Prevention and Management of Medical Emergencies

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• Serious medical emergencies in the dental office are, fortunately, rare

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• The primary reason for the limited frequency of emergencies in dental practice is the nature of dental education that prepares practitioners to recognize potential problems and manage them before they cause an emergency
However, when some dental/surgical procedures are necessary, the increased mental and physiological stress associated with such interventions can push the patient with a poorly-compensated medical condition into an emergency situation.

Similarly, the advanced forms of pain and anxiety control frequently needed for dental/surgical procedures can predispose patients to emergency conditions.
Prevention

• An understanding of the relative frequency of emergencies and knowledge of those likely to produce serious morbidity and mortality is important when the dentist sets priorities for preventive measures.

Prevention

• Malamed's study of patients in the dental school setting revealed that
  – Hyperventilation
  – Seizures
  – Hypoglycemia
were the three most common emergency situations occurring in patients before, during, or soon after general dental care.

Prevention

• These were followed in frequency by:
  – vasovagal syncope
  – angina pectoris
  – orthostatic hypotension
  – hypersensitivity (allergic) reactions.
Is Surgery the Culprit?

• The incidence of medical emergencies is higher in patients receiving ambulatory oral surgery compared with those receiving nonsurgical care because of the following three factors:
  – (1) surgery is more often stress provoking
  – (2) a greater number of medications are typically administered to perioperative patients
  – (3) often longer appointments are necessary when performing surgery

Other Factors

• Other factors that increase the potential for emergencies are:
  – age of the patient (very young and old patients being at greater risk)
  – the ability of the medical profession to keep relatively sick patients ambulatory and able to seek dental care
  – the increasing variety of drugs dentists administer in their offices

Prevention is Key

• Prevention is the cornerstone of management of medical emergencies
**Risk Assessment**

- The first step is risk assessment
- Begins with a careful medical evaluation that, in the dental office, requires accurately taking a medical history, including a review of systems guided by pertinent positive responses in the patient's history

**Vitals and Physical Exam**

- Vital signs should be recorded, and a physical examination (tailored to the patient’s medical history and present problems) should be performed

**Predisposing Medical Conditions**

- Although any patient can have a medical emergency at any time, certain medical conditions predispose patients to medical emergencies in the dental office
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**Predisposing Medical Conditions**

- These conditions are more likely to turn into an emergency when the patient is physiologically or emotionally stressed.

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**Conditions Affected by Anxiety**

- The most common conditions affected or precipitated by anxiety are:
  - Angina pectoris
  - Thyroid storm
  - Myocardial infarction
  - Insulin shock
  - Asthmatic bronchospasm
  - Hyperventilation
  - Adrenal insufficiency
  - Epilepsy
  - Severe hypertension

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**Modify Your Plan**

- Once those patients who are likely to have medical emergencies are recognized, the practitioner can prevent most problems from occurring by modifying the manner in which dental/surgical care is delivered.

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Preparedness

- Preparedness is the second most important factor (after prevention) in the management of medical emergencies

Preparedness

- Preparation for emergencies includes 4 actions:
  - (1) ensure that your education about emergency management is adequate and up to date
  - (2) have the auxiliary staff trained to assist in medical emergencies
  - (3) establish a system to gain ready access to other health care providers able to assist during emergencies
  - (4) equip the office with equipment and supplies necessary for emergency care
Continuing Education

• An important feature of continuing education should be to maintain certification in basic life support (BLS), including the use of automated external defibrillator units

Continuing Education

• Dentists who deliver parenteral sedatives other than nitrous oxide are wise to become certified in advanced cardiac life support and to have the drugs and equipment necessary for advanced cardiac life support available

Basic Life Support

• ABCs
  – A—Airway
  – B—Breathing
  – C—Circulation
Basic Life Support

• AIRWAY OBTAINED AND MAINTAINED BY COMBINATION OF THE FOLLOWING:
  – 1. Extending head at the neck by pushing upward on the chin with one hand and pushing the forehead back with other hand
  – 2. Pushing mandible forward by pressure on the mandibular angles
  – 3. Pulling mandible forward by pulling on anterior mandible
  – 4. Pulling tongue forward, using suture material or instrument to grasp anterior part of tongue

Basic Life Support

• BREATHING PROVIDED BY ONE OF THE FOLLOWING:
  – 1. Mouth-to-mouth or mouth-to-mask ventilation
  – 2. Resuscitation bag ventilation

Basic Life Support

• CIRCULATION PROVIDED BY EXTERNAL CARDIAC COMPRESSIONS
Office Staff Training

- The dentist must ensure that all office personnel are trained to assist in the recognition and management of emergencies.

Office Staff Training

- This should include reinforcement by regular emergency drills in the office and by annual BLS skills renewal.

Office Staff Training

- The office staff should be pre-assigned specific responsibilities so that in the event of a problem, each person knows what will be expected of them during an emergency.
Access to Help

- The ease of access to other health care providers varies from office to office.

Access to Help

- Seeking out individuals with training that would make them useful during a medical emergency is helpful.

Access to Help

- If the dental practice is located near other professional offices, prior arrangements should be made to obtain assistance in the event of an emergency.
Access to Help

- Not all physicians are well versed in the management of emergencies, and dentists must be selective in the physicians they contact for help during an emergency.

- Oral and maxillofacial surgeons are a good resource, as are most general surgeons, internists, and anesthesiologists.

- Ambulances carrying emergency medical technicians are useful to the dentist facing an emergency situation, and most communities provide easy telephone access (911) to a rapid-response emergency medical technician team.
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Access to Help

• Finally, it is important to identify a nearby hospital or freestanding emergency care facility with well-trained emergency care experts

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Access to Help

• Once the dentist has established who can be of assistance in the event of an emergency, the appropriate telephone numbers should be kept readily available

• The numbers should be called periodically to test their accuracy

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Emergency Supplies and Equipment

• The final means of preparing for emergencies is by ensuring that appropriate emergency drugs, supplies, and equipment are available in the office
Emergency Supplies and Equipment

• One basic piece of equipment is the dental chair that should be capable of allowing the patient to be placed in a flat position or, even better, in a head-down, feet-raised position.

• In addition, the chair must be capable of being lowered close to the floor to allow BLS to be performed properly, or standing stools should be kept in the office.

• Operatories should be large enough to allow a patient to be placed on the floor for BLS performance and should provide enough room for the dentist and others to deliver emergency care.
Emergency Supplies and Equipment

• If the operatory is too small to allow the patient to be placed on the floor, specially designed boards are available that can be placed under the patient’s thorax to allow effective BLS administration in the dental chair.

Emergency Supplies and Equipment

• Frequently, equipment used for respiratory assistance and the administration of injectable drugs is needed during office emergencies.

Emergency Supplies and Equipment

• Equipment for respiratory assistance includes oral and nasal airways, tonsil suction tips, connector tubing that allows the use of high-volume suction, and resuscitation bags (e.g., air mask bag unit [AMBU bags]) with clear face masks.
Emergency Supplies and Equipment

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- Tonsil-type suction tip is useful for rapidly clearing large volumes of fluids out of the mouth and pharynx.

