A Guide to Management of Common Medical Emergencies in the Dental Office

APPENDIX A

GENERAL CONSIDERATIONS

The best management of a dental office medical emergency is prevention. Dental practitioners must be prepared to treat the seemingly well but chronically ill patient whose condition is managed by a variety of drugs. Dentists and the members of their office staff must first be aware of the patient’s medical condition. This knowledge provides a strong indicator of the patient’s risk for having a medical emergency and also gives practitioners an opportunity to take measures that could prevent such emergencies. If an emergency does occur, an informed dentist will have a better idea of the type of medical problem the patient is experiencing. The dentist must also understand the pathophysiologic factors regulating disease processes and the pharmacodynamics of drug action and interaction.

Patients frequently experience physical reactions during treatment and this places considerable responsibility on the dentist to respond to any emergencies quickly, efficiently, and competently with adequate resuscitative procedures. Obviously one of the most important precepts of good medical emergency management is to keep a cool head, don’t panic, and implement basic cardiac life support (BCLS). The health professional is responsible for knowing and using those techniques that are known, practiced, safe, and efficient. An unfamiliar or unreliable maneuver should never be attempted. The dentist must be trained in providing BCLS, and in many cases may wish to pursue advanced cardiac life support (ACLS) training. Dental practitioners should also be aware that there were some changes in basic cardiopulmonary resuscitation (CPR) guidelines in 2005.

Although dentists should be prepared to provide resuscitative procedures in emergency situations, they should give even more consideration to preventing them. This can be accomplished by obtaining an adequate medical history of the patient, making an appropriate physical evaluation, and ensuring that the patient and environment are prepared before treatment begins. Sometimes emergencies may be prevented through the recognition of physical limitations before treatment begins.

Management of emergencies must begin long before they occur. The dentist must be prepared with a plan of action and an adequate armamentarium to meet emergencies. Presenting a plan for every situation that may arise in the dental office is impossible. No cookbook solutions exist, and hurried emotional responses are hazardous. The actions of the dental team must be based on a thorough background, continued study, and carefully prepared and rehearsed emergency procedures in which each individual has specific duties and responsibilities. This necessitates the presence of appropriate resuscitative equipment and drugs to permit the team to work calmly and precisely. This teamwork must be based on knowledge, practice, sound judgment, and confidence. Every dental office should have a written plan that spells out specific duties for each member of the office staff, covering areas such as who will call the emergency medical services (EMS) system (call 911), start CPR, begin an intravenous (IV) line, and administer drugs. A designated staff member should record every event and the time of each action.

A good medical history, appropriate physical evaluation, and proper consultation may prevent the onset of a life-threatening situation. However, unforeseen

*Much of the material contained herein is modified from Malamed SF: Medical Emergencies in the Dental Office, ed 4, St Louis, 2007, Mosby; the American Heart Association Guidelines for Basic Cardiac Life Support and Advanced Cardiac Life Support (Current Emergency Cardiovascular Care), Circulation, 102(8s), August 22, 2000; 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, Circulation, 112(24)s, December 13, 2005.
circumstances do occur and the dentist should make every effort to prevent irreversible physiologic damage.

Physical evaluation of patients has become more important because of the introduction of more complicated and lengthy dental procedures, the increasing number of medical risk patients, the growing number of geriatric patients, and the use of conscious sedation techniques. The goal of evaluation is to determine the ability of a patient to safely tolerate a specific procedure by gathering reliable information so that intelligent decisions can be made during treatment. It is not to diagnose and treat medical conditions. This approach eliminates the element of surprise, heightens the awareness of potential risk, produces confidence, establishes rapport with the patient, and provides a basis for communication with a physician when indicated.

Consultation with the patient’s physician should be made to ensure adequate knowledge of the patient’s particular problem and the proposed dental treatment plan. Generally, consultation with the physician does not alter the treatment plan, though occasionally it will do so significantly. Rarely, however, will consultation delay treatment. These consultations serve only as guidelines to patient management. The dentist must make final decisions regarding dental treatment.

