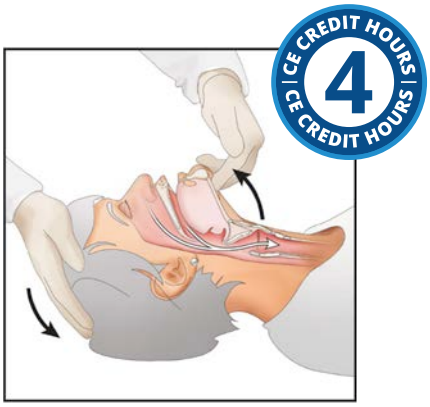
Managing Adult Medical Emergencies in the Dental Office



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Conflict of Interest Disclosure Statement
- The authors report no conflicts of interest associated with this course.

Introduction – Medical Emergencies
Participants in Managing Adult Medical Emergencies in the Dental Office will be introduced to information essential to diagnose and respond to adult medical emergencies in oral healthcare settings. Special emphasis is placed on factors to be considered in risk-assessment, recognizing medical emergencies that are immediately life-threatening and must be acted upon promptly (e.g., cardiac arrest); and those problems that, while not immediately life-threatening, require timely stabilization (e.g., hypoglycemia).

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Overview

Participants in this course will be introduced to information essential to diagnose and respond to adult medical emergencies in oral healthcare settings. Special emphasis is placed on factors to be considered in risk-assessment, recognizing medical emergencies that are immediately life-threatening and must be acted upon promptly (e.g., cardiac arrest); and those problems that, while not immediately life-threatening, require timely stabilization (e.g., hypoglycemia).

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Identify common orofacial myofunctional disorders.
- Discuss factors to consider in the risk stratification of patients with systemic diseases.
- Discuss essential elements of being prepared for a medical emergency in the oral healthcare setting.
- Recognize signs and symptoms and formulate a diagnosis for an emerging perioperative problem.
- Initiate timely action to stabilize the patient before emergency medical services arrive.

Introduction

The primary obligation and ultimate responsibility of oral healthcare personnel (OHCP) is the timely delivery of quality preventive, diagnostic, and therapeutic services within the bounds of the clinical circumstances presented by patients. The incidence of medical emergencies in oral healthcare settings is low. However, an ever-increasing number of patients with medical problems seek dental treatment and OHCP can expect to face situations that may threaten the physical well-being of at-risk patients.

It follows that OHCP must possess the knowledge and skills essential to determine their patients' physical and emotional ability to undergo and respond to dental care.[1] Diagnostic activities should be effective to establish a database that will serve as reference points for significant medical problems and, importantly, the database must identify those at-risk patients who may experience a medical emergency during the perioperative period.

Being ill prepared to respond to emerging perioperative medical events is inexcusable; being subjected to public censure or accused of negligence is an agony best prevented. Consequently, OHCP must **P-R-A-Y**, i.e., (1) ***P*** - repare for the role of "first responders;" (2) ***R*** - ecognize predisposing factors and signs and symptoms of medical emergencies; (3) ***A*** - ct to stabilize the patient; and (4) ***Y*** - ell for help, i.e., notify emergency medical services (EMS).[2-10]

OHCP must provide emergency care appropriate for the emergent setting (i.e., oral healthcare facility). At the very minimum, in the event of a life-threatening medical emergency, OHCP must feel comfortable to perform basic life support (BLS) techniques to stabilize the patient until EMS arrives. It must be emphatically stated that advanced life support (ALS) activities should not be attempted without sufficient training and maintenance of skills.

Procedure-specific Risk Factors

Every procedure elicits a stress-response, i.e., "surgical stress," characterized by physiological (i.e., autocrine, endocrine, and paracrine) changes accompanied by psychological reactions (e.g., fear, anxiety, anger, tension, malaise or fatigue).[11] The magnitude of these procedure-related responses is proportional to the severity of tissue trauma, duration of the procedure, volume of blood loss, fluid shifts, and changes in core body temperature.[11]

Based on the above criteria, procedure-related stress has been classified as high, intermediate, and low with estimated rates of associated major medical events of >5%, 1-5%, and <1%, respectively.[12] With low-stress procedures (e.g., dental procedures), the risk is negligible unless strong patient-specific risk factors are present. OHCP must identify patent-specific risk factors that may lead to medical emergencies during the perioperative period.

Patient-specific Risk Factors

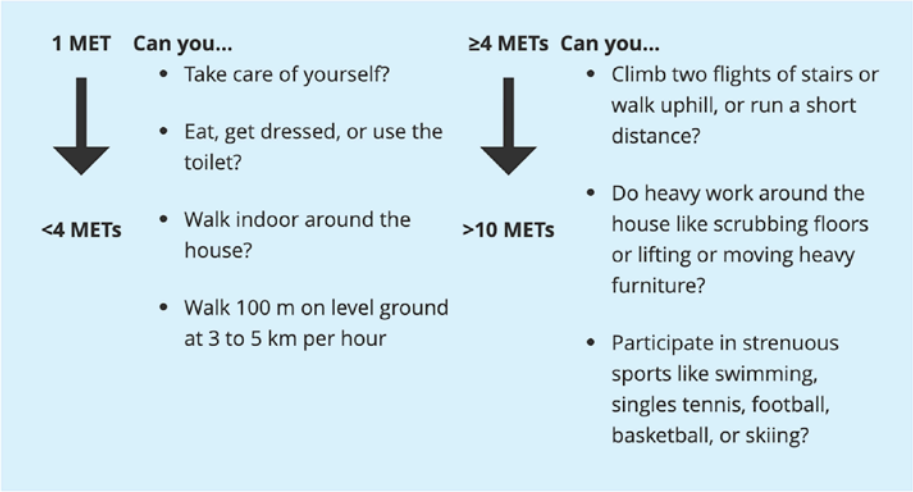
"Never treat a stranger." Identification of patient-specific risk factors is predicated on data obtained from the physical evaluation.[1] Past and present illnesses; major hospitalizations; review of organ systems; family history; social history; history of drug allergies and other adverse drug effects; medications, vitamins and other dietary supplements (including special diets) currently taken by the patient must be considered in determining perioperative risk.

Since the stress-response is mediated primarily by the sympathoadrenal system, the history should also seek to determine the patient's functional capacity (FC).[13] FC relates to a person's functional reserve, which correlates well with maximum oxygen uptake during treadmill testing and is expressed in metabolic equivalents (METs). One MET equals the resting or basal oxygen requirement (i.e., 3.5 ml of O_2 per kg per minute) of a 40–year-old, 70-kg man.

A validated method to determine FC, predicated on a person's ability to perform a spectrum of common daily activities, is presented in Box A.[14-16] FC is classified as excellent (>10 METs), good (7 METs to 10 METs), moderate (6 METs to 4 METs), or poor (<4 METs). The inability of a person to climb two flights of stairs or to run a short distance indicates poor functional capacity (<4 METs). When functional capacity is low, the risk of a medical emergency is high.[13]

For example, a person with no evidence of coronary artery disease (CAD), but who reports a history of sedentary lifestyle and has poor FC may benefit from a preoperative evaluation. Conversely, a patient considered high-risk because of a history of CAD who is asymptomatic and runs 30 minutes daily may need no further cardiovascular testing before proceeding with planned dental procedures, i.e., when functional capacity is high, the risk of a medical emergency is low.

Box A. Estimated Energy Requirement for a Spectrum of Common Daily Activities.[13-15]



Physical examination is also part of risk assessment.[1,13] A patient's mental state and general appearance, e.g., cyanosis, pallor, diaphoresis, shortness of breath, tightness and/or pain in the chest with minimal activity, tremor, anxiety, and peripheral edema are signs and symptoms that provide invaluable clues regarding the patient's overall health status. Critically, the physical examination must also include a determination of the patient's baseline vital signs.[1,13]

Predicated on patient-specific risk factors identified during the physical evaluation, the American Society of Anesthesiology (ASA) Physical Status (PS) Classification system provides a practical method to quantify perioperative risk for patients undergoing surgical (and by extension dental) procedures (Box B).[17,18] The rate of perioperative complications in medicine has been shown to correlate closely to the ASA PS classification and ranges from 0.4/1000 for ASA PS I to 9.6/1000 for ASA PS IV.[19]

"First, Do No Harm" (Hippocratic Oath)

Develop a medical emergency team (Box C). Know what to look for – be familiar with predisposing factors and signs and symptoms of medical emergencies. Be alert – monitor the patient's physical and emotional status during treatment – look for evidence of distress or adverse reactions, particularly when drugs are being administered to the patient. Train under simulated conditions. Check regularly the status of emergency drugs and other equipment (Box C).

Primary Survey

When faced with an emerging perioperative medical event, the following hierarchical steps must be implemented in every situation: (1) assess responsiveness, (2) check airway, (3) and, simultaneously, check breathing and pulse. These fundamental activities comprise the primary survey (Box D), which identifies those problems that are immediately life-threatening and must be promptly acted upon, i.e., obstructed airway, respiratory arrest, or cardiac arrest.