- Resuscitation (air mask bag unit [AMBU]) bag with clear face mask is properly positioned over the patient’s nose and mouth. The doctor can hold the mask in place while an assistant squeezes the bag. Oxygen-enriched air is provided by connecting the AMBU bag unit to an oxygen source at the other end of the bag.

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- Oral and nasal airways, and even laryngoscopes and endotracheal tubes for trachea intubation may be helpful for dentists trained in their proper use, or for others called into the office to assist during an emergency.

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- Establishment and maintenance of intravenous access:
  - NEED:
    - Plastic indwelling catheter
    - Intravenous tubing with flow valve
    - Tourniquet
    - 1-inch wide plastic tape
    - Crystalloid solution (normal saline, 5% dextrose in water)
Emergency Supplies and Equipment

• High-volume suction
  – NEED:
    • Large-diameter suction tip
    • Tonsillar suction tip
    • Extension tubing
    • Connectors to adapt tubing to office suction

• Drug administration
  – NEED:
    • Plastic syringes (5 and 10mL)
    • Needles (18 and 21 gauge)

• Oxygen administration
  – NEED:
    • Clear face mask
    • Resuscitation bag (air mask bag unit)
    • Extension oxygen tubing (with and without nasal catheters)
    • Oxygen cylinder with flow valve
    • Oral and nasal airways
    • Endotracheal tube
    • Demand valve oxygen mask
Emergency Supplies and Equipment

• Although emergency kits containing a variety of drugs are commercially available, dentists may prefer to assemble their own kits.

Emergency Supplies and Equipment

• This allows properly educated dentists to choose only those agents they feel are likely to be most useful during an emergency.

Emergency Supplies and Equipment

• The drugs and any equipment in the kit must be well labeled and checked frequently for completeness and to ensure that no drugs have passed the expiration date.
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**Emergency Supplies and Equipment**

- Labeling can include not only the drug name but also situations in which the drug is most commonly used

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**Emergency Drugs for the Dental Office**

- **General Drug Group**
- **Common Examples**

  - **PARENTERAL PREPARATIONS**
    - Analgesic: Morphine sulfate
    - Anticonvulsant: Diazepam, midazolam
    - Antihistamine: Diphenhydramine (Benadryl)
    - Antihypoglycemic: 50% dextrose in water, glucagon
    - Corticosteroid: Methylprednisone (Solu-Medrol), dexamethasone (Decadron), hydrocortisone (Solu-Cortef)
    - Narcotic antagonist: Naloxone (Narcan)
    - Sympathomimetic: Epinephrine
    - Vagolytic: Atropine

  - **ORAL PREPARATIONS**
    - Antihistamine: Diphenhydramine (Benadryl)
    - Antihypoglycemic: Candy, fruit juice, sugar
    - Vasodilator: Nitroglycerine (Nitrostat)

  - **INHALED PREPARATIONS**
    - Bronchodilator: Metaproterenol (Alupent), epinephrine (Medihaler-Epi)
    - Oxygen
    - Respiratory stimulant: Aromatic ammonia

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**Emergency Drugs for the Dental Office**

- One emergency item that must be available in dental offices is oxygen
- Many dentists use oxygen supplied in a portable tank
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Emergency Drugs for the Dental Office

- If properly trained or assisted by a properly trained individual, the dentist needs to provide a means of delivering the oxygen under positive pressure to the patient.

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Emergency Drugs for the Dental Office

- Establishing a system to check periodically that a sufficient supply of oxygen is always available is important.

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Emergency Drugs for the Dental Office

- Dentists who use a central oxygen system also need to have oxygen available that is portable for use outside of the operatory, such as in the waiting room or during transport to an emergency facility.
Hypersensitivity Reactions

• Several of the drugs administered to patients undergoing dental procedures/oral surgery can act as antigenic stimuli, provoking allergic reactions.

Hypersensitivity Reactions

• Of the four basic types of hypersensitivity reactions, only type I (immediate hypersensitivity) can cause an acute, life-threatening condition.
Hypersensitivity Reactions

• Type I allergic reactions are mediated primarily by immunoglobulin E antibodies

Hypersensitivity Reactions

• As with all allergies, initiation of a type I response requires exposure to an antigen previously seen by the immune system

Hypersensitivity Reactions

• The re-exposure to the antigen triggers a cascade of events that then are exhibited locally, systemically, or both in varying degrees of severity
Hypersensitivity Reactions

- The least severe manifestation of type I hypersensitivity is dermatologic.

- Skin or mucosal reactions include:
  - localized areas of pruritus
  - erythema
  - urticaria (wheals consisting of slightly elevated areas of epithelial tissue that are erythematous and indurated)
  - angioedema (large areas of swollen tissue generally with little erythema or induration)

- Although skin and mucosal reactions are not in themselves dangerous, they may be the first indication of more serious allergic manifestations that will soon follow.
Hypersensitivity Reactions

- Skin lesions usually take anywhere from minutes to hours to appear; however, those appearing and progressing rapidly after administration of an antigenic drug are the most foreboding.

Manifestations and Management of Hypersensitivity (Allergic) Reactions

**skin signs**
- Delayed-onset skin signs: erythema, urticaria, pruritus, angioedema

**management**
- Stop administration of all drugs presently in use
- Administer IV or IM Benadryl 50 mg
- Refer to physician/E.R.
- Prescribe oral antihistamine, such as Benadryl 50 mg q6h

**respiratory tract signs with or without cardiovascular or skin signs**
- Wheezing, mild dyspnea

**management**
- Stop administration of all drugs presently in use
- Place patient in sitting position
- Administer epinephrine
- Provide IV access
- Consult patient’s physician or emergency department physician
- Observe in office for at least 1 hour
- Prescribe antihistamine
Manifestations and Management of Hypersensitivity (Allergic) Reactions

- RESPIRATORY TRACT SIGNS WITH OR WITHOUT CARDIOVASCULAR OR SKIN SIGNS
  - Stridorous breathing (i.e., crowing sound), moderate to severe dyspnea

Management:
- Stop administration of all drugs presently in use
- Sit the patient upright, and have someone summon medical assistance
- Administer epinephrine
- Give oxygen (6 L/min) by face mask or nasally
- Monitor vital signs frequently
- Administer antihistamine
- Provide IV access; if signs worsen, treat as for anaphylaxis
- Consult patient’s MD or E.R. physician; prepare for transport to E.R. if signs do not improve rapidly

- RESPIRATORY TRACT SIGNS WITH OR WITHOUT CARDIOVASCULAR OR SKIN SIGNS
  - Anaphylaxis (with or without skin signs): malaise, wheezing, stridor, cyanosis, total airway obstruction, nausea and vomiting, abdominal cramps, urinary incontinence, tachycardia, hypotension, cardiac dysrhythmias, cardiac arrest

  – (Treatment next slide)

- MANAGEMENT OF ANAPHYLAXIS:
  - Stop administration of all drugs
  - Position patient supine on back board or on floor and have someone summon assistance
  - Administer epinephrine
  - Initiate basic life support and monitor vital signs
  - Consider cricothyrotomy if trained to perform and if laryngospasm is not quickly relieved with epinephrine
  - Provide IV access
  - Give oxygen at 6 L/min
  - Administer antihistamine IV or IM
  - Prepare for transport
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**Manifestations and Management of Hypersensitivity (Allergic) Reactions**

- Allergic reactions affecting the respiratory tract are more serious and require more aggressive intervention.