In most emergencies the dentist and staff should employ BCLS procedures and call the EMS 911 system phone number. Dentists should also be familiar with the use of an automated external defibrillator (AED).

Dentists with ACLS training may start an IV line and administer drugs through it as indicated. Use of the pulse oximeter and electrocardiography can be important adjuncts for monitoring a patient’s vital signs.

**GENERAL PRINCIPLES OF EMERGENCY CARE**

Most life-threatening office emergencies are caused by the patient’s inability to withstand physical or emotional stress or the patient’s reaction to drugs. Emergencies also can be caused by a complication of a preexisting systemic disease. Cardiopulmonary systems can be involved, thus requiring some emergency supportive therapy.

In all emergencies, the following procedures must be performed:

1. Place the patient in the supine position if possible; if still conscious, the patient may prefer a more upright position.
2. Give the patient the basics of life support (cardiopulmonary resuscitation [CPR]), which include the following:
   
   **NOTE:** The American Heart association made some changes to CPR procedures in 2005.

   a. Air passage opened and cleared if necessary
   b. Breathing ensured (by artificial respiration if necessary)
   c. Carotid pulse checked as a way of ensuring circulation; CPR administered if there is no carotid pulse, and blood pressure checked if carotid pulse is present
   d. Use of automated external defibrillator (AED)

   Once the emergency has been diagnosed, proper treatment in most cases includes the following:

   1. Emergency medical system activated by 911 phone call.
   2. Administration of oxygen (10 L/min. flow)
   3. Use of IV line for rapid drug administration (with ACLS training)
   4. Administration of CPR
   5. Use of AED
   6. Treatment with drugs (ACLS training for IV line)

**Key Points**

Elements essential to the successful treatment of medical emergencies include the following:

1. Quick recognition and diagnosis of signs and symptoms
2. Early response time (4 to 6 minutes without oxygen leads to irreversible brain damage)
3. Airway clearance (circulation meaningless without oxygen)
4. Proper monitoring of vital signs (e.g., carotid pulse)
5. Continued monitoring of patient status (e.g., color, ventilation, pulse, blood pressure, pupils)
6. Assurance that patient receives proper medical care

**TYPES OF EMERGENCIES AND THEIR TREATMENT**

**Unconsciousness**

**Syncope and Psychogenic Shock**

**Cause.** Cerebral hypoxia (reduced blood flow to brain)

**Symptoms**

1. Early
   a. Pallor
   b. Sweating
   c. Nausea
   d. Anxiety
2. Late
   a. Pupillary dilation
   b. Yawning
   c. Decreased blood pressure
   d. Bradycardia (slow pulse)
   e. Convulsive movements
   f. Unconsciousness

**Treatment**

1. Lower head slightly and elevate legs and arms (for pregnant women, roll on left side)
2. Administer oxygen at 10 L flow/min
3. Administer spirits of ammonia
4. Apply cold compresses to forehead
5. Monitor and record vital signs
6. Reassure patient
For low blood pressure or pulse (systolic is less than previous diastolic), the following procedures should be followed:

1. **Low blood pressure**
   a. Lower head and raise arms and legs
   b. Start 5% dextrose and lactated Ringer’s IV
   c. Administer a vasopressor drug (epinephrine 0.3-0.5 mg via subcutaneous (SC) or intramuscular (IM) routes or intravenously with ACLS training)

2. **Slow pulse** (less than 60 beats per minute)
   a. Administer 0.4 mg atropine via IV access to increase heart rate
   b. Repeat up to a dose of 1.2 mg, then consider use of additional vasopressors

**Cardiac Arrest**

**Signs and symptoms**
1. No pulse or blood pressure
2. Sudden cessation of respiration (apnea)

3. Cyanosis
4. Dilated pupils

**Treatment**
1. **Airway**—lift chin, clear airway if necessary, and observe for breathing
2. **Breathing**—infl ate lungs with mouth-to-mouth resuscitation, give two initial quick breaths, and perform endotracheal intubation and positive pressure oxygen
3. **Circulation**—check carotid pulse; if pulse is absent, compress sternum 1 to 2 inches (2 to 3) fingerwidths above xiphoid process

**NOTE:** The importance of technique for chest compressions cannot be over-emphasized; they must be adequate and efficient.