Box B. Modified ASA Physical Status Classification.[16,17]

Physical Status	Risk of Major Medical Event
ASA PS I	

• Normal healthy patient
  ○ No limitation on physical activity
  ▪ Excellent functional capacity
  ▪ >10 METs
	• Remote risk
	  ○ No organic, physiologic, or psychiatric problems
	  ▪ Excludes the very young and the very old

ASA PS II	

• Patient with well-controlled mild systemic disease affecting one organ system
  ○ No substantive functional limitations
  ▪ Good functional capacity
  ▪ 7 to 10 METs
	• Minimal risk
	  ○ Well-controlled hypertension (HTN); diabetes mellitus (DM); respiratory problems, i.e., asthma or chronic obstructive pulmonary disease (COPD); seizure disorder
	  ○ Mild obesity (BMI 30-39)
	  ○ Pregnancy

Box B. *Continued.*

Physical Status	Risk of Major Medical Event
ASA PS III	

• Patient with one or more moderate-to-severe systemic disease
  ○ Substantive functional limitation (but not incapacitating)
  ▪ Moderate functional capacity
  ▪ 4 to 6 METs
	• No immediate risk
	  ○ Poorly controlled DM or HTN
	  ○ Asymptomatic congestive heart failure (CHF)
	  ○ Stable angina
	  ○ History of (>3 months) myocardial infarction, cerebrovascular accident (CVA), transient ischemic attack (TIA), or coronary artery stents
	  ○ Morbid obesity (BMI ≥40)
	  ○ End stage renal disease (ESRD), patient undergoing regularly scheduled dialysis
	  ○ Respiratory problems with intermittent symptoms (asthma, COPD)

ASA PS IV	

• Patient has at least one severe systemic disease that is poorly controlled or at end-stage that is a constants threat to life
  ○ Substantive functional limitation (incapacitating)
  ▪ Poor functional capacity
  ▪ <4 METs
	• Possible risk
	  ○ History of recent (<3 months) of MI, CVA, TIA
	  ○ Unstable angina
	  ○ Severe valve dysfunction
	  ○ Symptomatic COPD
	  ○ Symptomatic CHF
	  ○ Hepato-renal failure
	  ○ ESRD, patient not undergoing regularly scheduled dialysis

ASA PS V	

• Moribund patients, not expected to survive 24 hours without medical or surgical intervention
  ○ No residual functional reserve
	• Imminent risk
	  ○ Multi-organ failure

Box C. Being Prepared.

Emergency Team	Emergency Drugs	Emergency Drugs
Team supervisor (the dentist) • Assesses level of consciousness • Performs physical examination • Obtains initial vital signs • Determines course of treatment • Initiates CPR and AED	**Epinephrine, 1:1,000** • Autoinjectors (adult, 0.3 mg; child, 0.15 mg) **Bronchodilator** • Albuterol inhaler **Diphenhydramine hydrochloride** • 25 mg oral tabs **Nitroglycerin** • 0.4 mg sublingual tablet or aerosol spray **Glucose tablets** **ASA** • 325 mg **Aromatic ammonia**	**Oxygen tank** • Portable E cylinder with regulator • Nasal cannula • Nonrebreathing masks with an oxygen reservoir • Nasal hood • Positive pressure administration capability • Bag-valve-mask device with oxygen reservoir **Stethoscope and sphygmomanometer** • Adult small, medium, and large cuff sizes **Automated external defibrillator (AED)** **Oropharyngeal airways** • Adult sizes 7, 8, and 9 centimeters **Magill forceps** • To retrieve foreign objects from the hypopharynx
Second member • Notifies staff • Gathers emergency equipment and supplies • Prepares therapeutic agents for administration by the dentist • Administers oxygen • Assists with CPR and AED		
Third member • Monitors vital signs • Records information in the chart • Activate EMS • Assists with CPR and AED • Performs other tasks		

Box D. Primary Survey: Every Patient.

Assess responsiveness (level of consciousness):

- Tap the patient on the shoulder and shout – "Are you OK?" (Figure 1)
    - Responsive patient
        - Alert
            - Awake and able to speak
        - Disoriented
            - May moan, cry, or make other sounds
            - Responds to verbal and/or painful stimuli. i.e., moves
    - Place responsive patient in the dental chair in an upright/semi-reclining position (Figure 2)
    - Unresponsive patient
        - Silent, does not respond to verbal and painful stimuli
            - Place unresponsive patient in the dental chair in a supine position on a firm, flat board (e.g., EMS board) to allow for adequate compressions later (Figure 3)
                - SUMMON THE OFFICE EMERGENCY TEAM
                - NOTIFY EMERGENCY MEDICAL SERVICES TEAM (EMS)

Figure 1.

Box D. ***Continued.***

Figure 2.

Figure 3.

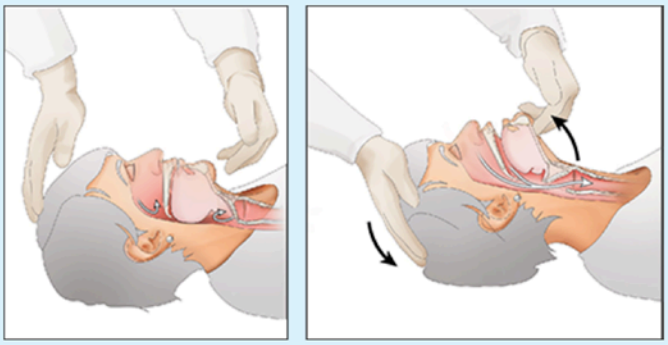
Check airway:

- If the patient is responsive (i.e., alert and talking, even in a whisper) the airway is open, at least partially, at this time
- If the patient is unresponsive (i.e., does not respond to verbal and painful stimuli) evaluate airway
    - If the airway is not open, it may be due to relaxation of the soft tissues of the oropharynx
        - Perform head-tilt/chin-lift (Figure 4)

Box D. *Continued.*

- If obstruction is caused by foreign material it must be cleared
  - Suction thick, frothy, bloody saliva and vomitus
  - Foreign object must be removed (see Airway obstruction (foreign body)

Figure 4.



Look for breathing and check pulse (minimum 5 seconds; maximum 10 seconds):

- Simultaneously, see if the patient's chest rises and falls, listen for escaping air, and feel the airflow against the side of your cheek (Figure 5); and palpate the carotid artery (Figure 6)
  - Unresponsive patient
    - Normal breathing (quiet, regular and effortless) and has definite pulse
      - Monitor vital signs until EMS arrives
    - No normal breathing, but has definite pulse
      - Initiate rescue breathing
        - 1 breath every 5-6 seconds (10 to 12 breaths/min.)
        - Check pulse every 2 minutes
          - If no pulse, begin cardiopulmonary resuscitation (CPR) and prepare for automated external defibrillation (AED) in accordance with current American Heart Association and/or American Red Cross Guildlines.[20,21]
    - No breathing or only agonal breaths (i.e., isolated or infrequent gasping) and no pulse
      - Begin CPR – cycles of 30 compressions and 2 breaths
        - Continue CPR until AED is turned on, the AED pads are applied, and the AED is ready to analyze the heart rhythm*
          - Ensure that everyone, including the rescuer performing CPR, is clear of the patient during AED rhythm analysis and shock

Box D. *Continued.*

- If the AED advises that a shock is not indicated
  - Resume the CPR immediately until prompted by AED to allow rhythm check (about 2 minutes)
- If the AED advises that a shock is indicated press the shock button
  - Resume CPR immediately until prompted by AED to allow rhythm check (about 2 minutes)
- Continue with CPR and defibrillation until EMS takes over or the patient starts to move

Figure 5.

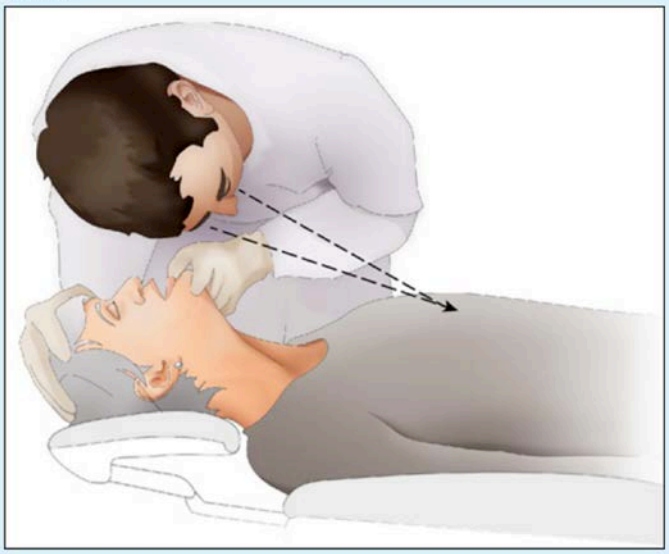


Figure 6.

