. This will allow the professional to be well-informed about the patient's medical history and know how to intervene in a medical emergency.

Among the first aid measures that should be provided to victims is Basic Life Support (BLS). According to María et al.,⁽³⁸⁾ BLS is essential for keeping the patient alive until emergency medical services arrive. This support does not require additional equipment, as the use of the first responder's mouth, hands, and knowledge are sufficient to maintain the patient's life until medical help arrives. According to the authors, the basic principles of first aid are: (1) save lives, (2) prevent deterioration before definitive treatment is established, and (3) seek qualified help.

According to González-Salvado et al.⁽³⁹⁾ BLS maneuvers consist of immediately recognizing and correcting respiratory and/or cardiovascular system failure. To do this, it is necessary to assess the patient's vital signs and monitor the heartbeat through the carotid pulse, as this is usually the last to disappear in a situation of cardiopulmonary arrest and the first to be restored.

It is also necessary to check whether the patient is breathing by placing the rescuer's face close to the victim's mouth or nose to feel for breath or observing chest movement. If not, the airways must be cleared by removing objects that may obstruct breathing and loosening clothing to facilitate ventilation, keeping the patient in a stable condition until specialized assistance arrives.

Real de Asúa et al.⁽⁴⁰⁾ emphasize that BLS measures include initiating cardiopulmonary resuscitation (CPR) and an automated external defibrillator (AED) while waiting for the previously requested emergency services. Therefore, dentists and other healthcare professionals should be encouraged to train in basic life support (BLS) and cardiopulmonary resuscitation (CPR) techniques to provide a safe and prepared environment for such events.

According to the various studies analyzed in this review, the eight most commonly reported medical emergencies in dental offices, in descending order of frequency, were the following: syncope, hypoglycemia, seizure, asthma attack, hypertensive crisis, anaphylactic shock, airway obstruction, and cardiopulmonary arrest.^(33,34,38,40)

These studies underscore the need for ongoing training for dentists, as medical emergencies, although rare, can occur anytime. Proper management of these situations requires theoretical knowledge, practical skills, and adequate equipment, which ensures patient safety and minimizes the risks associated with dental procedures.

Syncope

This is considered a sudden, momentary loss of consciousness caused by a decrease in brain oxygenation due to a reduction in blood flow to the brain. It is generally a benign condition that resolves quickly and spontaneously. In children, it is a rare occurrence.^(41,42)

Vasovagal syncope is the most common type and can be triggered by anxiety, the sight of blood or needles, unexpected pain, or other factors such as hunger and very hot environments. Although vasovagal syncope is the most common, vasodepressor syncope can also occur in the dental office. This happens in individuals with an extreme fear of the dentist's chair, which causes a stress reaction in the body known as "fight or flight." In this state, the skeletal muscles experience an increase in blood flow.^(7,8,33,34,41,42)

When this peripheral vasodilation is combined with a decrease in heart rate (instead of the expected increase due to panic), inadequate cardiac output results in loss of consciousness. Syncope is the most common medical emergency encountered in dental practice. Signs and symptoms include tachycardia, paleness, ringing in the ears, drowsiness, hypotension, and blurred or darkened vision.^(34,41,42)

What to do:

Treatment should be stopped immediately, and the patient's level of consciousness should be assessed. Place the patient in the supine position (with the lower extremities slightly elevated relative to the head, approximately 10 to 15 degrees). Carefully tilt the head back to facilitate breathing, monitor vital signs, and wait 2 to 3 minutes for consciousness to return.^(41,42,43)

If the patient does not regain consciousness within that time, call emergency medical services immediately and administer 3 to 4 liters of oxygen per minute while continuing to monitor vital signs and waiting for medical help. When the emergency team arrives, inform them of the medication and actions taken during care.^(41,42,43)

Hypoglycemia

This condition occurs when blood glucose levels are equal to or less than 40 milligrams per deciliter. It can occur in both diabetic and non-diabetic patients and is characterized by a threat to the patient's life. In hypoglycemia, the supply of glucose to the brain is considered insufficient, which impairs its functions. Symptoms of hypoglycemia can range from mild discomfort to coma.⁽⁴⁴⁾

The most common causes include excessive alcohol consumption, as this can hinder the release of glucose by the liver, insulin overdose, prolonged fasting, and excessive physical exertion.