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**Manifestations and Management of Hypersensitivity (Allergic) Reactions**

- The involvement of small airways occurs with wheezing, as constriction of bronchial smooth muscle (bronchospasm) and airway mucosal inflammation occurs.

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**Manifestations and Management of Hypersensitivity (Allergic) Reactions**

- The patient will complain of dyspnea and may eventually become cyanotic.
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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- Involvement of the larger airways usually first occurs at the narrowest portion of those air passages—the vocal cords in the larynx

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- Angioedema of the vocal cords causes partial or total airway obstruction

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- The patient is usually unable to speak and produces high-pitched crowing sounds (stridor) as air passes through constricted cords
As the edema worsens, total airway obstruction eventually occurs, which is an immediate threat to life.

Generalized anaphylaxis is the most dramatic hypersensitivity reaction, usually occurring within seconds or minutes after the parenteral administration of the antigenic medication; a more delayed onset occurs after oral or topical drug administration.

A variety of signs and symptoms of anaphylaxis exist, but the most important with respect to early management are those resulting from cardiovascular and respiratory tract disturbances.
An anaphylactic reaction typically begins with a patient complaining of malaise or a feeling of impending doom.

Skin manifestations soon appear, including flushing, urticaria, and pruritus on the face and trunk.

Nausea and vomiting, abdominal cramping, and urinary incontinence may occur.
Symptoms of respiratory embarrassment soon follow, with dyspnea and wheezing.

Cyanosis of nail beds and mucosa appear next if air exchange becomes insufficient.

Finally, total airway obstruction occurs, which causes the patient quickly to become unconscious.
Manifestations and Management of Hypersensitivity (Allergic) Reactions

• Disordered cardiovascular function initially occurs with tachycardia and palpitations

• Blood pressure tends to fall because of falling cardiac output and peripheral vasodilation, and cardiac dysrhythmias appear

• Cardiac output eventually may be compromised to a degree sufficient to cause loss of consciousness and cardiac arrest
Despite the potentially severe cardiovascular disturbances, the usual cause of death in patients having an anaphylactic reaction is laryngeal obstruction caused by vocal cord edema.

As with any potential emergency condition, prevention is the best strategy.

During the initial interview and subsequent recall visits, patients should be questioned about drugs to which they have a history of allergy.
• In addition, dentists should ask patients specifically about medications they intend to use during the planned oral surgical care.

• If a patient claims to have an allergy to a particular drug, the clinician should question the patient further concerning the way in which the allergic reaction has exhibited and what was necessary to manage the problem.

• Many patients will claim an allergy to local anesthetics. However, before subjecting patients to alternative forms of anesthesia, try to ensure that an allergy to the local anesthetic does indeed exist, because many patients have been told they had an allergic reaction when in fact they experienced a vasovagal hypotensive episode or mild palpitations.
Manifestations and Management of Hypersensitivity (Allergic) Reactions

- If an allergy is truly in question, the patient may require referral to a physician who can perform hypersensitivity testing.

- After it is determined that a patient does have a drug allergy, the information should be displayed prominently on the patient’s record in a way to alert care providers but still protect patient confidentiality.

- Management of allergic reactions depends on the severity of the signs and symptoms.
Manifestations and Management of Hypersensitivity (Allergic) Reactions

- The initial response to any sign of untoward reaction to a drug being given parenterally should be to cease its administration.

- If the allergic reaction is confined to the skin or mucosa, an antihistamine should be administered either IV or intramuscularly (IM).

- Diphenhydramine hydrochloride 50 mg is a commonly chosen antihistamine.
Manifestations and Management of Hypersensitivity (Allergic) Reactions

- The antihistamine is then continued in an oral form (diphenhydramine [Benadryl] 50 mg) every 6 to 8 hours for 24 hours.

Immediate, severe urticarial reactions warrant immediate parenteral (subcutaneous [SC] or IM) administration of 0.3 mL of a 1:1000 epinephrine solution, followed by an antihistamine.

The patient’s vital signs should be monitored frequently for 1 hour; if stable, the patient should be referred to a physician or an emergency care facility for further follow-up.
If a patient begins to show signs of lower respiratory tract involvement (i.e., wheezing during an allergic reaction), several actions should be initiated.

Outside emergency assistance should be summoned.

The patient should be placed in a semi-reclined position, and oxygen administration should be begun.
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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- Epinephrine should be administered by parenteral injection of 0.3 mL of a 1:1000 solution or with an aerosol inhaler (e.g., Medihaler-Epi, each inhalation of which delivers 0.3 mg).

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- Epinephrine is short acting; if symptoms recur or continue, the dose can be repeated within 5 minutes.

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

- Antihistamines such as diphenhydramine are then given.
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Manifestations and Management of Hypersensitivity (Allergic) Reactions

• The patient should be transferred to the nearest emergency facility to allow further management as necessary.

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

• If a patient shows signs of laryngeal obstruction (i.e., stridor), epinephrine (0.3 mL of 1:1000 solution) should be given as quickly as possible and oxygen should be administered.

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Manifestations and Management of Hypersensitivity (Allergic) Reactions

• If a patient loses consciousness and attempts made to ventilate the patient’s lungs fail, an emergency cricothyrotomy or tracheotomy may be required to bypass the laryngeal obstruction.
Once an airway is reestablished, an antihistamine and further doses of epinephrine should be given.

Vital signs should be monitored, and steps necessary to maintain the patient should be taken until emergency assistance is available.

Patients who show signs of cardiovascular system compromise should be closely monitored for the appearance of hypotension, which may necessitate initiation of BLS if cardiac output falls below the level necessary to maintain viability or if cardiac arrest occurs.
Chest Discomfort

The appearance of chest discomfort in the perioperative period in a patient who may have ischemic heart disease calls for rapid identification of the cause so that appropriate measures can be taken.

Clinical Characteristics of Chest Pain Caused by Myocardial Ischemia or Infarction

- **DISCOMFORT (PAIN) AS DESCRIBED BY PATIENTS**
  - 1. Squeezing, burning, pressing, burning, dueling, or crushing (not typically sharp or stabbing)
  - 2. Substernally located, with variable radiation to left shoulder, arm, or left side (or a combination of these areas or rest and relieved)
  - 3. Frequently associated at the onset with exertion, heavy meal, anxiety, or upon assuming horizontal posture
  - 4. Relieved by vasodilators, such as nitroglycerin, or rest (in the case of angina)
  - 5. Accompanied by dyspnea, nausea, weakness, palpitations, perspiration, or a feeling of impending doom (or a combination of these symptoms)
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**Chest Discomfort**

- Discomfort from cardiac ischemia is frequently described as a squeezing sensation, with a feeling of heaviness on the chest

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**Differential Diagnosis of Acute-Onset Chest Pain**

**COMMON CAUSES**

- **Cardiovascular system**: Angina pectoris, myocardial infarction
- **Gastrointestinal tract**: Dyspepsia (i.e., heartburn), hiatal hernia, reflux esophagitis, gastric ulcers
- **Musculoskeletal system**: Intercostal muscle spasm, rib or chest muscle contusions
- **Psychological**: Hyperventilation

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**Differential Diagnosis of Acute-Onset Chest Pain**

**UNCOMMON CAUSES**

- **Cardiovascular system**: Pericarditis, dissecting aortic aneurysm
- **Respiratory system**: Pulmonary embolism, pleuritis, tracheobronchitis, mediastinitis, pneumothorax
- **Gastrointestinal tract**: Esophageal rupture, achalasia
- **Musculoskeletal system**: Osteochondritis, chondroosteitis
- **Psychological**: Psychogenic chest pain (i.e., imagined chest pain)
Chest Discomfort

- Discomfort usually begins in a retrosternal location, radiating to the left shoulder and arm.