*If alone, the AED should be used as soon as it is determined that the patient is in cardiac arrest

The unresponsive patient in an oral healthcare setting depend on the office emergency team for (1) early recognition of airway obstruction, respiratory and/or cardiac arrest and notification of EMS, (2) early high-quality CPR to delay brain damage from lack of oxygen, (3) early defibrillation to restore an effective heart rhythm, and (4) early advanced life support and post-arrest care. For each minute CPR and/or defibrillation is delayed, the patient's chance of survival is reduced by 7 to 10 percent.

Airway Obstruction (Foreign Object)

Airway obstruction can lead to respiratory and cardiac arrest if not addressed quickly and effectively. A conscious patient clutching his/her throat is showing the universal sign of choking. Encourage patient to assume a comfortable position and cough forcefully until he/she can breathe normally. If the coughs become week and ineffective notify EMS; place the patient in a supine position; and deliver quick, upward abdominal thrusts until the object is forced out.

If the patient becomes unresponsive, immediately begin CPR with chest compressions and make sure an AED is readily available. Each time the airway is opened to give ventilations, look for any visible objects in the oropharynx. If an object can be seen, remove it (if possible) using a finger sweep motion (Figure 8). If a foreign object is not visible, a blind finger sweep should not be performed; continue CPR, cycles of 30 compressions and 2 ventilations, until EMS arrives.

Secondary Survey

If the patient is conscious proceed with the secondary survey (Box E). Since the pulse rate and character and the rate and character of respiration have already been determined, assess the blood pressure at this time. Next, correlate the patient's chief complaint and signs and symptoms to a specific organ system. The goal is to identify those problems that are not immediately life-threatening, but require timely stabilization (e.g., hypoglycemia, angina pectoris, ventilation failure).

Physical signs and symptoms are produced by physical causes and must be recognized before a physical problem can be diagnosed

Figure 7.

Figure 8.

and treated. Without at least a presumptive or working diagnosis there is nothing to treat. Based on symptoms analysis, medical emergencies can be characterized as altered consciousness; chest pain; and ventilatory, allergic (pruritus, urticaria, angioedema), neurogenic (i.e., sensory, affective, motor), and toxic events (Box F).

Syncope

Syncope (Table 1) is defined as sudden brief loss of consciousness due to cerebral ischemia. In a young adult it is usually precipitated by a generalized, progressive autonomic discharge secondary to anxiety, pain, heat, or humidity. The initial adrenergic response to a stressor is followed by an overwhelming cholinergic

Box E. Secondary Survey: Conscious Patient.

Quickly determine:

- Blood pressure
- Chief complaint (subjective information) associated with acute distress
- Signs and symptoms (objective data)
  - Identify organ system involved

Quickly review history and correlate to signs and symptoms:

- Allergies
- Current medications
- Past and present illnesses
- Last oral intake of food
- Events leading up to the emerging event

surge just prior to unconsciousness. Syncope in patients over 50 years of age may likely be secondary to cardiovascular disorders (e.g., dysrhythmia, postural hypotension), hypoglycemia or cerebrovascular insufficiency.

Postural (Orthostatic) Hypotension

Postural hypotension (Table 2) is defined as a decline of ≥20 mm Hg in the systolic BP, and/or a decline of ≥10 mm Hg in the diastolic BP, or an increase of ≥20 beats/minute in pulse rate, and abrupt symptoms of cerebral ischemia (syncope) following postural change from a supine to an upright position. It may be secondary to impaired homeostatic mechanisms of blood pressure regulation; age and/or cardiovascular-disease-related physiological changes; anti-hypertensive medications; and/or recent intake of food.

Hypoglycemia

Plasma glucose concentration is closely regulated by the autonomic nervous system. Glucagon promotes hepatic glycogenolysis and gluconeogenesis and is a hyperglycemic agent. Insulin promotes cellular glucose uptake and is a hypoglycemic agent. Hypoglycemia (Table 3) is defined as sustained plasma glucose level <70 mg/dL. Heavy exercise, anxiety, and infection may cause hypoglycemia, but the most common cause is treatment with insulin and/or oral hypoglycemic agents and inadequate carbohydrate intake (delayed, decreased, or missed meals).

Angina Pectoris

Angina pectoris (Table 4) is an acute coronary syndrome associated with transient ischemia to the myocardium. Hypoxia (and at times anoxia) results from diseases and conditions which lead to atherosclerosis and obstruction of coronary arteries by fatty deposits that limits and/or impairs coronary blood flow. Precipitating factors that increase cardiac oxygen demand in the presence of decreased perfusion of the myocardium include physical exertion, emotional stress, cold, recent meal. Unstable angina pectoris may occur spontaneously at rest.

Myocardial Infarction

Myocardial infarction (Table 5) is caused by abrupt anoxia to a portion of the heart resulting in myocardial tissue necrosis. Anoxia results from conditions that lead to the formation of atherosclerotic plaques. In later stages, atherosclerotic plaques may become disrupted and contribute to thrombus formation. Atherosclerotic plaques and thrombi impair blood flow to large and

Box F. Potential Medical Emergencies Based of Symptom Analysis during Secondary Survey.

Symptoms	Primary Working Diagnoses	Secondary Working Diagnoses
Altered consciousness	• Syncope • Postural hypotension • Hypoglycemia	• Anaphylaxis • Cardiac arrest • Seizure • Cerebrovascular accident • Hyperglycemia

Chest pain	• Angina pectoris
	• Myocardial infarction
		• With tachycardia
		  ◦ Syncope
		  ◦ Hyperventilation
		  ◦ Airway obstruction
		  ◦ Sympathetic reaction
		  ◦ Thyrotoxicosis
		  ◦ Panic attack
		  ◦ Hypertension
		• With bradycardia
		  ◦ Drug overdose
		• With deceased BP
		  ◦ Syncope
		  ◦ Postural hypotension
		  ◦ Anaphylaxis
		  ◦ Cardiac arrest
		  ◦ Adrenal insufficiency
		  ◦ Allergic reactions

Ventilation failure	• Hyperventilation • Asthma • COPD • Airway obstruction	• Anaphylaxis • Myocardial infarction • Drug overdose • Hyperglycemia
Pruritus, urticaria, angioedema	• Pruritus • Urticaria • Angioedema • Anaphylaxis • Delayed hypersensitivity reaction	

Box F. *Continued.*

Symptoms	Primary Working Diagnoses	Secondary Working Diagnoses
Altered sensory, affective and/or motor function	• Seizure • Cerebrovascular accident	• Syncope • Hyperventilation • Hypoglycemia

*Airway obstruction, respiratory arrest, and cardiac arrest are discussed under primary survey.
**Rare office emergencies (e.g., thyrotoxicosis, Addisonian crisis and emergencies that evolve over hours or days (e.g., advanced diabetic ketoacidosis, extreme hyperosmolarity) are mentioned, but no separate protocols are presented.

medium-sized arteries of the heart. History of cardiovascular diseases, diabetes mellitus, and cerebrovascular disease increases the overall risk of perioperative MI.

Hypertensive Emergency

Hypertension is defined as a blood pressure (BP) ≥130/80 mm Hg. Hypertensive emergency (Table 6) is defined by a BP ≥180/110 mm Hg and signs and symptoms of severely elevated BP. The mechanisms that lead to severely elevated BP appear to be related to a failure of normal autoregulatory function resulting in increased vascular resistance caused by endogenous vasopressors in patients with unrecognized or under-treated hypertension; and/or following the administration of sympathomimetic drugs such as high doses of epinephrine.

Hyperventilation

Hyperventilation (Table 7) is characterized by anxiety-related dyspnea and tachypnea. Cerebral hypoxia leads to prolonged inspiration (i.e., deep sighs), which result in low CO_2 concentration and elevated arterial pH (respiratory alkalosis). Hyperventilation syndrome is common in young women. Predisposing factors include pain, and personal and environmental stress. Other causes include cardiopulmonary disease (e.g., cardiogenic shock, COPD, pulmonary edema), and central nervous system stimulants (e.g., drugs, cola, coffee, tea).

Ventilation Failure

Ventilation failure (Table 8) is defined as a rise in CO_2 concentration when alveolar ventilation either falls or fails to respond adequately to increased CO_2 production. The most common causes are acute exacerbation of asthma and COPD. Asthma is diffuse airway inflammation caused by household (dust mites, pets) and environmental (pollens) allergens in genetically susceptible patients resulting in reversible bronchoconstriction. COPD (chronic bronchitis, emphysema) is a reversible airway obstruction caused an inflammatory response to toxins, e.g., cigarette smoke.