- **One operator:** 30 compressions : 2 inflations for a rate of 100 compressions/min.
NOTE: New in 2005: compression-to-ventilation ratio of 30:2 and breaths should only take 1 minute; emphasis on the efficacy of compressions.

b. Two operators: 15 compressions : 2 inflations for a rate of 100 compressions/min. Continue resuscitation until spontaneous pulse returns.

4. Use automated external defibrillator (AED).
5. IV drugs—start 5% dextrose lactated ringers (with ACLS training)
   a. Epinephrine: 0.5-1.0 ml:1,000, repeat every 5 minutes prn.
   b. Sodium bicarbonate: 1 mEq/kg initially and additional doses every 10 minutes until circulation is restored (or as governed by arterial blood gas measurement).
   c. Atropine sulfate: Indicated if pulse is less than 60 beats/min and systolic blood pressure is below 90. Initial dose: 0.5 mg; repeat every 5 minutes, not to exceed 2.0 mg total dose.
6. Other drugs used for treatment of cardiac arrest (with ACLS training)
   a. Lidocaine (anti-arrhythmic agent)
   b. Calcium chloride (increases myocardial contractility)
   c. Morphine sulphate (for pain relief)

Monitor and record all vital signs, drug administrations, and patient responses. Call 911 for emergency medical assistance.

### Diabetic Coma versus Insulin Shock

<table>
<thead>
<tr>
<th>Diagnostic Factors</th>
<th>Diabetic Coma (no insulin)</th>
<th>Insulin Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>HISTORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food intake</td>
<td>Normal or excessive</td>
<td>May be insufficient</td>
</tr>
<tr>
<td>Insulin</td>
<td>Insufficient</td>
<td>Excessive</td>
</tr>
<tr>
<td>Onset</td>
<td>Gradual (days)</td>
<td>Sudden (hours)</td>
</tr>
<tr>
<td>PHYSICAL EXAM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Extremely ill</td>
<td>Very weak</td>
</tr>
<tr>
<td>Skin</td>
<td>Dry and flushed</td>
<td>Moist and pale</td>
</tr>
<tr>
<td>Infection</td>
<td>Frequent</td>
<td>Absent</td>
</tr>
<tr>
<td>Fever</td>
<td>Frequent</td>
<td>Absent</td>
</tr>
<tr>
<td>GI SYMPTOMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouth</td>
<td>Dry</td>
<td>Drooling</td>
</tr>
<tr>
<td>Thirst</td>
<td>Intense</td>
<td>Absent</td>
</tr>
<tr>
<td>Hunger</td>
<td>Absent</td>
<td>Occasional</td>
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<tr>
<td>Vomiting</td>
<td>Common</td>
<td>Rare</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>Frequent</td>
<td>Absent</td>
</tr>
<tr>
<td>BREATH</td>
<td>Acetone odor</td>
<td>Normal</td>
</tr>
<tr>
<td>BLOOD PRESSURE</td>
<td>Low</td>
<td>Normal</td>
</tr>
<tr>
<td>PULSE</td>
<td>Weak and rapid</td>
<td>Full and bounding</td>
</tr>
<tr>
<td>TREMOR</td>
<td>Absent</td>
<td>Frequent</td>
</tr>
<tr>
<td>CONVULSIONS</td>
<td>None</td>
<td>In late stages</td>
</tr>
</tbody>
</table>

### Treatment
1. Place patient in supine position.
2. Administer oxygen.
3. If patient is conscious, give patient a high sugar–containing drink such as Glucola or orange juice.
4. If patient is unconscious, a glucose paste can be applied to the buccal mucosa. A dentist with ACLS training can start IV 5% dextrose (D5LR) and run the IV drip as fast as possible.
5. Monitor and record vital signs.
6. Activate EMS system by calling 911.
7. Transport patient to emergency room if some improvement is not fairly rapid.