It is recommended that blood glucose levels be monitored with a glucometer before consultations. If values are below normal levels (70-120 mg/dl when fasting), the patient should be offered a carbohydrate to avoid complications during procedures.^(44,45)

Initial signs and symptoms: These include sweating, tachycardia, anxiety, nervousness, hunger, nausea, vomiting, and abdominal discomfort.^(44,45)

Symptoms in advanced stages: Seizures, loss of consciousness, decreased body temperature, and blood pressure.⁴⁵ It is essential to instruct patients not to come to the appointment on an empty stomach, to check that diabetic patients have taken their medication correctly, and to schedule appointments preferably in the morning and keep them short.⁽⁴⁶⁾

What to do:

In the event of hypoglycemia, the procedure should be stopped immediately and the patient placed in a comfortable position. If the patient is conscious, foods rich in rapidly absorbed carbohydrates, such as candy, chocolate, or sugary liquids, should be offered.^(44,45)

If the patient is unconscious, call emergency medical services immediately. While waiting for the team to arrive, administer 50 milliliters of 50 % glucose solution intravenously over 2 to 3 minutes. When the emergency team arrives, informing them about the medication administered is essential.^(44,45,46)

Seizures

Seizures result from a disturbance in normal brain function. They are characterized by temporary and reversible changes caused by an episode of abnormal electrical activity in the brain. These episodes can cause motor activity, sensory phenomena, and changes in behavior and consciousness. During a seizure, there are moments of muscle contractions combined with brief periods of relaxation.⁽⁴⁷⁾

The most well-known seizures are tonic-clonic seizures, in which involuntary contractions of the skeletal muscles follow a loss of consciousness. These contractions alternate between episodes of muscle relaxation and violent contractions. This type of seizure usually lasts between 2 and 5 minutes.⁽⁴⁸⁾

In general terms, a seizure episode can manifest as convulsions lasting 20 minutes or as shorter but repeated episodes. Seizures can be classified as idiopathic or triggered by factors such as emotional stress, physical trauma, high fever, withdrawal from psychotropic drugs and alcohol, overdose of anesthetics, or intracranial injuries such as stroke, tumors, or brain abscesses.^(47,48)

According to Jiménez and Vásquez, convulsive episodes can pose various risks to the patient's life due to significant metabolic disturbances, such as hypoxia, increased intracranial pressure, acidosis, hypoglycemia, and fever. They also indicate that fatal cases are rare and generally occur in situations where seizures are very prolonged, lasting more than 30 minutes.^(47,48)

Signs and symptoms

Symptoms may include a previous episode called an aura, characterized by alterations in taste, hearing, and vision that allow the patient to anticipate the onset of the seizure. Subsequently, the patient loses consciousness and falls to the ground, beginning what is known as epileptic snoring. This sound is produced by air passing through the diaphragm's partially closed glottis and spasms.^(47,48,49)

At this point, foam may be seen coming out of the patient's mouth, which is a mixture of saliva and air. If this foam contains blood, it may indicate soft tissue injuries in the mouth, such as bites to the cheeks and tongue.^(47,48,49)

Procedure in case of a seizure

In the event of a seizure during a dental procedure, the following actions should be taken:⁽⁵⁰⁾

