



ORIGINAL RESEARCH PAPER

Oral and Maxillofacial Surgery

A DENTIST'S GUIDE FOR GETTING EQUIPPED FOR MEDICAL EMERGENCIES

KEY WORDS:

Medical emergencies, Dental office, dental clinic, Basic Life support.

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ABSTRACT

A medical emergency is an unannounced threat to a person's life that needs to be dealt with a quick response. A medical emergency can occur at any time and place, even in a dental clinic. Even though the possibility of a medical emergency in a dental setting is unlikely, it is not insignificant and cannot be ignored because it can be life-threatening emergency or even prove fatal. Most of the emergencies can be handled with basic life support, however, some others may also require specialized pharmacological therapy. Aim of this paper is to review all the medical emergencies that can be encountered in dental settings, how to deal with them and basic equipment and medications which should be available in a dental clinic. This paper also highlights the significance of medical history and how we can prevent them to occur.

INTRODUCTION

A Medical emergency is a sudden threat to a person's life and requires immediate attention. A medical emergency can happen at any time and any place, including a dental setting. Dentistry includes various invasive and non-invasive procedures. The invasive procedures are done under anesthesia which is mostly via local injections. However, depending on the case specific procedures can be done under general anesthesia as well as conscious sedation. Invasive procedures include periodontal flap surgeries, gingivectomy, extractions, implants, various oral and maxillofacial surgeries. The anxiety and fear of a dental procedure, the ever-increasing lifestyle diseases, and the rising geriatric population add to the risk factors that are likely to predispose a dental practitioner to encounter a medical emergency.¹

These situations need not be directly associated with dental treatment and could purely be a chance occurrence. Although the likelihood of a medical crisis in a dental setting is rare, it is not negligible, and one cannot disregard it as it can be potentially fatal.¹ It is critical to recognize a medical emergency at the earliest and should be done at the first hint of the symptoms.² In managing an emergency, not just a timed but a correct response can substantially alter a patient's morbidity and potential fatality.

Ensuring an issue does not arise is preferable to dealing with it afterwards. Thus a detailed history taking is of vital importance to prevent any medical emergency from arising. In an emergency, the ability to offer adequate basic life support and promptly access emergency medical services by a dental practitioner is cardinal.³

Preventing or treating inadequate oxygenation of vital organs like the brain and heart is crucial in handling medical emergencies. This is in line with the fundamentals of cardiopulmonary resuscitation, which the dentist must be proficient in.⁴

In all emergency cases, the fundamental principles of resuscitation should be followed, i.e.,

P- Position; C- Chest compression; A- Airway; B- Breathing

It is only after the basic life support that the drug therapy is taken into consideration.

A quick response, with sound knowledge to correctly

diagnose and manage any anticipated emergency condition along with being equipped with the essential drugs and equipment, will determine the success of saving the patient.³

Incidence

Medical emergencies that can arise in a dental practice, according to Greenwood et al., include the following: Vasovagal syncope (faint), Hyperventilation (panic attack), Acute asthma attack, Angina/Myocardial infarction, epileptic seizures, diabetic emergencies (hypoglycemia), Hypersensitivity reactions (allergies), choking and aspiration, adrenal insufficiency and cardiac arrest.⁵

A general dental practitioner is estimated to have a medical emergency on average once every two years. The most frequent emergency observed in dental practice is vasovagal syncope, followed by hypoglycaemia, asthma, and hypotension.⁶

According to a study, 4.8% of all general dental practitioners witnessed 22% of all syncope. For those with more expertise in their line of work, vasovagal syncope is less common.⁷

Surgeons followed by periodontists are more likely to face a medical emergency.⁷

Table-1 Risk Factors During Dental Treatment⁸

• Presence of comorbid conditions
• Increased dental surgical procedures
• Longer appointments
• Increased drug usage
• Increased geriatric patients

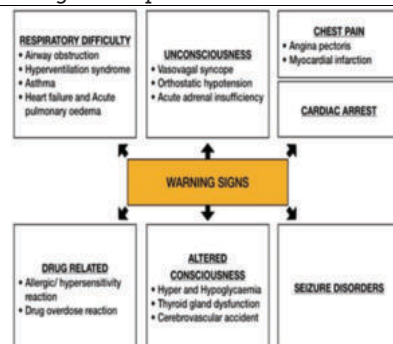


Figure 1: Warning Signs Of Different Medical

Emergencies⁸

PREVENTION

Prevention is the cornerstone of managing any medical emergency. However, unanticipated emergencies can result from choking and aspiration, fear of dental treatment, or unknown health conditions. However, a detailed history taking is of vital importance to foresee any medical emergency that may arise.⁹ Understanding the patient's medical status helps identify and understand what to anticipate and look for to encourage a quicker response. While documenting the medical history of a patient, it is necessary to seek answers to the following fundamental questions,¹⁰

1. Are you taking any medication?
2. Do you have any allergies?
3. Have you previously been admitted to the hospital?
4. Is there a history of bleeding?
5. Do you have shortness of breath?
6. Do you have/ had chest pain?