**NOTE:** If in doubt, treat as insulin shock.

### Response to treatment
1. Insulin shock: rapid improvement after carbohydrate administration
2. Diabetic coma
   a. No improvement after carbohydrate administration
   b. Slow improvement (6-12 hours) after insulin administration

### Acute Adrenal Insufficiency

**Cause.** Adrenal suppression (low adrenocorticotropic hormone) because exogenous steroids suppress adrenal production. The patient may be medicated with steroids for dozens of medical problem; or the cause may be primary or secondary malfunction of the adrenal cortex.

**Signs and symptoms**
1. Altered consciousness
2. Confusion, weakness, fatigue
3. Headache
4. Pain in abdomen, legs
5. Nausea, vomiting
6. Hypotension and syncope
7. Coma

**Treatment**

**Management of the Patient With Acute Adrenal Insufficiency**

<table>
<thead>
<tr>
<th>Conscious</th>
<th>Unconscious</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Position patient semireclining</td>
<td>1. Position patient supine</td>
</tr>
<tr>
<td>2. Monitor and record vital signs</td>
<td>2. BCLS</td>
</tr>
<tr>
<td>3. Administer oxygen</td>
<td>3. Administer oxygen</td>
</tr>
<tr>
<td>4. Administer steroids, hydrocortisone 100 mg, or dexamethasone 4 mg (IV with ACLS training)</td>
<td>4. Summon EMS (911 call)</td>
</tr>
<tr>
<td>5. May have to transfer to hospital for lack of fluids</td>
<td>5. Review patient’s medical history</td>
</tr>
<tr>
<td>6. Administer steroids hydrocortisone 100 mg, or dexamethasone 4 mg</td>
<td>6. Administer vasopressor (epinephrine 0.5 ml)</td>
</tr>
</tbody>
</table>
Cerebrovascular Accident

**Signs and symptoms**
1. Early warning signs
   a. Dizziness (patient may fall)
   b. Vertigo and vision changes
   c. Nausea and vomiting
   d. Transient paresthesia
   e. Unilateral weakness or paralysis
2. General symptoms
   a. Headache
   b. Nausea
   c. Vomiting
   d. Convulsions, coma

**NOTE:** Blood pressure and pulse are generally normal. Raised blood pressure and body temperature and lowered pulse and respiration indicate increased intracranial pressure.

**Treatment**
1. Call EMS (911).
2. Position patient in reclining, semi-sitting position with the head elevated.
3. Provide the following support:
   a. Oxygen at 10 L/min flow
   b. No sedative use
   c. Airway and breathing maintenance
4. Monitor and record vital signs.
5. Keep patient quiet and still.
6. Ensure rapid transfer to hospital.

Convulsions

**Causes**
1. Syncope
2. Drug reactions
3. Insulin shock
4. Cerebrovascular accident
5. Convulsive seizure disorder

**Signs and symptoms**
1. Aura—flash of light or sound
2. Mental confusion
3. Excessive salivation
4. Tonic contractions and tremors
5. Convulsive movements of extremities
6. Rolling back of eyes
7. Loss of consciousness

**Treatment**
1. Protect patient from personal damage.
2. After convulsion, make sure airway is open.
3. Dispense oxygen at 10 L/min flow.
4. For status epilepticus, administer diazepam (Valium) 5-20 mg IV.
5. Monitor and record vital signs.
6. Support respiration (patient may have respiratory arrest).