Pruritus, Urticaria, and Angioedema

Pruritus or itching (Table 9) is a dermal reaction to diverse stimuli, including light touch, vibration, wool fibers, and a number of chemical mediators. Histamine released by mast cells is one of the most significant chemical mediators. Pruritus is a common symptom of primary skin diseases including allergic contact dermatitis. Less commonly it reflects a systemic reaction to drugs (e.g., NSAIDs, penicillin, and opioids) and other allergens.

Urticaria (Table 9) is a reaction to vasoactive substances (e.g., histamine) released by mast cells in the superficial dermis resulting in intradermal edema caused by capillary and venous vasodilation. The process could be an IgE-mediated type I hypersensitivity reaction; direct non-immune-mediated-activation of mast cells by drugs; drug-induced cyclooxygenase inhibition that activates mast cells by poorly understood mechanisms; or caused by stress and anxiety.

Angioedema (Table 9) is anaphylaxis of the subcutaneous tissues. It results from mast cell and basophil activation in the deeper dermis and subcutaneous tissues and is pathogenically related to urticaria which occurs at the

epidermal-dermal junction. The causes of acute angioedema, which may be accompanied by pruritus and urticaria, include drugs and other allergens. Chronic angioedema is mostly idiopathic, rarely IgE mediated, and some cases are hereditary.

Anaphylaxis

Anaphylaxis (Table 10) is a Type I hypersensitivity reaction. Initial exposure to an allergen results in antigen-specific antibody production dominated by the immunoglobulin E (IgE) isotype. Following re-exposure, IgE antibodies bind to mast cells and basophils associated with mucosal and epithelial tissues. The simultaneous binding of an antigen to adjacent IgE molecules fixed to Fc receptors triggers degranulation of mast cells and basophils resulting in the release of histamine, leukotrienes, prostaglandins, chemokines, enzymes and cytokines in target tissues.

Delayed Hypersensitivity Reactions

Delayed hypersensitivity or Type IV reactions (Table 11) are T-cell-mediated, i.e., specifically sensitized CD4+ T-lymphocytes initiate the reactions. Sensitization develops slowly requiring repeated exposures to a specific allergen. Once sensitized, upon reexposure immunologically committed lymphocytes react with the allergen (antigen) and damage tissue by direct toxic effects or through the release of cytokines, which activate eosinophils, monocytes, neutrophils, and macrophages and killer cells.

Seizures

Seizures are a group of neurological disorders caused by excessive discharge of cerebral neurons. They may lead to focal (motor, sensory (somatic, visual, auditory, olfactory); psychomotor (automatisms, psychical); or generalized (myoclonic, absence, and tonic-clonic or grand mal (Table 12) seizures. The cause may be genetic; or head trauma, hypoxia, infection (fever) pregnancy, drug or alcohol overdose or withdrawal, sensory input (e.g., sound, light, touch, and smell), hypoglycemia, circulatory disturbances, degenerative disorders, and tumors.

Cerebrovascular Accident

Cerebrovascular accident or stroke (Table 13) is a syndrome associated with the interruption of blood supply to a portion of the brain causing neurologic deficit. Most commonly, a stroke is secondary to an evolving blood clot associated with atherosclerosis that progressively blocks a cerebral artery. Alternatively, it may be due to an embolus that lodged in a cerebral artery obstructing blood flow or result from subarachnoid or intracerebral hemorrhage into brain tissue. Stroke-like symptoms lasting less than 1 hour are termed transient ischemia attacks (TIA).

Local Anesthetics Toxicity

Local anesthetics (LAs) are nonselective voltage-gated sodium channel blockers. This nonselective blockade is not only the source of LAs' efficacy in blocking action potentials in Aδ and C fibers, but it is also responsible for LAs toxic properties related to the blockade of other sensory, motor, and autonomic fibers. Toxic reactions (Table 14) may result from (1) excessive dosage, (2) repeated doses, (3) rapid absorption, (4) unintentional intravascular injection, (5) low plasma protein binding, and (5) slow metabolism or elimination of the LA or its metabolites.

Summary

Preparedness in emergency medicine mandates didactic and clinical training in emergency medicine, periodic office emergency drills, and maintaining basic emergency drugs and equipment. Education and hands-on training should include issues related to prevention, recognition, and emergent-setting-appropriate management of medical emergencies with emphasis on the importance of performing a primary and a secondary survey.

Table 1. Syncope.

Prevention:

- Identify at-risk patient
  - Reduce Stress
  - Treat patient in a supine position
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Adrenergic component
  - Anxiety
  - Pallor
  - Pupillary dilation
  - Palpitation
- Cholinergic component
  - Diaphoresis (perspiration)
  - Nausea
  - Salvation
  - Bradycardia
  - Hypotension
  - Sudden, brief loss of consciousness
  - Seizure (rarely)

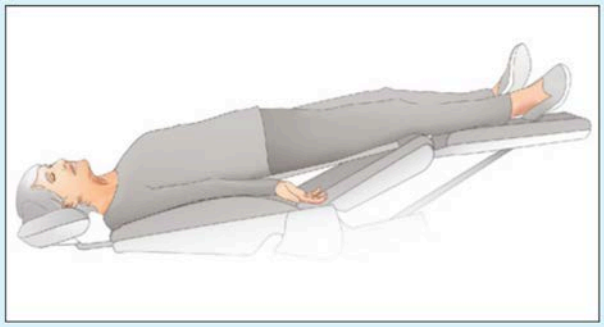
Emergency response:

- Place patient in Trendelenburg position, i.e., head and chest slightly below a line parallel to the floor and feet slightly elevated (Figure 9)
  - Administer oxygen
    - 4 to 6 L/min by nasal cannula
  - Stimulate cutaneous reflexes
    - Cold towel compresses to forehead and back of head
    - Administer aromatic ammonia inhalant
  - Reevaluate vital signs

Table 1. ***Continued.***

- If patient's condition deteriorates
    - Notify EMS
        - Monitor vital signs
            - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
                - Immediate CPR and defibrillation congruent with current recommendations

Figure 9.



Nota bene:

- Signs of recovery: vital signs return to baseline values, patient is alert
- Signs of deterioration: vital signs unstable, mental status labile

Table 2. Postural Hypotension.

Prevention:

- Identify at-risk patient
  - Schedule dental appointments 30 to 60 minutes after the ingestion of meals and medications
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity
  - Upon completion of procedures, allow at-risk patients to assume an upright position gradually over 2 minutes

Signs and symptoms:

- No prodromal signs and symptoms
- Abrupt syncope when patient assumes an upright position
  - A decline (from baseline) of 20 mm Hg or more in the systolic blood pressure AND/OR
  - A decline (from baseline) of 10 mm Hg or more in the diastolic blood pressure AND/OR
  - An increase (from baseline) in pulse rate of 20 beats per minute or more

Emergency response:

- Immediately return patient to supine position for 5-10 minutes
  - Administer oxygen
    - 4 to 6 L/min by nasal cannula
  - Reevaluate vital signs
- Allow patient to assume a sitting position for at least 2 minutes
  - Reevaluate vital signs
- Allow patient to stand for 2 minutes
  - Reevaluate vital signs
- If patient's condition is deteriorating
  - Notify EMS
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovery: vital signs return to baseline values, patient is alert
- Signs of deterioration: vital signs unstable, mental status labile
- Postural hypotension, often observed in older patients, may result in significant morbidity from associated falls
  - The lack of prodromal signs and symptoms should prompt oral healthcare providers to take preemptive action.

Table 3. Hypoglycemia.

Prevention:

- Identify at-risk patient
  - Confirm compliance with regimen of antidiabetic medications and food intake
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Signs and symptoms start to develop at plasma glucose values <65 mg/dL
  - Adrenergic manifestations
    - Twitching, tremor
    - Anxiety, nervousness
    - Sweating, cold, clammy skin
    - Pallor
    - Mydriasis
  - Glucagon manifestations
    - Hunger
    - Nausea, vomiting, abdominal discomfort
  - Neuroglycopenic manifestations
    - Fatigue, weakness, lethargy
    - Paresthesia
    - Flashes of light in the field of vision
    - Headache
    - Subtle reduction in mental capacity (plasma glucose level <65 mg/dL)
    - Impairment of action and judgment (plasma glucose level <40 mg/dL)
    - Focal or generalized seizure (plasma glucose level <30 mg/dL)
    - Hypoglycemic coma (plasma glucose level <10 mg/dL)

Table 3. *Continued.*

Emergency response:

- Place patient in a semi-reclining position (supine if patient becomes unconscious)
    - Mild hypoglycemia
        - If the patient is conscious, able to follow commands, and can swallow safely administer oral glucose in the form of glucose tablets (if available) otherwise a glass of fruit juice or 3 tbsp of sugar with water are acceptable alternatives
    - Severe hypoglycemia, i.e., loss of consciousness and/or seizure
        - Notify EMS
            - Apply a ribbon of sucrose paste (cake icing) on oral soft tissues or administer glucagon, 1 mg, IM or SL
            - Administer oxygen
                - 4 to 6 L/min by nasal cannula
            - Monitor vital signs
                - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
                    - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovering: improved mental state
- Signs of deterioration: vital signs unstable, mental status labile

Table 4. Angina Pectoris.