The questioning should focus on certain conditions such as diabetes mellitus, hypertension, or cardiovascular disorders such as angina, myocardial infarction, stroke, asthma or other respiratory disorders, epilepsy, hepatitis, or jaundice.¹¹

For a female patient, it is necessary to elicit information regarding pregnancy and lactational status. A positive response to any of these questions should be further investigated, and the dental treatment must be modified in accordance with the patient's medical history.

The visual examination of the patient comes next in the preventative process after documenting the medical history. An examination starts as soon as the patient walks into the clinic; this initial visualization encompasses the patient's built, gait, body posture, nourishment and orientation to time, place, and person. Speaking with the patient is another way to gauge their level of anxiety and mental health.

The mnemonic 'PICKLE' can be used for the general physical examination

Pallor, Icterus, Cyanosis, Clubbing, Koilonychia, Lymphadenopathy, and Edema.

- Pallor is the paleness of skin and the mucous membrane and indicates anaemia, frightened state, or presyncope.⁸
- Icterus, which is the yellowing of the skin and eyes, is a sign of jaundice and might reveal a prior or current hepatic disease.¹²
- Cyanosis results in excess of reduced haemoglobin which turns the nails, tongue, lips, and cheeks blue. It manifests in cardiac failure, chronic pulmonary disease, methemoglobinemia, or polycythemia.⁸
- Clubbing is the bulbous enlargement of soft parts of the terminal phalanges with both transverse and longitudinal carving of the nails. It frequently signals cardiopulmonary disease as well as various thyroid-related endocrine abnormalities.¹²
- Koilonychia is a concave nail dystrophy and is suggestive of chronic iron deficiency anaemia.¹²
- Lymphadenopathy is the inflammatory or non-inflammatory enlargement of the lymph nodes. It is associated with many causes which can be inflammatory (septic, tuberculosis, syphilis, HIV), Neoplastic (lymphosarcoma, carcinoma, sarcoma, malignant melanoma), haematological (Hodgkin's disease, non-Hodgkin's lymphoma, chronic lymphatic leukemia), Immunological (drug reaction, SLE, rheumatoid arthritis).¹²
- Edema is the collection of fluid in the interstitial spaces or serous cavities. It is often seen in patients with right ventricular failure, varicose veins, renal disease, and near-term pregnancy.⁸

Taking the patient's baseline vitals when doing an examination is a critical step that provides knowledge about the patient's general health. The treatment plan is modified in light of the vital signs, and in the event of an emergency, they can be compared to the vital signs in the emergency condition.

The risk assessment must also be made using the American Society of Anaesthesiologist (ASA) classification system.¹⁴



Figure 2: General Scheme Of Case Taking¹³

Table 2: American Society Of Anaesthesiologist (ASA) Classification For Risk Assessment¹⁴

RISK ASSESSMENT	
ASA 1	A normal healthy patient
ASA 2	A patient with mild systemic disease
ASA 3	A patient with severe systemic disease
ASA 4	A patient with severe systemic disease that is a constant threat to life
ASA 5	A moribund patient who is not expected to survive without the operation
ASA 6	A declared brain-dead patient whose organs are being removed for donor purposes

PREPARATION

Having an emergency preparedness plan is a vital factor after prevention in managing medical emergencies. Adequate preparedness includes the following specific actions,¹⁵

- 1) Continuing education in emergency recognition and management by the dentist to keep up to date.
- 2) Efficiently Trained auxiliary staff to assist in medical emergencies
- 3) Ensuring easy access to additional healthcare professionals who can help in an emergency.
- 4) Equipping the office with equipment and supplies needed to provide initial care for patients having severe problems.

To effectively save a patient's life in emergency, dental professionals and other auxiliary personnel must be efficiently trained in BLS.