Chest Discomfort

- Patients with documented heart disease who have had such discomfort in the past will usually be able to confirm that the discomfort is from the heart.

Chest Discomfort

- For patients who are unable to remember such a sensation in the past or who have been assured by their physician that such discomfort does not represent heart disease, further information is useful before assuming a cardiac origin of the symptom.
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**Chest Discomfort**

- The patient should be asked to describe the exact location of the discomfort and any radiation, how the discomfort is changing with time, and if postural position affects the discomfort.

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**Chest Discomfort**

- Pain resulting from gastric reflux into the esophagus because of chair position should improve when the patient sits up and is given an antacid.

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**Chest Discomfort**

- Discomfort caused by costochondritis or pulmonary conditions should vary with respirations or be stimulated by manual pressure on the thorax.
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Chest Discomfort
- The only other common condition that can occur with chest discomfort is anxiety, which may be difficult to differentiate from cardiogenic problems without the use of monitoring devices not commonly present in the dental office.

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Chest Discomfort
- If chest discomfort is suspected to be caused by myocardial ischemia or if that possibility cannot be ruled out, measures should be instituted that decrease myocardial work and increase myocardial oxygen supply.

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Chest Discomfort
- All dental care must be stopped, even if the procedure is only partially finished.
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**Chest Discomfort**

- The patient should be reassured that everything is under control while vital signs are being obtained, oxygen administration is started, and nitroglycerin is administered sublingually or by oral spray.

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**Chest Discomfort**

- **Management:**
  - The nitroglycerin dose should be 0.4 mg dissolved sublingually and repeated (if necessary) every 5 minutes as long as systolic blood pressure is at least 90 mm Hg, up to a maximum of three doses.

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**Chest Discomfort**

- If vital signs remain normal, the chest discomfort is relieved, and the amount of nitroglycerin that was required to relieve the discomfort was not more than normally necessary for that patient, the patient should be discharged with plans for future procedures to be done in a hospital setting after conferring with the patient’s physician.
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**Chest Discomfort**

- Some circumstances do require transport to an emergency facility

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**Chest Discomfort**

- If the pulse is irregular, rapid, or weak, or the blood pressure is found to be below baseline, outside emergency help should be summoned while the patient is placed in an almost supine position and oxygen and nitroglycerin therapy are started.
Chest Discomfort

- Venous access should be initiated and a slow 5% dextrose in water drip should be begun, if possible, for use by emergency personnel.

- Another serious situation requiring transfer to a hospital is a case in which the patient’s discomfort is not relieved after 20 minutes of appropriate therapy.

- In this case it should be presumed that a myocardial infarction is in progress.
Chest Discomfort

• Such a patient is especially prone to the appearance of serious cardiac dysrhythmias or cardiac arrest; therefore, vital signs should be monitored frequently, and BLS should be instituted if indicated.

Chest Discomfort

• Morphine sulfate (4 to 6 mg) may be administered IM or SC to help relieve the discomfort and reduce anxiety.

Chest Discomfort

• Morphine also provides a beneficial effect for patients who are developing pulmonary edema.
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**Chest Discomfort**

- Transfer to a hospital should be expedited because thrombolytic agents and/or an angioplasty plus stenting procedure may be able to preserve some or all of the ischemic myocardium.

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**Respiratory Difficulty**

- Many patients are predisposed to respiratory problems in the dental setting.

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**Respiratory Difficulty**

- These patients include patients with:
  - asthma
  - chronic obstructive pulmonary disease (COPD)
  - extremely anxious patients
  - patients who are atopic (allergic)
  - those in whom a non-inhalation sedative technique using respiratory depressant drugs is to be used.
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Respiratory Difficulty

- Special precautions should be taken to help prevent the occurrence of emergencies
- If these patients are not treated promptly, the situation may become life-threatening

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Asthma

- Patients with a history of asthma can be a particular challenge to manage safely if emotional stress or many pharmacologic agents easily trigger their respiratory problems

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Asthma

- Most patients with asthma are aware of the symptoms that signal the onset of bronchospasm
Asthma

• Patients will complain of shortness of breath and want to sit erect

Asthma

• Wheezing is usually audible, tachypnea and tachycardia begin, and patients start using their accessory muscles of respiration

Asthma

• As bronchospasm progresses, patients may become hypoxic and cyanotic, with eventual loss of consciousness
Asthma

Management should start with placing patients in an erect or semierect position.

Patients should then administer bronchodilators, using their own inhalers or one provided from the office emergency supply.

The inhaler may contain epinephrine, isoproterenol, metaproterenol, or albuterol.
Asthma

- Repeated doses should be administered cautiously to avoid overdosing the patient

Asthma

- Oxygen administration should follow, using nasal prongs or a face mask

Asthma

- In more severe asthmatic episodes or when aerosol therapy is ineffective, epinephrine (0.3 mL of a 1:1000 dilution) may be injected SC or IM
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**Asthma**

- When patients have severe respiratory embarrassment, it may be necessary to obtain outside emergency medical assistance.
- Respiratory problems caused by drug allergy may be difficult to differentiate from those resulting from asthma.
- Management of the respiratory problems is the same in either case.

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Management of acute asthmatic episode occurring during dental surgery:

1. Notify all dental personnel.
2. Administer the inhaler.
3. Monitor signs and symptoms closely.
4. Administer oxygen.
5. Provide for suction and mouth care.

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**Hyperventilation**

- The most frequent cause of respiratory difficulty in the dental setting is anxiety that is expressed as hyperventilation, which is usually seen in patients in their teens, 20s, and 30s, and can frequently be prevented through anxiety control.

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Dentists should be attuned to the signs of patient apprehension and, through the health interview, should encourage patients to express their concerns.

Patients with extreme anxiety should be managed with an anxiety-reduction protocol. In addition, pharmacologic anxiolysis may be necessary.