Prevention:

- Identify at-risk patient
    - Reduce anxiety
    - Ensure profound local anesthesia
        - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Mild to moderate substernal pain of sudden onset
    - Squeezing
    - Tight
    - Heavy
    - Radiates to the left shoulder, arm, and jaw
- BP ↑ from baseline

Table 4. *Continued.*

Emergency response:

- Place patient in an upright or semi-reclining position
  - Note the time and administer nitroglycerin
    - 0.4 mg, tablet/spray, SL
    - Administer oxygen
      - 2 to 4 L/min by nasal cannula
    - Reevaluate vital signs
  - If pain is not relieved 5 minutes after the initial dose, repeat nitroglycerin
    - 0.4 mg, tablet/spray, SL
    - Reevaluate vital signs
  - If pain is not relieved 10 minutes after the initial dose, repeat nitroglycerin
    - 0.4 mg, tablet/spray, SL
    - Reevaluate and record vital signs
- In a conscious patient, chest pain lasting more than 10 minutes must be assumed to be due to unstable angina or myocardial infarction
  - Notify EMS
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovery: pain subsides, vital signs return to baseline values
- Signs of deterioration: persistent pain, unstable vital signs, altered mentation
- Adverse reaction to nitroglycerin includes flushing, headaches, dizziness, nausea, and vomiting; syncope and paradoxical angina pectoris due to nitrate-induced vasodilation has been reported

Table 5. Myocardial Infarction.

Prevention:

- Identify at-risk patient
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Severe substernal chest pain lasting longer than 3 to 5 minutes
  - Radiates to the arms, neck, shoulders, or jaw
- Weakness, dizziness, light-headedness
- Nausea and/or vomiting
- Dyspnea, tachypnea, or apnea
- Pale or ashen skin (especially around the face)
- Diaphoresis
  - Cool, clammy skin
- Hypotension
  - Systolic blood pressure <90 mm Hg
- Tachycardia (over 100 beats/minute)
  - Palpitation

Emergency response:

- Place patient in an upright or semi-reclining position
  - Notify EMS
    - Administer oxygen
      - 6 L/min by nasal cannula
    - Encourage patient to chew an adult aspirin, 325 mg, unless otherwise contraindicated
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Table 5. *Continued.*

Nota bene:

- Signs of recovery: pain is subsiding, vital signs returning to baseline values
- Signs of deterioration: pain persists, vital signs unstable, altered mentation (loss of consciousness)
- Signs and symptoms of MI vary from mild, vague discomfort to cardiogenic shock with an overall mortality rate to greater than 80%
- Patient denial may minimize symptoms and elderly and diabetic patients have a higher incidence of silent MI characterized by vague symptoms of shortness of breath, epigastric distress, hypotension, and altered mental state
- More than 60 days should elapse after a MI before elective noncardiac procedures, e.g., elective dental care
- Recent MI, defined as having occurred within 6 months of noncardiac surgery, is an independent risk factor for perioperative stroke

Table 6. Hypertensive Emergency.

Prevention:

- Identify at-risk patient
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Restlessness
- Flushed face
- Visual disturbances
- Dyspnea
  - Pulmonary edema/congestive heart failure
- A "hammering" pulse
- Altered mental state
- Chest pain
  - Myocardial ischemia, infarction, or aortic dissection
- Seizure
  - Hypertensive encephalopathy
- Cerebral hemorrhage, coma, death

Table 6. *Continued.*

Emergency response:

- Place patient in an upright or semi-reclining position
    - Notify EMS
        - Administer oxygen
            - 4 to 6 L/min by nasal cannula
        - Monitor vital signs
            - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
                - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- In the oral healthcare setting, the BP should not be acutely lowered.
    - Tissue perfusion in the brain, heart, and kidneys is tightly regulated within a certain range of mean arterial pressure (MAP), abruptly decreasing the MAP can lead to significant drop in cerebral blood flow and, thus, cerebral ischemia.
- Hypertensive urgency (BP ≥180/110 mm Hg, patient is asymptomatic)
    - Medical evaluation and risk modification within 24 to 48 hours - same day referral

Table 7. Hyperventilation.

Prevention:

- Identify at-risk patient
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Frequent (>20 breaths/min), prolonged sighing inspiration
- Dyspnea
  - Sometimes so severe that the patient feels like suffocating
- Light-headedness and dizziness
- Paresthesia
  - Burning or prickling feeling of the face and extremities
- Tonic muscle spasm
- Tetani can occur because with severe respiratory alkalosis
- Tightness, pain in the chest
- Syncope

Emergency response:

- Place patient in an upright or semi-reclining position
  - Instruct the patient to take in a shallow breath and hold it as long as possible
    - Repeat this sequence 6 to 10 times
  - Alternatively, have patient rebreed expired air from a paper bag – DO NOT ADMINISTER OXYGEN
- If patient is not responding
  - Notify EMS
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovering: breathing returns to normal
- Signs of deterioration: vital signs unstable
- Anxiety, often precipitated by personal or environmental stress, is the most common predisposing factor associated with hyperventilation, these patients respond well to pre-operative sedation
- Hypoxia, associated with cardiopulmonary disease, may also cause hyperventilation. Patients who relate a history of hyperventilation secondary to a medical condition (other than anxiety) should not receive pre-operative sedation

Table 8. Ventilation Failure.

Prevention:

- Identify at-risk patient
  - Reduce stress
  - Do not prescribe or administer respiratory depressants and COX-inhibitors
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Coughing, wheezing, shortness of breath (dyspnea)
- Anxiety, restlessness, agitation
- Pallor or cyanosis of the lips
- Noticeable use of the accessory muscles of respiration
- Patient may become confused and lethargic
- Respiratory failure (in cases of severe exacerbation)

Emergency response:

- Place patient in an upright position
  - Administer a short acting beta$_2$ agonist bronchodilator
    - Two to 4 puffs of albuterol by metered-dose inhaler (up to 3 times 20 minutes apart)
  - Administer oxygen
    - Patients with asthma do not need O_2 unless the O_{2sat} is <90% as measured by a pulse oximeter
      - 2 to 4 L/minute by nasal cannula
    - Patients with COPD require O_2 supplementation, even those who do not need it chronically
      - 2 L/minute by nasal cannula (higher levels of O_2 may worsen respiratory failure)
- If patient's condition deteriorates
  - Notify EMS
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Table 8. *Continued.*

Nota bene:

- Signs of recovery: the rate and character of breathing returns to normal
- Signs of deterioration: no improvement in the rate and character of breathing, increased cyanosis
- When ventilating a patient, squeeze the bag only until resistance is felt or the chest starts to rise and allow time for expiration
    - Attempting to ventilate with large volumes of air or too rapidly will increase "air-trapping" and may lead to pneumothorax
- Patients with a particularly severe ongoing asthma attack (status asthmaticus) who do not respond to usual treatment may progress to acute respiratory arrest and death

Table 9. Pruritus, Urticaria, and Angioedema.

Prevention:

- Identify at-risk patient
    - Reduce stress
    - Do not prescribe COX-inhibitors
    - Ensure profound local anesthesia
        - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Pruritus
    - Localized itching
    - Generalized itching
    - Maculopapular or urticarial rash
- Urticaria
    - Migratory, well-circumscribed, erythematous pruritic wheals of the skin
        - The onset with contact or inhaled allergens is within minutes or hours following exposure
        - The onset with ingested allergens is within 48 hours
        - The onset with emotional stimuli is within seconds or minutes
    - Urticaria may be accompanied by angioedema
- Angioedema
    - May be pruritic or non-pruritic and may be accompanied by urticaria
    - Local, diffuse painful swelling of the face, eyelids, lips, tongue, and extremities (back of hands)
    - Swelling of the tongue and pharyngeal and laryngeal edema may cause respiratory distress
        - Complete airway obstruction can occur

Table 9. ***Continued.***

Emergency response:

- Stop exposure precipitating agent
  - Pruritus
    - Generalized
      - Administer oral diphenhydramine (an H_1-receptor antagonist)
        - 25 to 50 mg, four times daily until symptoms subside
  - Acute urticaria
    - Administer oral diphenhydramine (an H_1-receptor antagonist)
      - 25 to 50 mg, four times daily until symptoms subside
  - Acute angioedema
    - Mild angioedema
      - Administer diphenhydramine (an H_1-receptor antagonist)
        - 25 to 50 mg, four times daily until symptoms subside
    - Severe angioedema
      - Administer prednisone
        - 30 to 40 mg, by mouth, once a day, until symptoms subside
    - Pharyngeal or laryngeal edema with stridor and wheezing
      - Notify EMS
        - Immediately administer epinephrine 1:1000
          - Adult: epinephrine (EpiPen), 0.3 mg, IM (anterolateral thigh)
          - Child: epinephrine (EpiPen Jr), 0.15 mg, IM (anterolateral thigh)

Nota bene:

- Signs of recovery: signs and symptoms subside
- Signs of deterioration: progressive angioedema' stridor, wheezing and other evidence of respiratory distress

Table 10. Anaphylaxis.