Table-3 Chain Of Survival By American Heart Association¹⁶

KEY PRINCIPLES IN RESUSCITATION
INHCA - In Hospital Cardiac Arrest
<ul style="list-style-type: none"> • Early recognition and prevention • Emergency response system activation • Early and high-quality CPR focusing on chest compressions • Rapid defibrillation • Post-cardiac arrest care
OHCA - Out Of Hospital Cardiac Arrest

- Activation of emergency response
- High-quality CPR
- Rapid defibrillation
- Advanced resuscitation
- Post-cardiac arrest care

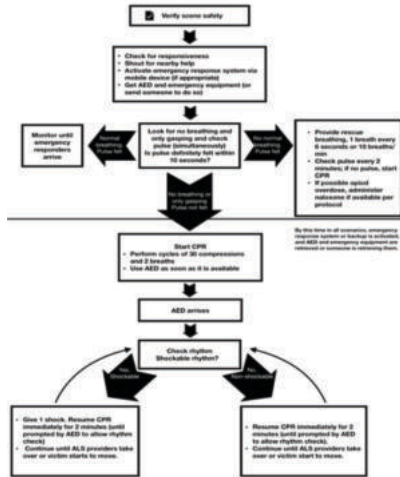


Figure 3: Adult BLS Algorithm For Healthcare Providers¹⁶

Table-4 Essential Emergency Drugs^{8,3}

DRUG	ACTION	INDICATION	CONTRAINDICATION	ADMINISTRATION	SUGGESTED FOR EMERGENCY KIT
Epinephrine	α- and β-adrenergic receptor agonist	Anaphylaxis (severe allergic reaction); Severe asthma (bronchospasm)	No C/I to epinephrine administration in anaphylaxis	I.M. or S.C. administration- 1:1000 concentration, 0.3mg (adults) and 1:2000 concentration, 0.15mg (pediatric); I.V. administration- 1:10,000 concentration	2 preloaded auto-injector syringes of epinephrine of both adult and pediatric dosages each
Diphenhydramine	Histamine blocker	Mild allergic reaction	No C/I to diphenhydramine administration in an allergic reaction	50 mg I.M, 25 to 50mg orally every three to four hours	Two 1 ml ampules (50mg/ml)
Oxygen	Arterial blood oxygenation	Hypoxemia	Hyperventilation	Dose as needed by the victim	1 E cylinder of oxygen
Nitroglycerine	Vasodilator	Angina (chest pain)	Signs and symptoms of low blood pressure (light-headedness, dizziness, systolic BP. <90 mm Hg)	One sublingual tablet every five minutes (maximum: three doses); One translingual spray every five minutes (maximum: three times)	1 bottle (25 tablets) of 0.4mg
Albuterol	Selective β ₂ - adrenergic receptor agonist	Mild asthma (bronchospasm)	No C/I to albuterol in acute episodes of bronchospasm	Two to three inhalations every one to two minutes, up to three times as per requirement	1 metered dose inhaler (Consider including a spacer)
Dextrose gel	Anti-hypoglycemic	Hypoglycemia (secondary to diabetes mellitus or fasting hypoglycemia)	Depressed consciousness or unconsciousness (liquid or gel to never be placed in the mouth of an unconscious person)	Ingestion of any of the available forms (instagluucose, orange juice, non-diet soft drink)	1 tube
Aspirin	Anti-platelet	Myocardial infarction	Patients with aspirin allergy or active gastrointestinal hemorrhage	One full-strength (325mg), non-enteric, coated aspirin tablet, chewed and swallowed	Chewable aspirin or powdered aspirin
Aromatic ammonia	Respiratory stimulant	Syncope	No C/I to aromatic ammonia in syncope	Inhalant crushed and held four to six inches under the nose	2 boxes of vaporoles

Secondary Emergency Drugs

The following injectable drugs are of secondary importance, and they fall under the category of secondary emergency drugs, which must only be administered by medical professionals who have received specialized training in their usage.

Table -5 Secondary Emergency Drugs⁸

ANALGESIC	Morphine sulphate
ANTICONVULSANT	Midazolam
ANTIHYPERTENSIVE	Esmolol
VASOPRESSOR	Ephedrine
ANTIHYPOGLYCEMIC	50% Dextrose
ANTICHOLINERGIC	Atropine
CORTICOSTEROID	Hydrocortisone sodium succinate

Emergency Drugs

Even though BLS is the most significant and the first step in managing all emergencies, certain drugs must be necessary to handle the medical crisis. The dental clinic has to keep its emergency drugs regularly stocked and newly replenished. One cannot afford to lose time attempting to locate the proper medication in an emergency; thus, it must be kept in an accessible location and be part of the emergency kit. The dentist must be fully knowledgeable about when, how, and which medications to deliver when needed.

Antidotal Drugs

Flumazenil, a benzodiazepine antagonist, must be included in the emergency kit if the doctors are using benzodiazepines to produce moderate to profound sedation or for general anaesthesia. Similarly, it is crucial to have Naloxone, table-side while using opioids to induce analgesia. These drugs can potentiate respiratory depression, which can only be reversed by their antagonists.^{8,9}

Emergency Equipment

The mere availability of emergency equipment cannot determine the success of managing a medical emergency. As long as the dental professional and the auxiliary staff are not adequately trained to use the emergency equipment, it is rendered useless.