Local Anesthesia Drug Toxicity

**Causes**
1. Too large a dose of local anesthetic per body weight
2. Rapid absorption of drug or inadvertent IV injection
3. Slow detoxification or elimination of drug

**Signs and symptoms**
1. Early
   a. Talkative, restless, apprehensive, excited manner
   b. Convulsions
   c. Increase in blood pressure and pulse rate

**NOTE:** The stimulation is followed by depression of the central nervous system.

2. Late signs and symptoms
   a. Convulsions followed by depression
   b. Drop in blood pressure
   c. Weak, rapid pulse or bradycardia
   d. Apnea
   e. Unconsciousness, death

**NOTE:** Lidocaine toxicity is documented to have occasionally exhibited only the depression without the usual prodromal of the excitatory phase.

**Treatment**
1. Protect patient during the convulsive period (consider administration of 5-15 mg valium IV if convulsive period is prolonged).
2. Monitor and record vital signs.
3. Provide supportive therapy.
   a. Keep patient in supine position.
   b. Maintain oxygen at 10 L flow/min.
   c. Maintain blood pressure.
   d. Treat bradycardia (0.4 mg atropine IV, with ACLS training).
   e. Transport to hospital.

**Respiratory Difficulty**

**Hyperventilation**

**Cause**
1. Excess loss of CO₂
2. Respiratory alkalosis

**Symptoms**
1. Rapid, shallow breathing
2. Confusion
3. Dizziness
4. Paresthesia
5. Carpal-pedal spasms

**Treatment**
1. Explain the problem to the patient and reassure patient.
2. Instruct the patient to be calm and breathe slowly.
3. Have patient breathe slowly into a paper bag.
4. Reappoint for presedation.

**Aspiration or Swallowing a Foreign Object**

**Cause.** Foreign body in larynx or pharynx.

**Signs and symptoms**
1. Coughing or gagging associated with a foreign object; inability to speak.
2. Possible cyanosis from airway obstruction.
3. Violent respiratory effort.
4. Suprasternal retraction.
5. Rapid pulse.

**Treatment**
1. Keep patient supine if unconscious; keep standing or sitting leaning forward if conscious.
2. Establish airway (open and evaluate breathing).
3. Apply Heimlich maneuver.

**NOTE:** If cricothyrotomy is necessary, refer to “Cricothyroid Membrane Puncture” procedure that follows.
4. Administer oxygen.

5. Maintain the supine position and transport patient to hospital for radiographs.
   A. Posterior-anterior chest view
   B. Lateral chest view
   C. Flat plane abdominal view to establish location

**NOTE:** If foreign object is in GI tract, follow with x-ray examination. Foreign object in trachea or lung requires a bronchoscopy or thoracotomy. If foreign object has occluded the airway, the Heimlich maneuver may be of benefit before initiation of a cricothyrotomy.

**Cricothyroid Membrane Puncture.** The approach to a patient with acute airway obstruction should be:
1. Recognition of obstruction
2. Use of nonsurgical maneuvers to relieve obstruction (i.e., back blows, Heimlich maneuver)
3. Administration of mouth-to-mouth breathing to bypass obstruction or to diagnose obstruction
4. Activation of EMS with 911 call
5. Establishment of an emergency surgical airway (cricothyrotomy) if Heimlich maneuver is unsuccessful
2. Ensure that chin and sternal notch are held in median plane.
3. Perform 2-cm vertical incision through skin over cricothyroid cartilage.
4. Perform 2-cm transverse incision over cricothyroid membrane.
5. Insert small scissors or hemostats through cricothyroid membrane and into the tracheal space, or use large (8-gauge) needle.
6. Expand instrument and dilate transversely.
7. Insert tube into trachea between beaks of dilating instrument.
8. Remove scissors or hemostats.
9. Tape tube into place.
10. Use positive pressure or enriched oxygen flow if patient is breathing independently.
11. Arrange for rapid transfer of patient to the hospital.