- Immediately stop treatment and remove any objects from the patient's mouth to prevent accidental aspiration or swallowing of objects.
- Place the patient in a supine position, ensuring that the airways are clear.
- If the patient vomits, turning their head to one side is essential to allow drainage of the contents and prevent bronchial aspiration.
- Protect the patient's head to prevent injury from sudden movements.
- Monitor vital signs and wait for the seizure to end, usually lasting between 3 and 5 minutes.
- If the seizure does not stop or is prolonged, anticonvulsant medications may be administered, such as:
 - Midazolam (0,2-0,3 mg/kg in adults intramuscularly).
 - Diazepam (5 to 10 mg/kg intravenously).
- These measures should be applied quickly and accurately to minimize risks and stabilize the patient until a specialized medical team arrives.⁽⁵⁰⁾

Hypertensive crisis

A hypertensive crisis is a condition characterized by elevated systolic and/or diastolic blood pressure, often without symptoms. Some hypertensive patients are not even aware that they have this condition. Hypertensive crisis may be caused by a genetic predisposition or be related to risk factors such as a sedentary lifestyle, obesity, alcohol consumption, smoking, excessive salt intake, and stress, among others.⁽⁵¹⁾

During dental treatment, patients are exposed to stress due to pain, anxiety, and tension, which causes a physiological imbalance and, consequently, a change in blood pressure. For this reason, the dental surgeon must measure blood pressure during dental procedures, especially during surgery, to avoid possible complications.⁽⁵²⁾

It is very important to take a detailed medical history of these patients to obtain as much information as possible about the type of medication they use and to identify attitudes related to fear and anxiety. An anxiolytic may be prescribed to the patient before appointments, and measures may be taken to reduce their

discomfort during treatment, such as pain control, covering instruments, and shorter sessions.⁽⁵³⁾ It is also essential to measure the blood pressure of all patients before each appointment, as hypertension can often be a silent disease. The patient may discover during the dental appointment that they are hypertensive. In such cases, the patient should be referred to a specialist physician.⁽⁵⁴⁾

Definition	Blood pressure
Optimal	120/85 mm Hg
Normal	130/85 mm Hg
High	130/85 mm Hg to 139/89 mm Hg
Controlled stage I hypertension	Up to 160/100 mm Hg
Stage II hypertension	160/100 mm Hg to 180/110 mm Hg
Severe hypertension	Above 180/110 mm Hg

Patients with symptomatic and asymptomatic severe hypertension have the same blood pressure levels (above 180/110 mmHg). The difference lies in the fact that patients with symptomatic severe hypertension may experience breathing difficulties, visual disturbances, and spontaneous nasal or gum bleeding, among other symptoms, as a result of this blood pressure disorder.

In terms of dental care, patients with stage I hypertension can undergo both elective and emergency procedures. Patients with stage II hypertension should postpone elective procedures, although emergency procedures should be performed to relieve pain. However, in patients with severe symptomatic or asymptomatic hypertension, neither elective nor emergency procedures should be performed. These patients should be referred immediately for medical care.⁽⁵⁴⁾

Signs and symptoms that hypertensive patients may present include headache, epistaxis, gingival bleeding after manipulation, dizziness, mental confusion, malaise, and visual disturbances. Suppose a hypertensive patient presents with headache, respiratory distress, or visual disturbances. In that case, care should be interrupted immediately, mobile emergency medical services should be requested, and the patient should be placed comfortably.⁽⁵⁵⁾

It is essential to reassure the patient and monitor their vital signs, checking their blood pressure, pulse, and breathing while waiting for the emergency services to arrive. Antihypertensive drugs are a medical competence; therefore, the dental surgeon should not administer them to their patients to control the crisis.⁽⁵⁵⁾

Cardiopulmonary arrest

Cardiopulmonary arrest is an interruption of blood oxygenation and circulatory flow, resulting in the absence of breathing and pulse in the main arteries. This event requires immediate attention, as it can cause irreversible damage to organs and, as a result, death of the patient. These alterations in blood oxygenation and the collapse of the heart and lungs can cause the patient to become unconscious and, if not treated in time, could lead to death.⁽⁵⁶⁾ Signs and symptoms include unconsciousness, absence of carotid pulse, and absence of breathing.