The first manifestation of hyperventilation syndrome is frequently a complaint of an inability to get enough air.
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Hyperventilation
• The patient breathes rapidly (tachypnea) and becomes agitated

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Hyperventilation
• The rapid ventilation increases elimination of CO2 through the lungs

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Hyperventilation
• The patient soon becomes alkalotic; may complain of becoming light-headed and of having a tingling sensation in the fingers, toes, and perioral region; and may even develop muscle twitches or convulsions
Hyperventilation
• Eventually loss of consciousness occurs

Management of a hyperventilating patient involves:
– terminating the surgical procedure
– positioning the patient in a semi-erect position
– providing reassurance

If symptoms of alkalosis occur, the patient should be forced to breathe into and out of a small bag.
Hyperventilation
• Oxygen-enriched air is not indicated

Hyperventilation
• If hyperventilation continues, you may have to administer a sedative such as midazolam (Versed), by giving 2 to 4 mg IM or by IV titration of the drug until hyperventilation ceases or the patient is sedated

Hyperventilation
• Once hyperventilation stops, the patient should be rescheduled, with plans to use preoperative anxiolytics or intraoperative sedation (or both) in future visits
Chronic Obstructive Pulmonary Disease

- Patients with well-compensated COPD can have difficulty during oral surgery

- Many of these patients depend on maintaining an upright posture to breathe adequately

- In addition, they become accustomed to having high arterial CO2 levels and use a low level of blood oxygen as the primary stimulus to drive respirations
Chronic Obstructive Pulmonary Disease
• Many of these patients experience difficulty if placed in an almost supine position or given high-flow nasal oxygen

Chronic Obstructive Pulmonary Disease
• Patients with COPD often rely on their accessory muscles of respiration to breathe

Chronic Obstructive Pulmonary Disease
• Lying supine interferes with the use of these accessory muscles; therefore, patients will usually ask or struggle to sit up before problems resulting from positioning occur
Chronic Obstructive Pulmonary Disease

• Excessive lung secretions that are more difficult to clear when supine also accompany COPD

Chronic Obstructive Pulmonary Disease

• If excessive oxygen is administered to a patient susceptible to COPD, the respiratory rate will fall, which produces cyanosis, and apnea may eventually occur

Chronic Obstructive Pulmonary Disease

• The treatment for such a problem is to discontinue oxygen administration before the patient becomes apneic
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**Chronic Obstructive Pulmonary Disease**
- The respiratory rate should soon improve

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**Chronic Obstructive Pulmonary Disease**
- If apnea occurs and the patient loses consciousness, artificial ventilation must be initiated and emergency assistance summoned

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**Foreign-Body Aspiration**
- Aspiration of foreign bodies into the airway is always a potential problem during oral surgical and other dental procedures
Foreign-Body Aspiration
• This is especially true if the patient is positioned supine or semi-erect in the chair or is sufficiently sedated to dull the gag reflex

Foreign-Body Aspiration
• Objects that fall into the hypopharynx are frequently swallowed and usually pass harmlessly through the gastrointestinal tract

Foreign-Body Aspiration
• Even if the clinician feels confident that the material was swallowed, chest and abdominal radiographs should be obtained to eliminate the possibility of asymptomatic aspiration into the respiratory tract
Foreign-Body Aspiration

- Occasionally, the foreign object is aspirated into the larynx, where in the lightly sedated or non-sedated patient, violent coughing will ensue that may expel the aspirated material.

- The patient can usually still talk and breathe.

- However, larger objects that are aspirated may obstruct the airway and become lodged in such a manner that coughing is ineffective because the lungs cannot be filled with air before the attempted cough.
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**Foreign-Body Aspiration**
- In this situation the patient usually cannot produce any vocalizations and becomes extremely anxious.
- Cyanosis soon appears, followed by loss of consciousness.

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**Foreign-Body Aspiration**
- The manner in which aspirated foreign bodies are managed depends primarily on the degree of airway obstruction.

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**Foreign-Body Aspiration**
- Patients with an intact gag reflex and a partially obstructed airway should be allowed to attempt to expel the foreign body by coughing.
Foreign-Body Aspiration

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• If the material will not come up, the patient should be given supplemental oxygen and transported to an emergency facility to allow laryngoscopy or bronchoscopy to be performed.

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• The completely obstructed but awake patient should have abdominal thrusts or Heimlich maneuvers performed until successful expulsion of the object occurs or consciousness is lost.

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Abdominal thrusts for an unconscious patient

Chair is recumbent position

The heel of the right palm placed just below the xiphoid process and the left hand placed over the right to deliver force. Arms are quickly thrust into the patient's abdomen, directing force down and superiorly. Rescuer is behind the patient and positions hands on either side of the patient's chest. Rescuer's hands are quickly pulled into the abdominal area, attempting to have any residual air in the lungs dislodge the obstruction from the airway.
Foreign-Body Aspiration

• If a patient has a diminished gag reflex as a result of sedation or has a completely obstructed airway and loses consciousness, abdominal thrusts should be performed with the patient in a supine position.

• After each volley of thrusts, the patient should be quickly turned onto the side and the clinician should finger sweep the mouth to remove any object that may have been forced out.

• If the patient is not exchanging air, BLS should be started.
Foreign-Body Aspiration

- If air cannot be blown into the lungs, additional abdominal thrusts should be attempted, followed by oral finger sweeps and BLS.

- Dentists trained in laryngoscopy can look into the larynx and use Magill forceps to try to remove any foreign material.

- If several attempts to relieve the obstruction fail, an emergency cricothyrotomy may be necessary.
Gastric-Contents Aspiration

• Aspiration of gastric contents into the lower respiratory tract presents another situation that frequently leads to serious respiratory difficulties.

Gastric-Contents Aspiration

• The particulate matter in gastric contents causes physical obstruction of pulmonary airways, but it is usually the high acidity of gastric material that produces more serious problems.
Gastric-Contents Aspiration

• The low pH of gastric juice quickly necrotizes the pulmonary tissue it contacts, and a respiratory distress syndrome soon follows, with transudation of fluid into pulmonary alveoli and a loss of functioning lung tissue.

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Gastric-Contents Aspiration

• The patient with an intact gag reflex rarely aspirates gastric contents during vomiting.

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Gastric-Contents Aspiration

• Rather, it is the patient with a diminished gag reflex caused by sedation, unconsciousness, or topical anesthesia in the oropharynx who is at greatest risk for gastric aspiration.
Gastric-Contents Aspiration

• The sedated or unconscious patient who aspirates a significant amount of gastric material will first show signs of respiratory difficulty, such as tachypnea and wheezing

Gastric-Contents Aspiration

• Tachycardia and hypotension may soon occur, and as ventilatory capability worsens, cyanosis appears

Gastric-Contents Aspiration

• Eventually respiratory failure occurs that is refractory to BLS and requires intubation and the delivery of high concentrations of oxygen
Gastric Contents Aspiration

- Prevention of gastric aspiration involves instruction to patients to avoid eating or drinking for 8 hours before any oral surgery appointment during which they are to be moderately or deeply sedated.

- A deeply sedated or unconscious patient who begins to vomit should be immediately placed into a head-down, feet-raised position and turned onto the right side to encourage oral drainage of vomitus.

- High-volume suction should be used to assist removal of vomitus from the oral cavity.
Gastric Contents Aspiration

• If the clinician suspects that gastric material may have entered the lower respiratory tract, a call should be placed for emergency assistance.

Gastric Contents Aspiration

• The patient should be placed on supplemental oxygen and vital signs monitored.

Gastric Contents Aspiration

• If possible, the dentist should gain venous access (i.e., start an IV line) and be prepared to administer crystalloid solution (e.g., normal saline or 5% dextrose in water) to help treat a falling blood pressure and allow emergency technicians to administer IV bronchodilators if necessary.
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**Gastric-Contents Aspiration**

- Immediate transportation to an emergency facility is mandatory

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**Management of vomiting patient with possible aspiration of gastric contents**

1. Place patient in supine position.
2. Perform suction if necessary.
5. Administer oxygen if necessary.
6. Transport to emergency department.