**Bronchial Asthma**

**Signs and symptoms**
1. Sense of suffocation
2. Pressure in chest
3. Nonproductive cough
4. Expiratory wheezes
5. Prolonged expiratory phase
6. Increased respiratory effort
7. Chest distension
8. Thick, stringy mucous sputum
9. Cyanosis (in severe cases)

**Treatment**
1. Use Beta2-agonist inhaler (e.g., Isuprel mistometer)
   1 to 2 deep inhalations
2. Activate EMS (911 call)
3. Dispense oxygen at 1L/min flow
4. If unresponsive, administer epinephrine (0.3-0.5 mg, 1:1000, SC; repeat every 20 minutes prn)
5. Dispense theophylline ethylenediamine (aminophylline) 250-500 mg IV over 10 minutes (contraindication: hypotension) if dentist has ACLS training
6. Administer hydrocortisone sodium succinate (Solu-Cortef), 100 mg IV
7. Monitor and record vital signs
8. Arrange for rapid transport of patient to the hospital

**Mild Allergic Reaction**

**Symptoms**
1. Mild pruritus (itching)—slow appearance
2. Mild urticaria (rash)—slow appearance

**Treatment**
1. Administer diphenhydramine (Benadryl) 25-50 mg PO, IV, or IM (if dentist has ACLS training)
2. Repeat dose up to 50 mg every 6 hours orally for 2 days
3. If suspected allergy to medication, withdraw drug administration

**Severe Allergic Reaction**

**Symptoms**
1. Skin reactions—rapid appearance
   a. Severe pruritus (itching)
   b. Severe urticaria (rash)
2. Swelling of lips, eyelids, cheeks, pharynx, and larynx (angiogenic edema)
3. Anaphylactic shock
   a. Cardiovascular—fall in blood pressure
   b. Respiratory—wheezing, choking, cyanosis, hoarseness
   c. Central nervous system—loss of consciousness, dilatation of pupils

**Treatment**
1. Call EMS (through 911)
2. Administer epinephrine 0.3-0.5 mg 1:1000 SC or IM (contraindication: severe hypertension) or IV if dentist has ACLS training; repeat every 5-10 minutes as needed
3. Administer theophylline ethylenediamine (aminophylline) 250-500 mg IV over 10 minutes (contraindication: hypotension) if dentist has ACLS training
4. Dispense steroids—hydrocortisone sodium succinate (Solu-Cortef), 100 mg SC or IM or IV if dentist has ACLS training
5. Administer oxygen
6. Monitor and record vital signs
7. Perform CPR if needed (including use of Automated External Defibrillator (AED)
8. Use cricothyrotomy if needed
9. Ensure rapid transfer of patient to hospital

**Respiratory Arrest**

**Cause**
1. Physical obstruction of airway (tongue or foreign object)
2. Drug-induced apnea

**Signs and symptoms**
1. Cessation of breathing
2. Cyanosis

**Treatment**
1. Place patient in supine position
2. Keep airway open by tilting head back and removing obstruction if possible; if not possible perform Heimlich maneuver

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3. Activate EMS (911 call)
4. Ventilate patient 12 to 15 times per minute
   a. If apnea is secondary to narcotic, give 0.4 mg naloxone hydrochloride (Narcan) IV, IM, or SC and administer oxygen
   b. If apnea is secondary to sedative barbiturate or diazepam overdose, the following should be performed:
      (1) Administer oxygen or artificial respiration
      (2) Keep patient awake
      (3) Support blood pressure through position of patient, parenteral fluids, and vasopressors
      (4) Take patient to hospital if necessary

**NOTE:** Monitor patient carefully for the duration of action of Narcan, which may be less than that of the narcotic. No reversal agent exists for sedative and barbiturate overdose. Flumazenil is an agent that can reverse the effects of diazepam. Dentists with ACLS training may select to have this drug available.

**Chest Pain**

**Angina Pectoris**

**Cause.** Blood supply to the cardiac muscle is insufficient (atherosclerosis or coronary artery spasm) and precipitated by stress, anxiety, and physical activity.