Table-6 Emergency Equipment^{8,9}

EQUIPMENT	INDICATION & USE	SUGGESTED FOR EMERGENCY KIT
OXYGEN DELIVERY SYSTEM	Positive pressure ventilation assures 100% oxygen delivery to the patient but is not used due to the increased risk of overventilation. Bag-valve-mask device ventilation is the most preferred choice of ventilation in which the rescuer must squeeze the bag and ventilate the person with one hand while maintaining an airtight seal and a patent airway with the other. The Pocket mask enables mouth-to-mask ventilation to the apneic patient and is conveniently sized to be carried along at all times.	<ul style="list-style-type: none"> One portable oxygen cylinder (E cylinder) Oxygen delivery system with bag-valve-mask device- Minimum: 1 large adult, 1 child Pocket mask- 1 per employee
AUTOMATED EXTERNAL DEFIBRILLATOR	Rapid defibrillation has been declared a vital part of the BLS chain of survival by the American Heart Association (AHA). ¹⁶ The likelihood of a successful resuscitation increases with a shorter delay between the patient's collapse and defibrillation.	<ul style="list-style-type: none"> 1 AED
MONITORING EQUIPMENT	Required for primary assessment.	<ul style="list-style-type: none"> 1 Stethoscope 1 sphygmomanometer with adult-large, adult-medium, child size cuffs

PULSE OXIMETER	Used in states of hypoxemia and helps evaluate the hemodynamic status of the victim. ¹⁷ Usually placed on the fingertip to measure oxygen saturation levels of the arterial blood as well as the pulse rate. Capable of quickly detecting even minute variations in oxygen levels.	<ul style="list-style-type: none"> 1 fingertip pulse oximeter for routine dental office use 1 vital signs monitor for dental offices utilizing moderate or deep sedation or general anesthesia
TOURNIQUETS	Necessary for intravenous drug administration. However, a sphygmomanometer cuff can also be used.	<ul style="list-style-type: none"> 3 tourniquets and 1 sphygmomanometer
SYRINGES	Necessary for parenteral administrations of drugs.	<ul style="list-style-type: none"> Two to four 2ml or 3ml disposable syringes with 18- or 21-gauge needles
SUCTION AND ASPIRATING APPARATUS	A high-volume suction system and large bore suction tips are utilized to remove different aspirated objects from the patient's mouth.	<ul style="list-style-type: none"> 2 plastic evacuators or tonsillar suction tips A non-electric suction device should be considered
MAGILL INTUBATION FORCEPS	Used for assisting nasotracheal intubation and removing foreign bodies. ¹⁸ It is capable of removing numerous dental items (crowns, files) that may become ingested or aspirated during a dental procedure.	<ul style="list-style-type: none"> 1 pediatric-size Magill intubation forceps
WALL CLOCK WITH A SECOND HAND	Used to measure heart rate and document various events and pharmacological interventions.	<ul style="list-style-type: none"> 1 wall clock with a second hand

Secondary Emergency Equipment*

The following equipment can only be added to the emergency kit if the doctors and staff are proficiently trained in handling them. For correct insertion and use of these devices, sufficient hands-on training and expertise are required.

OROPHARYNGEAL AND NASOPHARYNGEAL AIRWAYS	Come in different sizes and are employed in unconscious patients with airway soft tissue blockage.	<ul style="list-style-type: none"> 1 set of oropharyngeal and nasopharyngeal airways each (adult and pediatric-sized)
LARYNGOSCOPE AND ENDOTRACHEAL TUBES	Used for endotracheal intubation.	<ul style="list-style-type: none"> 1 laryngoscope 1 set of spare batteries Endotracheal tubes (Adult and pediatric-sized)

LARYNGEAL MASK AIRWAY	A supraglottic device and is popularly gaining use in airway rescue.	<ul style="list-style-type: none"> • 1 set of laryngeal mask airway (adult and pediatric-sized)
CRICOTHYROTOMY KIT	Used to make an opening in the trachea when previous methods of securing a patent airway have failed.	<ul style="list-style-type: none"> • 1 scalpel with a disposable blade • 1 cricothyrotomy device



Figure 4: Bag-valve-mask Device
Sources: www.googleimages.com/bagvalvemaskdevice



Figure 5: Automated External Defibrillator
Sources: www.googleimages.com/automatedexternaldefibrillator



Figure 6: Magill Intubation Forceps
Sources: www.googleimages.com/magillintubationforceps



Figure 7: Oropharyngeal Airway
Sources: www.googleimages.com/oropharyngealairway

CONCLUSION

Medical emergencies are quite prevalent in dental practice. The best method of care is prevention, which is accomplished by a comprehensive medical history and physical examination. To respond efficiently to such stressful situations, dental practitioners and the auxiliary staff must be well-trained and well-equipped with emergency drugs and equipment.

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