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**Altered Consciousness**

- An alteration in a patient’s level of consciousness may result from a large variety of medical problems
Slide 226

Altered Consciousness
• The altered state can range from mild light-headedness to a complete loss of consciousness

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Altered Consciousness
• Without attempting to include all possible causes of altered consciousness, a discussion is presented of commonly occurring conditions that may lead to an acutely altered state of consciousness before or while patients are undergoing oral surgical procedures

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Vasovagal Syncope
• The most common cause of a transient loss of consciousness in the dental office is vasovagal syncope
**Vasovagal Syncope**

- This generally occurs because of a series of cardiovascular events triggered by emotional stress brought on by the anticipation of or delivery of dental care.

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**Vasovagal Syncope**

- The initial event in a vasovagal syncopal episode is the stress-induced increase in amounts of catecholamines that cause a decrease in peripheral vascular resistance, tachycardia, and sweating.

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**Vasovagal Syncope**

- The patient may complain of feeling generalized warmth, nausea, and palpitations.
Vasovagal Syncope

• As blood pools in the periphery, a drop in the arterial blood pressure appears, with a corresponding decrease in cerebral blood flow.

Vasovagal Syncope

• The patient may then complain of feeling dizzy or weak.

Vasovagal Syncope

• Compensatory mechanisms attempt to maintain adequate blood pressure, but they soon fade, leading to vagally mediated bradycardia.
Vasovagal Syncope

- Once the blood pressure drops below levels necessary to sustain consciousness, syncope occurs.

Vasovagal Syncope

- If cerebral ischemia is sufficiently slow to develop, the patient may first develop seizures.
Vasovagal Syncope

- The syncopal episode and any accompanying seizure usually end rapidly once the patient assumes or is placed in a horizontal position with the feet elevated.

Vasovagal Syncope

- Once consciousness is regained, the patient may have pallor, nausea, and weakness for several minutes.
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**Vasovagal Syncope**

- Prevention of vasovagal syncopal reactions involves proper patient preparation

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**Vasovagal Syncope**

- The extremely anxious patient should be treated by using an anxiety-reduction protocol and, if necessary, should be given anxiolytic drugs before treatment

Slide 243

**Vasovagal Syncope**

- Oral surgical care should be provided while the patient is in a semisupine or fully supine position
Vasovagal Syncope

- Any signs of an impending syncopal episode should be quickly treated by placing the patient in a fully supine position or a position in which the legs are elevated above the level of the heart and by placing a cool, moist towel on the forehead.

- If the patient is hypoventilating and is slow to recover consciousness, a respiratory stimulant such as aromatic ammonia may be useful.

- If the return of consciousness is delayed for more than a minute, an alternative cause for depressed consciousness other than vasovagal syncope should be sought.
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**Vasovagal Syncope**

- After early recovery from the syncopal episode, the patient should be allowed to recover in the office and then be discharged with an escort.

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**Vasovagal Syncope**

- Future office visits by the patient will require preoperative sedation, additional anxiety-reducing measures, or both.

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**Orthostatic Hypotension**

- Another common cause of a transient altered state of consciousness in the dental setting is orthostatic (or postural) hypotension.
Orthostatic Hypotension

- This problem occurs because of pooling of blood in the periphery that is not remobilized quickly enough to prevent cerebral ischemia when a patient rapidly assumes an upright posture.

The patient will therefore feel light-headed or become syncopal.

Patients with orthostatic hypotension who remain conscious will usually complain of palpitations and generalized weakness.
Orthostatic Hypotension

• Most individuals who are not hypovolemic or have orthostatic hypotension resulting from the pharmacologic effects of drugs, such as antihypertensive agents, will quickly recover by reassuming the reclined position.

Orthostatic Hypotension

• Once symptoms disappear, the patient can generally sit up (although this should be done slowly) and sit on the edge of the chair for a few moments before standing.

Orthostatic Hypotension

• Blood pressure can be taken in each position and allowed to return to normal before a more upright posture is assumed.
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Orthostatic Hypotension

• Some patients have a predisposition to orthostatic hypotension

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Orthostatic Hypotension

• In the ambulatory population, this is usually encountered in patients receiving the following medications: drugs that produce intravascular depletion, such as diuretics; drugs that produce peripheral vasodilation, such as most nondiuretic antihypertensives, narcotics, and many psychiatric drugs; and drugs that prevent the heart rate from increasing reflexively, such as β-sympathetic antagonist medications (e.g., propranolol)

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Orthostatic Hypotension

• Patients with a predisposition to postural hypotension can usually be managed by allowing a much longer period to attain a standing position (i.e., by stopping at several increments while becoming upright to allow reflex cardiovascular compensation to occur)
**Orthostatic Hypotension**

- If the patient was sedated by using long-acting narcotics, an antagonist such as naloxone may be necessary.

**Orthostatic Hypotension**

- Patients with severe problems with postural hypotension as a result of drug therapy should be referred to their physician for possible modification of their drug regimen.

**Management of Orthostatic Hypotension**

2. Position patient in supine posture, with legs raised above the level of the head.
3. Monitor vital signs.
4. Once blood pressure improves, slowly return patient to sitting posture.
5. Discharge patient to home once vital signs are normal and stable.
6. Obtain medical consultation before any further dental care.
Seizure

• Idiopathic seizure disorders are exhibited in many ways, ranging from grand mal seizures, with their frightening display of clonic contortions of the trunk and extremities, to petit mal seizures that may occur with only episodic absences (e.g., blank stare).

Seizure

• Although rare, some seizure disorders, such as those resulting from injury-induced brain damage or damage from ethanol abuse, have a known cause.

Seizure

• Usually the patient will have had the seizure disorder previously diagnosed and will be receiving antiseizure medications, such as phenytoin (Dilantin), phenobarbital, or valproic acid.
Seizure

• Therefore the dentist should discover through the medical interview the degree of seizure control present to decide whether oral surgery can be safely performed

Seizure

• The patient should be asked to describe what witnesses have said occurs just before, during, and after the patient’s seizures

Seizure

• Discovery of any factors that seem to precipitate the seizure, the patient’s compliance with antiseizure drugs, and the recent frequency of seizure episodes is helpful
Seizure

- Patients with seizure disorders who appear to have good control of their disease, that is, infrequent episodes that are brief and are not easily precipitated by anxiety, are usually able to undergo oral surgery safely in the ambulatory setting.

Seizure

- The occurrence of a seizure while a patient is undergoing care in the dental office is rarely an emergency that calls for actions other than simply protecting the patient from self-injury.

Seizure

- However, management of the patient during and after a seizure varies, based on the type of seizure that occurs.
**Seizure**

- The patient’s ability to exchange air must be monitored by close observation

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**Seizure**

- If it appears that the airway is obstructed, measures to reopen it must be taken, for example, by placing the head in moderate extension (chin pulled away from the chest) and moving the mandible away from the pharynx

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**Seizure**

- If the patient vomits or seems to be having problems keeping secretions out of the airway, the patient’s head must be positioned to the side to allow obstructing materials to drain out of the mouth
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Seizure

• If possible, high-volume suction should be used to evacuate materials from the pharynx.