Prevention:

- Identify at-risk patient
    - A negative history of prior anaphylactic reaction does not rule out the possibility of a type I allergic reaction

Signs and symptoms:

- 1 to 15 minutes following exposure to a specific allergen
    - Pruritus, urticaria, angioedema
    - Coughing, stridor, dyspnea, wheezing,
    - Agitation, flushing, palpitation
    - Unresponsiveness, convulsion,
    - Hypotension, cardiogenic shock

Emergency response:

- Place patient in a supine position
    - Select an auto-injector with the appropriate dosage strength predicated on the patient's body weight: patients ≥30 kg (≥66 pounds): 0.3 mg
        - Remove the auto-injector from its protective case
        - Check to make sure the expiration date has not passed.
        - Confirm that the liquid inside the auto-injector is not discolored (i.e., not pinkish or brownish), cloudy, and is free of particles.
    - Grasp the auto-injector in the dominant hand, with thumb closest to the safety cap; and, with the other hand, remove the cap.
        - Hold the patient's leg to keep it steady while injecting.
            - Place (jab) the needle end of the auto-injector at right angle against the anterolateral aspect of the thigh.
            - The needle is designed to go through clothing.
    - Press on the auto-injector firmly to release the needle and inject the epinephrine.
        - Keep auto-injector in place for ≈5 seconds.
        - Do not be alarmed if liquid is left in the auto-injector, the auto-injector is designed to release the proper dose.
    - Remove the auto-injector and massage the injection site for 10 seconds.
        - Some auto-injectors have a needle that retracts back into the case after use.
        - If the needle remains exposed, insert the injector (needle first) back into its case.

Table 10. ***Continued.***

- **Immediately following the administration of epinephrine, the patient must be referred for additional medical care – Call 911.**
  - Tell the dispatcher you just administered epinephrine to a patient to treat a suspected anaphylactic reaction.
- With severe persistent anaphylaxis a repeat injection of epinephrine, with an additional auto-injector, may be necessary in 15-20 minutes.
  - **More than two sequential doses of epinephrine should not be administered without direct medical supervision of the patient.**
- Do not discard the auto-injector
  - Identify the site of injection and surrender the auto-injector to EMS personnel
- Patients with stridor and wheezing unresponsive to epinephrine should be given O_2
  - 4 to 6 L/minute by nasal cannula
- Monitor vital signs
  - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
    - Immediate CPR and defibrillation congruent with current recommendations.

Nota bene:

- Signs of recovering: character of respiration returns to normal, vital signs return to baseline values
- Signs of deterioration: loss of consciousness, breathing unstable, vital signs labile
- For patients with cardiovascular diseases and/or diabetes mellitus, start treatment with smaller doses of epinephrine
  - Paradoxically, patients taking beta-adrenergic blocking agents may require more epinephrine to reverse the effects of anaphylaxis.

Table 11. Delayed Hypersensitivity Reaction.

Prevention:

- Identify at-risk patient
    - A negative history of prior anaphylactic reaction does not rule out the possibility of a type IV allergic reaction

Signs and symptoms:

- 6 to 48 hours following exposure to a specific antigen
    - Fever, malaise
    - Pruritus, erythema urticaria
    - Perioral paresthesia
    - Angioedema
    - Wheezing

Emergency response:

- Patient should assume an upright or semi-reclining position
    - Identify drugs and other potential allergens to which the patient may have been exposed to in the clinical process
        - Verify that the onset of signs and symptoms was after the initiation of pharmacological or clinical intervention
        - Determine the time interval between the initiation of drug therapy or clinical intervention and the onset of signs and symptoms
        - If the patient is still exposed to the suspected allergen, stop its use
    - In the absence of respiratory distress
        - Prescribe diphenhydramine hydrochloride, 25 to 50 mg, PO, q.i.d
            - Arrange supervision of patient for at least 6 hours after the onset of signs and symptoms
            - If the patient develops wheezing
            - Instruct patient or caretaker to immediately notify EMS

Nota bene:

- Signs of recovery: symptoms subside
- Signs of deterioration: pruritus, erythema, urticaria, and angioedema worsen; stridor and wheezing progressing to respiratory distress

Table 12. Tonic-clinic (grand mal) Seizure.

Prevention:

- Identify at-risk patient
  - Eliminate known causative or precipitating factors (if possible)
  - Confirm compliance with anticonvulsant chemotherapy
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Aura phase
  - Visual and auditory disturbances
  - Dizziness
- Sudden loss of consciousness
  - Initial convulsions explosively force air out of the lungs, resulting in the epileptic "cry"
  - Generalized motor tonic-clonic seizures follow this eerie, birdlike scream
    - The tonic component is characterized by opisthotonos, the person is forced into an arched position when the violent spasm of all body musculature pulls his back muscles
      - Arching of the back creates a convexity in the ventral body region
    - The clonic component is characterized by alternating contraction and relaxation of all muscles
  - Tongue-biting
  - Increased salivation
  - Incontinence
  - Hyperventilation
- Postictal depression of motor and sensory function
  - Fatigue, mental confusion, and respiratory depression

Table 12. *Continued.*

Emergency response:

- Place patient in a supine position
  - Protect patient from injury
    - Guide the extremities during seizure, but do not restrain
  - After the seizure is complete
    - Suction oral cavity if needed
    - Position patient on his/her side (recovery position)
    - Administer oxygen
      - 4 to 6 L/minute by nasal cannula
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Notify EMS
          - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovery: patient regains consciousness, respiration returns to normal
- Signs of deterioration: unconsciousness persists, respiratory depression progressing to respiratory arrest

Table 13. Cerebrovascular Accident.

Prevention:

- Identify at-risk patient
  - Reduce anxiety
  - Ensure profound local anesthesia
    - Use local anesthetic agents containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Headache, stiffness in the neck
- Nausea and vomiting
- Pupils unequal
- Slurred speech
- Motor dysfunction
  - Facial drooping
  - Hemiplegia
- Focal or generalized seizure
- Altered mentation

Table 13. *Continued.*

Emergency response:

- Stroke assessment[22]
  - Place patient in an upright or semi-reclining position
    - Ask patient to smile
      - Normal: both sides of face move equally
      - Abnormal: one side of face does not move at all
    - Ask patient to raise both arms
      - Normal: both arms move equally or not at all
      - Abnormal: one arm drifts compared to the other
    - Ask the patient to repeat "you can't teach an old dog new tricks"
      - Normal: patient uses correct words with no slurring
      - Abnormal: slurred or inappropriate words or mute
  - If any one of the 3 signs of stroke assessment is abnormal
    - Notify EMS
      - Administer oxygen
        - 2 to 4 L/minute by nasal cannula
      - Monitor vital signs
        - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of respiratory and/or cardiac arrest
          - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovery: patient regains consciousness, respiration returns to normal
- Signs of deterioration: unconsciousness persists, respiratory depression progressing to respiratory arrest

Table 14. Local Anesthetic Toxicity.

Prevention:

- Determine dosage
  - Based on weight
    - mg of drug per pound of body weight
  - If patient weighs ≥150 lbs.
    - No more than maximum recommended dose (MRD)
  - The dose of local anesthetic agent containing a vasoconstrictor congruent with the patient's functional capacity

Signs and symptoms:

- Nausea, vomiting
- Constriction of pupils (miosis)
- Drossiness, lethargy, sedation, unconsciousness, coma
- Respiratory depression
  - Respiratory arrest
- Depressed cardiac conduction, excitability, and contractility
  - Ventricular arrhythmias
  - Atrioventricular block
  - Cardiac arrest

Emergency response:

- Place patient in a supine position
  - Administer oxygen
    - 4 to 6 L/min by nasal cannula
  - Notify EMS
    - Monitor vital signs
      - If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest
        - Immediate CPR and defibrillation congruent with current recommendations

Nota bene:

- Signs of recovery: patient regains consciousness, respiration returns to normal
- Signs of deterioration: unconsciousness persists, respiratory depression progressing to respiratory arrest

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: *www.dentalcare.com/en-us/professional-education/ce-courses/ce516/test*

1. All the following statements related to medical emergencies in oral healthcare settings are correct EXCEPT which one?

A. Diagnostic activities should be effective to establish a database that identifies those patients at-risk who may experience a medical emergency.
B. Available data on the types and incidence of medical emergencies in oral healthcare settings indicate that the rate of medical emergencies per dentist per year is quite high.
C. At a minimum, in the event of a life-threatening medical emergency, OHCP must feel comfortable to perform BLS techniques to stabilize the patient until EMS arrives.
D. It must be emphatically stated that advanced life support (ALS) activities should not be attempted without sufficient training and maintenance of skills.