**Signs and symptoms**
1. Substernal pain or pain referred to arms, neck, or abdomen

2. Pain lasting less than 15 minutes and possibly radiating to the left shoulder
3. Positive response to nitroglycerine
4. Patient usually has a history of the condition

**NOTE:** Vital signs are normal; no hypotension, sweating, or nausea occurs.

**Treatment**
1. Place patient in semireclining or sitting-up position with head elevated
2. Administer nitroglycerin 0.3 mg tablet sublingual or spray amyl nitrate bud (3 tablets, 1 tablet every 5 minutes up to a total of 3 tablets)
3. Administer oxygen at 10 L/min flow
4. Put patient at rest and give reassurance
5. Monitor and record vital signs

**NOTE:** If any doubt exists about whether angina or myocardial infarction exists, call EMS (through 911) or transport patient to hospital emergency room. Once the nitroglycerin tablet container has been opened, the remaining tablets have a poor shelf life (30 days); a new supply should be stocked.

**Myocardial Infarction**

**Cause.** Most commonly occlusion of coronary vessels occurs. Anoxia, ischemia, and infarct are present.

**Signs and symptoms**
1. Crushing chest pain
   a. More severe than angina, possibly radiating to neck, shoulder, jaw
b. Longer than 15 minutes
c. Not relieved by nitroglycerin tablets
d. Squeezing or heavy feeling
2. Cyanosis, pale, or ashen appearance
3. Weakness
4. Cold sweat
5. Nausea, vomiting
6. Air hunger and fear of impending death
7. Increased, irregular pulse beat of poor quality and containing palpitations
8. Feeling of impending doom

**Treatment**
1. Place patient in most comfortable position
2. Administer oxygen at 10 L/min flow
3. Activate EMS (911 call)
4. Monitor and record vital signs
5. Reassure patient

**NOTE:** Maintain patient in most comfortable position; this may not be the supine position since the air hunger may be associated with orthopnea. Nitrous oxide-oxygen (N₂O-30%, O₂ 70%), Demerol (50 mg IV), or morphine (10 mg IV) may be administered if the dentist has ACLS training. The condition may progress to cardiac arrest.
6. CPR (including use of automated external defibrillator (AED))

**Other Reactions**

**Intraarterial Injection of Drug Into the Arm**

**Symptoms**
1. Pain and burning sensation distal to the injection site
2. Cold and blotching hand or fingers distal to the injection site

**Treatment**
1. Place patient in supine position
2. Administer oxygen
3. Leave needle in place and inject 40 to 60 mg 2% lidocaine (2-3 ml), 100 mg hydrocortisone sodium succinate (Solu-Cortef) IM
4. Later, transport patient to hospital where treatment may include heparinization and brachial plexus block

**Extrapyramidal Reactions**

**Antipsychotic drugs producing side reactions**
1. Phenothiazines (Compazine, Thorazine, Phenergan, Sparine, Stelazine, Trilafon, and Mellaril)
2. Butyrophenones (Haldol and Innovar [general anesthetic])
3. Thioxanthenes (Navane and Taractan)

**Signs and symptoms**
1. Acute dystonic reaction (more frequent in young people, women)
   a. Rapid onset
   b. Involuntary movement of tongue, muscles of mastication, and muscles of facial expression
   c. Neck muscles affected frequently (torticollis), arms and legs less frequently
2. Akathisia (constant motion)
3. Parkinsonism
4. Tardive dyskinesia ([buccolingomasticatory triad] sucking, smacking, chewing, fly-catching movement of tongue)

**Treatment**
1. Position patient in semierect position
2. Administer diphenhydramine HCl (Benadryl) 25-50 mg orally, IV if dentist has ACLS training
3. Administer oxygen
4. Monitor and record patient’s vital signs
5. Transfer to hospital if necessary
Response to Unknown Cause. When a cause for the patient’s response cannot be rationally identified, a period of observation is justified.
1. Place patient in supine position
2. Activate EMS (911 call)
3. Support airway respiration and administer oxygen
4. Monitor and record vital signs
5. Start IV 5% dextrose with lactated ringers solution
6. Keep patient off all medication
7. Transfer to hospital if serious
8. Be prepared to do CPR and use the AED