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Seizure

• Brief periods of apnea may occur, which require no treatment other than ensuring a patent airway.

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Seizure

• However, apnea for more than 30 seconds demands that BLS techniques be initiated.
Seizure

• Although frequently described as being important, the placement of objects between the teeth in an attempt to prevent tongue biting is hazardous and therefore unwarranted.

Seizure

• Continuous or repeated seizures without periods of recovery between them are known as status epilepticus.

Seizure

• This problem warrants notification of outside emergency assistance because it is the most common type of seizure disorder to cause mortality.
Seizure

• Therapy includes instituting measures already described for self-limiting seizures; in addition, administration of a benzodiazepine is indicated.

Seizure

• Injectable water-insoluble benzodiazepines such as diazepam must be given IV to allow predictability of results, which may be difficult in the patient having seizures if venous access is not already available.

Seizure

• Injectable water-soluble benzodiazepines such as midazolam provide a better alternative, because IM injection will give a more rapid response.
Seizure

• However, the doctor administering benzodiazepines for a seizure must be prepared to provide BLS because patients may experience a period of apnea after receiving a large, rapid dose of benzodiazepines.

Seizure

• After seizures have ceased, most patients will be left either somnolent or unconscious.

Seizure

• Vital signs should be monitored carefully during this time, and the patient should not be allowed to leave the office until fully alert and in the company of an escort.
Seizure

- The patient’s primary care physician should be notified to decide whether medical evaluation is necessary and whether ambulatory dental care is advisable in the future.

Local Anesthetic Toxicity

- Toxicity reactions occur if the local anesthetic is given in an amount or in a manner that produces an excessive serum concentration.
Local Anesthetic Toxicity

- Prevention of a toxicity reaction to local anesthetics generally involves several factors.

- First, the dose to be used should be the least amount of local anesthetic necessary to produce the intensity and duration of pain control required to successfully complete the planned surgical procedure.

- The patient’s age, lean body mass, liver function, and history of problems with local anesthetics must be considered when choosing the dose of local anesthesia.
Local Anesthetic Toxicity

- The second factor to consider in preventing a local anesthetic overdose reaction is the manner of drug administration

- The dentist should give the required dose slowly, avoiding intravascular injection, and use vasoconstrictors to slow the entry of local anesthetics into the blood

- The choice of local anesthetic agents is the third important factor to consider in attempting to lessen the risk of a toxicity reaction
Local Anesthetic Toxicity

Local anesthetics vary in their lipid solubility, vasodilatory properties, protein binding, and inherent toxicity.

Therefore the dentist must be knowledgeable about the various local anesthetics available to make a rational decision when choosing which drug to administer and in what amounts.

Suggested Maximum Dose of Local Anesthetics

<table>
<thead>
<tr>
<th>DRUG</th>
<th>COMMON BRAND</th>
<th>CONCENTRATION</th>
<th>MAXIMUM DOSE (mg/kg)</th>
<th>MAXIMUM # OF 1.8mL CARTRIDGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine with epinephrine</td>
<td>Xylocaine</td>
<td>2% lidocaine 1:100,000 epi</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Mepivacaine</td>
<td>Carbocaine</td>
<td>3%</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Prilocaine</td>
<td>Citanest</td>
<td>4%</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Bupivacaine with epinephrine</td>
<td>Marcaine with epinephrine</td>
<td>0.5% bupivacaine 1:200,000 epi</td>
<td>1.5</td>
<td>10</td>
</tr>
</tbody>
</table>

Max doses are those for healthy individuals. Max dose of epinephrine is 0.2 mg per appointment.
Local Anesthetic Toxicity

• The clinical manifestations of a local anesthetic overdose vary depending on the severity of the overdose, how rapidly it occurs, and the duration of the excessive serum concentrations.

Local Anesthetic Toxicity

• Signs of a mild toxicity reaction may be limited to increased patient confusion, talkativeness, anxiety, and slurring of speech.

Local Anesthetic Toxicity

• As the severity of the overdose increases, the patient may display stuttering speech, nystagmus, and generalized tremors.
Local Anesthetic Toxicity

• Symptoms such as headache, dizziness, blurred vision, and drowsiness may also occur

Local Anesthetic Toxicity

• The most serious manifestations of local anesthetic toxicity are the appearance of generalized tonic-clonic seizures and cardiac depression leading to cardiac arrest

Local Anesthetic Toxicity

• Mild local anesthetic overdose reactions are managed by monitoring vital signs, instructing the patient to hyperventilate moderately with or without administering oxygen, and gaining venous access
Local Anesthetic Toxicity

- If signs of anesthetic toxicity do not rapidly disappear, a slow IV 2.5- to 5-mg dose of diazepam should be given.

Medical assistance should also be summoned if signs of toxicity do not rapidly resolve or progressively worsen.

If convulsions occur, patients should be protected from hurting themselves.
Local Anesthetic Toxicity

- Basic life support measures are instituted as needed, and venous access is gained, if possible, for administration of anticonvulsants.

Local Anesthetic Toxicity

- Medical assistance should be obtained.
- If venous access is available, diazepam should be slowly titrated until the seizures stop (5 to 25 mg is the usual effective range).

Diabetes Mellitus

- Diabetes mellitus is a metabolic disease in which the patient’s long-term prognosis appears to depend on keeping serum glucose levels close to normal.
Diabetes Mellitus

- An untreated insulin-dependent diabetic person constantly runs the risk of developing ketoacidosis and its attendant alteration of consciousness, requiring emergency treatment.

- Although a compliant insulin-taking diabetic person may suffer long-term problems because of relatively high serum glucose levels, the more common emergency situation the person encounters is hypoglycemia resulting from a mismatch of insulin dose and serum glucose.

- Severe hypoglycemia is the emergency situation dentists are most likely to face when providing oral surgery for a diabetic patient.
Diabetes Mellitus

- Serum glucose concentration in the diabetic patient represents a balance between administered insulin, glucose placed into the serum from various sources, and glucose use.

Diabetes Mellitus

- The two primary sources of glucose are dietary and gluconeogenesis from adipose tissue, muscle, and glycogen stores.

Diabetes Mellitus

- Physical activity is the principal means by which serum glucose is lowered.
Diabetes Mellitus
• Therefore, serum glucose levels can fall because of any or all of the following:
  – 1. Increasing administered insulin
  – 2. Decreasing dietary caloric intake
  – 3. Increasing metabolic use of glucose (e.g., exercise, infection, or emotional stress)

Diabetes Mellitus
• Problems with hypoglycemia during dental care usually arise because the patient has acutely decreased caloric intake, an infection, or an increased metabolic rate caused by considerable anxiety

Diabetes Mellitus
• If the patient has not compensated for this diminution of available glucose by decreasing the usual dose of insulin, hypoglycemia results
Diabetes Mellitus

• Although patients taking oral hypoglycemics can also have problems with hypoglycemia, their swings in serum glucose levels are usually less pronounced than those of insulin-dependent patients with diabetes, so they are much less likely to quickly become severely hypoglycemic.

Diabetes Mellitus

• Many patients with diabetes are well informed about their disease and are capable of diagnosing their own hypoglycemia before it becomes severe.