2. All the following statements related to procedure-specific risk factors are correct EXCEPT which one?

A. Every procedure elicits a stress-response, i.e., "surgical stress," characterized by physiological changes accompanied by psychological reactions.
B. The magnitude of surgical stress is unrelated to the severity of tissue trauma, duration of the procedure, volume of blood loss, fluid shifts, and changes in core body temperature.
C. Procedure-related surgical stress can be classified as high, intermediate, and low with estimated rates of associated major medical events of >5%, 1-5%, and <1%, respectively.
D. With low surgical stress, e.g., dental procedures, the risk of a major medical event is negligible unless strong patient-specific risk factors are present.

3. All the following statements are correct with respect to a determination of patient-specific risk factors EXCEPT which one?

A. Identification of patient-specific risk factors is predicated on data obtained from the physical evaluation, i.e., medical history and physical examination.
B. The stress-response is mediated primarily by the sympathoadrenal system; therefore, the medical history should also seek to determine the patient's functional capacity (FC).
C. FC relates to a person's functional reserve, which correlates well with maximum oxygen uptake during treadmill testing and is expressed in metabolic equivalents (METs).
D. The method to determine FC, predicated on a person's ability to perform a spectrum of common daily activities, has not been validated.

4. All the following statements are correct with respect to risk assessment EXCEPT which one?

A. FC relates to a person's functional reserve, which correlates well with maximum oxygen uptake during treadmill testing.
B. The inability of a person to climb two flights of stairs or to run a short distance is indicative of a functional capacity of <4 METs.
C. For a patient with a history of CAD who is asymptomatic and runs 30 minutes daily the risk of a medical emergency is predictable high.
D. Risk assessment must also include a determination of the patient's baseline vital signs.

5. All the following statement related to the ASA PS classification system are correct EXCEPT which one? The ASA PS classification system _____.

A. invariably is predicated on patient-specific risk factors as identified in consultation with a physician
B. provides a practical method to quantify perioperative risk for patients undergoing surgical (and by extension dental) procedures
C. correlates well with the rate of perioperative complications in medicine
D. defines ASA PS II as a patient with well-controlled mild systemic disease affecting one organ system and no substantive functional limitations, i.e., good functional capacity

6. Which of the following statements is correct with respect to the risk of major medical events associated with ASA FS IV?

A. Minimal risk
B. No immediate risk
C. Imminent risk
D. Possible risk

7. Being prepared to respond to a major medical event in oral healthcare settings requires all the following EXCEPT which one?

A. Knowing what to look for, i.e., familiarity with predisposing factors and signs and symptoms of medical emergencies.
B. Being alert, i.e., looking for evidence of distress or adverse reactions, particularly when drugs are being administered to the patient.
C. Regularly checking the status of emergency drugs and other equipment.
D. Training under real-life conditions, such as in an emergency room rotation.

8. When faced with an emerging medical event, the primary survey must be implemented in every situation to identify those problems that are not immediately life-threatening.

A. True
B. False

9. All the following statements related to a patient's level of consciousness are correct EXCEPT which one?

A. An alert patient is awake and speaks.
B. A disoriented patient may moan, cry, or make other sound.
C. An unconscious patient is silent.
D. An unresponsive patient does not respond to verbal commands but responds to painful stimuli.

10. Which of the following statements related to the responsive patient as determined during the primary survey is correct?

A. Place the patient on a firm, flat board (e.g., EMS board) to allow for adequate compressions later.
B. Summon the office emergency team.
C. Notify emergency medical services (EMS).
D. Place the patient in the dental chair in an upright/semi-reclining position.

11. All the following statements are correct with respect to the status of the airway and actions to be taken during the primary survey EXCEPT which one?

A. If the patient is responsive (i.e., alert) but is talking only in a whisper) the airway is completely obstructed.
B. If the patient is unresponsive (i.e., does not respond to verbal commands and painful stimuli) evaluate airway.
C. If the airway is not open, it may be due to relaxation of the soft tissues of the oropharynx - perform head-tilt/chin-lift.
D. If obstruction is caused by foreign material it must be cleared - suction thick, frothy, bloody saliva and vomitus; foreign object must be removed.

12. All the following statements related to a patient's breathing and pulse and actions to be taken during the primary survey are correct EXCEPT which one?

A. During the primary survey the patient's breathing and pulse should be checked sequentially, i.e., see if the patient's chest rises and falls, listen for escaping air, feel the airflow against the side of your cheek; and lastly, palpate the carotid artery.
B. In an unresponsive patient with normal breathing and a definite pulse monitor vital signs until EMS arrives.
C. In an unresponsive patient, if the breathing is not normal, but the patient has definite pulse initiate rescue breathing.
D. In an unresponsive patient, in the absence of pulse, begin cardiopulmonary resuscitation (CPR) and prepare for automated external defibrillation (AED).

13. All the following statement related to the management of a patient who is not breathing or takes only agonal breaths (i.e., isolated or infrequent grasping) and has no pulse are correct EXCEPT which one?

A. Begin CPR, turn on AED and apply AED pads - when the AED is ready to analyze the heart rhythm, ensure that the rescuer continues performing CPR.
B. If the AED advises that a shock is not indicated, resume CPR immediately until prompted by AED to allow rhythm check (about 2 minutes).
C. If the AED advises that a shock is indicated, press the shock button and resume CPR immediately until prompted by AED to allow rhythm check (about 2 minutes).
D. Perform CPR with defibrillation until EMS takes over or the patient starts to move.

14. For each minute CPR and defibrillation is delayed, the patient's chances of survival is reduced by 7 to 10 percent.

A. True
B. False

15. All the following statements related to airway obstruction due to a foreign object are correct EXCEPT which one?

A. A conscious patient who is clutching the throat is showing the universal sign of choking - encourage the patient to cough forcefully until he/she can breathe normally.
B. If the coughs become week and ineffective, place the patient in a supine position and deliver quick, upward abdominal thrusts until the object is forced out.
C. If the patient becomes unresponsive, immediately begin CPR with chest compressions and make sure an AED is readily available.
D. Each time the airway is opened to give ventilations, look for any visible objects in the oropharynx - if a foreign object is not visible, perform a blind finger sweep.

16. All the following statements related to the secondary survey are correct EXCEPT which one?

A. If the patient is conscious and communicative, proceed with the secondary survey.
B. Before determining the patient's blood pressure, reassess the pulse rate and character and the rate and character of respiration.
C. During the secondary survey correlate signs and symptoms associated with the patient's chief complaint to a specific organ or body system.
D. The secondary survey is to identify problems that are not immediately life-threatening (e.g., hypoglycemia, angina pectoris, ventilation failure), but require timely stabilization.

17. All the following statements related to medical emergencies within the context to the secondary survey are correct EXCEPT which one?

A. Physical signs and symptoms are produced by physical causes and must be recognized before a physical problem can be diagnosed.
B. Without at least a presumptive or working diagnosis there is nothing to treat.
C. Based on symptoms analysis, medical emergencies can be characterized as altered consciousness; chest pain; and ventilatory, allergic (e.g., pruritus, urticaria, angioedema), and neurogenic (e.g., altered sensory, affective, motor function).
D. Common office emergencies such as thyrotoxicosis, Addisonian crises, advanced diabetic ketoacidosis, and extreme hyperglycemia are predictably diagnosed and dealt with in the primary survey.

18. All the following statement related to syncope are correct EXCEPT which one?

A. Syncope is defined as sudden brief loss of consciousness due to cerebral ischemia.
B. In the young adult syncope it is usually precipitated by anxiety, pain, heat, or humidity.
C. Syncope in patients over 50 years of age may likely be secondary to cardiovascular disorders (e.g., dysrhythmia, postural hypotension), hypoglycemia or cerebrovascular insufficiency.
D. In syncope, the initial cholinergic response to a stressor is followed by an overwhelming adrenergic response.

19. All the following statements associated with syncope are correct EXCEPT which one?

A. Signs and symptoms associated with the adrenergic component of syncope include diaphoresis (perspiration), nausea, salivation, bradycardia, hypotension, and loss of consciousness.
B. When the working diagnosis is syncope, place patient in Trendelenburg position, i.e., head and chest slightly below a line parallel to the floor and feet slightly elevated.
C. Emergency responses to syncope include the administration of oxygen, 4 to 6 L/min by nasal cannula, and stimulation of cutaneous reflexes.
D. If at any time the patient with syncope becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest.