Emergency Kit
Review contents, expiration date, and clarity of all drugs periodically (at least monthly). Ensure kit contains the following:
1. Oxygen setup
2. Blood pressure cuff
3. Stethoscope
4. Syringes (1, 5, 10, and 20 ml)
5. Lacrimal pocket mask
6. Disposable airway No. 2, 3, and 4
7. Butterflies No. 3, 21 gauge
8. 22-gauge needles
9. IV tubing set, Long No. 880-35
10. 250 ml dextrose, lactated ringers solution
11. Paper tape roll
12. Alcohol sponges
13. Drugs
   a. Atropine 0.4 mg ampule, 1 ml
   b. Benadryl (diphenhydramine) 50 mg tablets or 50 mg/1 ml syringe/22 gauge, 1-inch needle
   c. Aminophylline (theophylline ethylenediamine) 250 mg/IO ml syringe/22 gauge, 1-inch needle
   d. Hydrocortisone sodium succinate (Solu-Cortef) 100 mg/2 ml syringe/22 gauge, 1 needle
   e. Epinephrine 1:1000 1.0 ml ampule
   f. Narcan (Naloxone hydrochloride) 0.4 mg/1 ml ampule/1 TB syringe
   g. Amyl nitrate 0.18 ml bud
   h. Nitroglycerine 0.3 mg tabs (packed as 30/bottle)
   i. Two ammonia inhalants buds
   j. Orange juice, Glucola, glucose paste, or dextrose 50% 100 ml
   k. Sodium bicarbonate: 50 ml of 7.5% solution (44.6 mEq)—two bottles
   l. Isuprel mistometer (Isoproterenol hydrochloride)
   m. Diazepam (Valium) 5 mg/ml
   n. Lidocaine 2%, 2 ml ampules
14. Curved cricothyrotomy cannula
15. Padded tongue blade
16. Pulse oximeter/ECG (medical resources)
17. Automated external defibrillator (e.g., Heartstream FR-2, Medtronic Physio-control, Survivalink)
NOTE: Commercial medical emergency kits for dentistry are available from companies such as Banyon International and Health First.

Pediatric Drug Doses
Pediatric doses are presented on a weight basis, which can be simply multiplied. Though nomograms using weight, surface area, and other factors may be more accurate, the proposed method is suggested in an emergency situation.
1. Diphenhydramine HCL (Benadryl): 1-1.25 mg/kg up to 50 mg maximum IV; then 1-1.25 mg/kg q 6 h orally or parenteral
2. Atropine sulfate: 0.01 mg/kg up to 0.4 mg maximum IV or SC
3. Theophylline ethylenediamine (aminophylline): 3-5 mg/kg IV slowly—20 mg/min maximum
4. Epinephrine (adrenaline) 1:1,000: 0.05 mg-0.3 mg maximum SC or IM; diluted to 1:10,000 for IV administration
5. Isoproterenol sulfate 70 mEq/spray aerosol (MedVislet-Iso): 1 inhalation (70 mEq maximum
6. Amyl nitrate bud 0.3 mL: Unlikely in children—same as adult
7. Ammonia inhalants: Same as adults
8. Hydrocortisone sodium succinate. Dose: adult dose IV—50 mg, 100 mg and above
9. Sodium bicarbonate 44.6 mEq/50 ml: 1 mEq/kg IV; 0.5-1 mEq/kg q 10 mm
10. Naloxone HC1 (Narcan): No pediatric doses clearly established; 0.01 mg/kg IV (preferably) q 2-3 min for 2 to 3 doses maximum
11. 50% dextrose injection: 0.5 mg/kg or l ml/kg
12. Diazepam (Valium): Dose not clearly established under age 12, but in range of 0.1-0.5 mg/kg for intractable seizures

Record of Emergency Treatment

<table>
<thead>
<tr>
<th>Time</th>
<th>Comments</th>
<th>BP</th>
<th>Pulse</th>
<th>Drugs</th>
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