Diabetes Mellitus

• The patient may feel hunger, nausea, or light-headedness or may develop a headache.
Diabetes Mellitus

- The dentist may notice the patient becoming lethargic, with decreased spontaneity of conversation and ability to concentrate.

- As hypoglycemia worsens, the patient may become diaphoretic or have tachycardia, piloerection, or increased anxiety and exhibit unusual behavior.

- The patient may soon become stuporous or lose consciousness.
Diabetes Mellitus

• Severe hypoglycemia in diabetic patients usually can be avoided through measures designed to keep serum glucose levels on the high side of normal or even temporarily above normal.

Diabetes Mellitus

• During the health history interview, the dentist should get a clear idea of the degree of control of the patient's diabetes.

Diabetes Mellitus

• If patients do not regularly check their own urine or serum glucose, their physician should be contacted to determine whether routine dental care can be performed safely.
Diabetes Mellitus

• If a diabetic patient indicates a feeling of low blood sugar or if signs or symptoms of hypoglycemia appear, the procedure being performed should be stopped and the patient should be allowed to consume a high-caloric carbohydrate, such as a few packets of sugar, a glass of fruit juice, or other sugar-containing beverages.

• If the patient fails to improve rapidly, becomes unconscious, or is otherwise unable to take a glucose source by mouth, venous access should be gained and an ampule (50 mL) of 50% glucose (dextrose) in water should be administered IV over 2 to 3 minutes.

• If venous access cannot be established, 1 mg of glucagon can be given IM.
Diabetes Mellitus

- If 50% glucose and glucagon are unavailable, a 0.5-mL dose of 1:1000 epinephrine can be administered SC and repeated every 15 minutes as needed.

- A patient who seems to have recovered from a hypoglycemic episode should remain in the office for at least 1 hour, and further symptoms should be treated with oral glucose sources.
Adrenal Insufficiency

- Primary adrenocortical insufficiency (Addison’s disease) or other medical conditions in which the adrenal cortex has been destroyed are rare

Adrenal Insufficiency

- However, adrenal insufficiency resulting from exogenous corticosteroid administration is common because of the multitude of clinical conditions for which therapeutic corticosteroid administration is given

Adrenal Insufficiency

- Patients with adrenal insufficiency are frequently not informed concerning their potential need for supplemental medication, and those with secondary adrenal insufficiency may fail to inform the dentist that they are taking corticosteroids
Adrenal Insufficiency

• This is not a problem, provided the patient is not physiologically or emotionally stressed

Adrenal Insufficiency

• However, should the patient be stressed, adrenal suppression that results from exogenous corticosteroids may prevent the normal release of endogenous glucocorticoids in amounts needed to help the body meet the elevated metabolic demands.

Adrenal Insufficiency

• Patients at risk for acute adrenal insufficiency as a result of adrenal suppression are generally those who take at least 20 mg of cortisol (or its equivalent) daily for at least 2 weeks any time during the year preceding the planned major oral surgical procedure.
Adrenal Insufficiency

- However, in most straightforward oral surgical procedures done under local anesthesia or nitrous oxide and local anesthesia, administration of supplemental corticosteroids is unnecessary.

Adrenal Insufficiency

- Early clinical manifestations of acute adrenal insufficiency crisis include mental confusion, nausea, fatigue, and muscle weakness.

Adrenal Insufficiency

- As the condition worsens, the patient develops more severe mental confusion; pain in the back, abdomen, and legs; vomiting; and hypotension.
**Adrenal Insufficiency**

- Without treatment the patient will eventually begin to drift in and out of consciousness, with coma harkening the pre-terminal stage.

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**Management of Acute Adrenal Insufficiency**

1. Terminate all dental treatment
2. Position patient in supine position, with legs raised above level of head
3. Have someone summon medical assistance
4. Administer corticosteroid (100 mg hydrocortisone IM or IV or its equivalent)
5. Administer oxygen
6. Monitor vital signs
7. Start an IV line and drip of crystalloid solution
8. Start basic life support, if necessary
9. Transport to emergency care facility

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**Cerebrovascular Compromise**

- Alterations in cerebral blood flow can be compromised in three principal ways:
  - (1) embolization of particulate matter from a distant site
  - (2) formation of a thrombus in a cerebral vessel, or
  - (3) rupture of a vessel
Cerebrovascular Compromise

• Material that embolizes to the brain comes most frequently from thrombi in the left side of the heart, from the carotid artery, or from bacterial vegetations on infected heart surfaces.

Cerebrovascular Compromise

• Cerebrovascular thrombi generally form in areas of atherosclerotic changes.

Cerebrovascular Compromise

• Finally, vascular rupture can occur because of rare congenital defects in the vessel, that is, berry aneurysms.
Cerebrovascular Compromise

- The effect on the level of consciousness of a cerebrovascular problem depends on the severity of the cerebral lesion.

- If the problem rapidly resolves, such as happens with transient ischemic attacks, the symptoms of cerebral vascular compromise may last only a few seconds or minutes.

- However, if ischemia is severe enough, an infarction may occur in an area of the brain, leaving a neurologic deficit.
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**Cerebrovascular Compromise**

- A transient ischemic attack that occurs during dental care requires that the procedure be terminated

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**Cerebrovascular Compromise**

- However, little must be done for the patient other than reassurance, because most patients experience only a temporary numbness or weakness of both of the extremities on one side of the body or visual disturbance

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**Cerebrovascular Compromise**

- Consciousness is usually unaltered
Cerebrovascular Compromise

- Transient ischemic attacks frequently precede a cerebral infarction, so immediate physician referral is important.

Cerebrovascular Compromise

- Cerebrovascular compromise that results from embolism usually occurs first with a mild headache, followed by the appearance of other neurologic symptoms, such as weakness in an extremity, vertigo, or dizziness.

Cerebrovascular Compromise

- However, cerebral hemorrhage typically has the abrupt onset of a severe headache, followed in several hours by nausea, dizziness, vertigo, and diaphoresis.
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**Cerebrovascular Compromise**

- The patient may go on to lose consciousness

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**Manifestations of Cerebrovascular Compromise in Progress**

- Headache that can range from mild to the worst the patient has ever experienced
- Unilateral weakness or paralysis of extremities or facial muscles or both
- Slurring of speech or inability to speak
- Difficulty breathing or swallowing or both
- Loss of bladder and bowel control
- Seizures
- Visual disturbance
- Dizziness
- Partial or total loss of consciousness

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**Cerebrovascular Compromise**

- If signs or symptoms of a cerebrovascular compromise arise and are not transient, a major problem affecting the cerebral vasculature may be occurring
Cerebrovascular Compromise

- The procedure should be stopped, and frequent monitoring of vital signs should be begun.

- Medical help should be called to assist in the event the patient becomes hypotensive or unconscious and to transport the patient to a hospital where neurosurgical intervention or thrombolytic therapy can be initiated, as indicated.

- If the patient develops respiratory difficulty, oxygen should be administered.
Cerebrovascular Compromise

• Any narcotics that the patient has been administered should be reversed

Cerebrovascular Compromise

• If consciousness is lost, vital signs should be monitored frequently and cardiopulmonary resuscitation should be begun if necessary

Questions?