Procedure to follow:

Immediately stop whatever you are doing, place both hands on the patient's shoulders to apply gentle stimulation, and ask if they are okay. This allows you to assess the patient's level of consciousness. If they are unconscious, call emergency medical services immediately.⁽⁵⁶⁾

Next, assess breathing by placing your face close to the patient's mouth and nose and observing chest movements. If there are no signs of breathing or a pulse, immediately begin cardiopulmonary resuscitation (CPR). According to Cruz Neto, these maneuvers should follow the ABC scheme, which consists of:

- C = Chest compressions.
- A = Airway opening.
- B = Breathing.

It is also recommended that anyone, whether a professional or not, perform chest compressions on patients in cardiopulmonary arrest. CPR should initially be performed with the patient lying on a hard surface.⁽⁵⁷⁾

Next, remove any objects from the patient's mouth. Draw an imaginary line between the nipples and place one hand in the center of the chest, on the sternum. Place the other hand on top of the first, interlocking your fingers. However, during compressions, your fingers should not touch the ribs.⁽⁵⁷⁾

The arms should be stretched out and leaned over the patient, using the body's weight to produce a depression of 5 centimeters. Immediately afterward, without removing the hands, the pressure should be relieved to allow the chest to expand and venous blood to return to the heart. These movements should be repeated at a rate of 100 compressions per minute.⁽⁵⁸⁾

For ventilation, lift the patient's chin by tilting their head back. Use your other hand's middle and index fingers to hold the chin. Then, place your lips around the patient's mouth and blow for 1 second, watching the chest rise, and repeat the procedure again. The maneuvers should be combined in a ratio of 3:2, i.e., three compressions for every two ventilations.⁽⁵⁸⁾

Acting immediately, such as calling for help and having the necessary equipment and medications available in the office, makes the difference between successful management and failure to assist in a medical emergency. In addition, having these emergency kits in the office is essential, especially in rural areas where assistance may take considerable time to arrive. The dental surgeon's preparedness to act in emergencies and adequate availability of these kits can save the patient's life and keep them stable and safe while waiting for help to arrive.⁽⁵⁸⁾

CONCLUSION

Although rare, medical emergencies in the dental setting represent a critical challenge that requires comprehensive preparation on the part of professionals. Dental care is not limited to the oral cavity; it requires a holistic approach considering the patient's overall health, especially in aging populations or those with comorbidities. This approach is essential to prevent critical situations and, if they do occur, to manage them effectively and quickly.

Prevention is established as the first line of defense, based on a detailed medical history, continuous monitoring of vital signs, and preparation to act in the event of conditions such as syncope, hypoglycemia, seizures, hypertensive crisis, and cardiorespiratory arrest. Although diverse in etiology, these emergencies share the need for immediate intervention based on well-defined protocols. For example, syncope and hypoglycemia can be effectively controlled by simple measures such as placing the patient in a supine position or administering glucose. In contrast, more serious emergencies such as cardiopulmonary arrest require cardiopulmonary resuscitation (CPR) and, ideally, the use of an automated external defibrillator (AED).

The studies reviewed highlight that dentists' theoretical and practical preparation and ongoing training of clinical staff are essential to ensuring patient safety. However, the lack of emphasis on training in medical emergencies and variability in equipment availability in dental offices represent significant obstacles. Implementing well-equipped emergency kits, including essential medications and devices, is crucial to improving outcomes in critical cases, especially in rural areas where medical assistance may be delayed.

In addition, successful management of these situations involves technical knowledge and interpersonal skills to reassure the patient and coordinate care. Constant preparation, commitment to professional development, and implementation of appropriate protocols are key factors in mitigating the risks associated with these emergencies.

In conclusion, preventing and managing medical emergencies in the dental office protects patients' lives and strengthens confidence in the dental care system. Investing in training, equipment, and protocols is an ethical and professional imperative that ensures a safe and prepared environment in critical events. This underscores the need for a proactive, multidisciplinary, and quality-focused approach to addressing these challenges.

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