20. All the following statements related to postural hypotension are correct EXCEPT which one?

A. Postural hypotension is defined as a decline of ≥20 mm Hg in the systolic BP, and/or a decline of ≥10 mm Hg in the diastolic BP, or an increase of ≥20 beats/minute in pulse rate.
B. Signs and symptoms of postural hypotension include a distinctive prodrome.
C. Acute signs and symptoms include abrupt cerebral ischemia (syncope) following postural change from a supine to an upright position.
D. Postural hypotension may be secondary to impaired homeostatic mechanisms of blood pressure regulation; age and/or cardiovascular-disease-related physiological changes; anti-hypertensive medications; and/or recent intake of food.

21. All the following statements related to the emergency response to postural hypotension are correct EXCEPT which one?

A. Immediately return patient to supine position for 5-10 minutes; administer oxygen, 4 to 6 L/min by nasal cannula; and reevaluate vital signs.
B. When vital signs return to baseline values, allow patient to assume a sitting position for at least 2 minutes; reevaluate vital signs.
C. If vital signs are stable, allow patient to stand for 2 minutes; reevaluate vital signs; stable vital signs and alertness are signs of recovery.
D. Postural hypotension is often observed in younger patients and may result in significant morbidity.

22. All the following statements related to hypoglycemia are correct EXCEPT which one?

A. Glucagon promotes hepatic glycogenolysis and gluconeogenesis and is a hypoglycemic agent.
B. Hypoglycemia is defined as sustained plasma glucose level <70 mg/dL.
C. Heavy exercise, anxiety, and infection may cause hypoglycemia.
D. The most common cause of hypoglycemia is treatment with insulin and/or oral hypoglycemic agents and delayed, decreased, or missed meals.

23. All the following statements related to hypoglycemia are correct EXCEPT which one?

A. Neuroglycopenic manifestations of hypoglycemia include twitching and tremor; anxiety and nervousness; sweating, cold, clammy skin; pallor; and mydriasis.
B. If the working diagnosis is mild hypoglycemia, i.e., the patient is conscious, able to follow commands, and can swallow administer glucose tablets (if available), otherwise a glass of fruit juice or 3 tbsp of sugar with water is acceptable.
C. If the diagnosis is severe hypoglycemia, i.e., altered or loss of consciousness and/or seizure, notify EMS; apply a ribbon of sucrose paste (cake icing) on oral soft tissues or administer glucagon, 1 mg, IM or SL; administer oxygen, 4 to 6 L/min by nasal cannula; and monitor vital signs.
D. Signs of recovery include improved mental state.

24. All the following statements related to angina pectoris are correct EXCEPT which one?

A. Angina pectoris is a chronic coronary syndrome characterized by persistent cardiac oxygen demand.
B. Hypoxia (and at times anoxia) results from diseases and conditions which lead to atherosclerosis and obstruction of coronary arteries by fatty deposits that limits and/or impairs coronary blood flow.
C. Precipitating factors that increase cardiac oxygen demand in the presence of decreased perfusion of the myocardium include physical exertion, emotional stress, cold, recent meal.
D. Unstable angina pectoris may occur spontaneously at rest.

25. All the following statements related to the management of angina pectoris are correct EXCEPT which one?

A. If the working diagnosis is angina pectoris, place patient in an upright or semi-reclining position.
B. If the working diagnosis is angina pectoris, note the time and administer nitroglycerin, 0.4 mg, tablet or spray, SL and administer oxygen, 2 to 4 L/minute by nasal cannula.
C. In a conscious patient, chest pain lasting more than 5 minutes must be assumed to be due to unstable angina or myocardial infarction; notify EMS.
D. Adverse reaction to nitroglycerin includes flushing, headaches, dizziness, nausea, and vomiting; syncope and paradoxical angina pectoris due to nitrate-induced vasodilation has been reported.

26. All the following statements related to myocardial infarction are correct EXCEPT which one?

A. Myocardial infarction is caused by abrupt anoxia to a portion of the heart resulting in myocardial tissue necrosis.
B. Anoxia results from conditions that lead to the formation of atherosclerotic plaques, which in later stages become disrupted and contribute to thrombus formation.
C. Atherosclerotic plaques and thrombi impair blood flow to large and medium-sized veins of the heart.
D. History of cardiovascular diseases, diabetes mellitus, and cerebrovascular disease increases the overall risk of perioperative MI.

27. All the following statements related to myocardial infarction are correct EXCEPT which one?

A. If the working diagnosis is myocardial infarction, place patient in an upright or semi-reclining position; notify EMS; administer oxygen, 6 L/min by nasal cannula; and encourage patient to chew an adult aspirin, 325 mg, unless otherwise contraindicated.
B. If at any time the patient becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest and initiate immediate CPR and defibrillation congruent with current recommendations.
C. Patient denial may minimize symptoms and elderly and diabetic patients have a higher incidence of silent MI characterized by vague symptoms of shortness of breath, epigastric distress, hypotension, and altered mental state.
D. More than 6 months should elapse after a MI before elective noncardiac procedures, e.g., elective dental care is considered.

28. All the following statements related to hypertensive emergency are correct EXCEPT which one?

A. Hypertension is defined as a blood pressure (BP) ≥130/80 mm Hg.
B. Hypertensive emergency is defined by a BP ≥180/110 mm Hg and signs and symptoms of severely elevated BP.
C. Hypertensive emergency is unlikely with the administration of sympathomimetic drugs such as high doses of epinephrine.
D. The mechanisms that lead to severely elevated BP appear to be related to a failure of normal autoregulatory function resulting in increased vascular resistance caused by endogenous vasopressors in patients with unrecognized or under-treated hypertension.

29. All the following statements related to hypertensive emergency or urgency are correct EXCEPT which one?

A. If the working diagnosis is hypertensive emergency, place patient in an upright or semi-reclining position; notify EMS; administer oxygen, 4 to 6 L/min by nasal cannula; and monitor vital signs.
B. In a hypertensive emergency in the oral health care setting, the BP should be promptly lowered to decrease the mean arterial pressure (MAP) to prevent cerebral ischemia.
C. If the working diagnosis is hypertensive urgency (BP ≥180/110 mm Hg, patient is asymptomatic), medical evaluation and risk modification is indicated within 24 to 48 hours.
D. Untreated hypertensive emergency can lead to altered mental state, chest pain (myocardial ischemia, infarction, or aortic dissection), seizure, cerebral hemorrhage, coma, and death.

30. All the following statements related to hyperventilation are correct EXCEPT which one?

A. Hyperventilation is characterized by cerebral hypoxia that leads to prolonged inspiration (i.e., deep sighs), which result in low CO_2 concentration.
B. Predisposing factors in young people include pain, and personal and environmental stress.
C. Hyperventilation syndrome is especially common in young men.
D. Hyperventilation may be secondary to cardiopulmonary disease (e.g., cardiogenic shock, COPD, pulmonary edema), and central nervous system stimulants (e.g., drugs, cola, coffee, tea).

31. All the following statements related to hyperventilation are correct EXCEPT which one?

A. If the working diagnosis is hyperventilation, place patient in an upright or semi-reclining position; instruct the patient to take in a shallow breath and hold it as long as possible; repeat this sequence 6 to 10 times.
B. If the working diagnosis is hyperventilation, place patient in an upright or semi-reclining position and administer oxygen, 4 to 6 L/min by nasal cannula.
C. Signs and symptoms of hyperventilation include light-headedness and dizziness, paresthesia, burning or prickling feeling of the face and extremities tightness or pain in the chest, and syncope.
D. Tonic muscle spasm and tetani can occur because with severe respiratory alkalosis.

32. All of the following statements are correct with respect to ventilation failure EXCEPT which one?

A. Ventilation failure is defined as a rise in CO_2 concentration when alveolar ventilation either falls or fails to respond adequately to increased oxygen.
B. The most common causes are acute exacerbation of asthma and chronic obstructive pulmonary disease (COPD).
C. Asthma is a diffuse airway inflammation in response to household (dust mites, pets) and environmental (pollens) allergens in genetically susceptible patients resulting in reversible bronchoconstriction.
D. COPD is a reversible airway obstruction caused an inflammatory response to toxins, e.g., cigarette smoke.

33. All of the following statements are correct with respect to ventilation failure EXCEPT which one?

A. Signs and symptoms of ventilation failure include coughing, wheezing, shortness of breath (dyspnea); anxiety, restlessness, agitation; pallor or cyanosis of the lips; noticeable use of the accessory muscles of respiration; and respiratory failure.
B. If the working diagnosis is ventilation failure, place patient in an upright position; administer a short acting $beta_2$ agonist bronchodilator, two to 4 puffs of albuterol by metered-dose inhaler (up to 3 times 20 minutes apart).
C. Patients with asthma do not need O_2 unless the O_2 sat is <90% as measured by a pulse oximeter, 2 to 4 L/min by nasal cannula.
D. Patients with COPD must not be given O_2 supplementation, as higher levels of O_2 may worsen respiratory failure.

34. All the following statements are correct with respect to pruritus, urticaria, or angioedema EXCEPT which one?

A. Histamine, released in response to various stimuli, is one of the most significant chemical mediators associated with pruritus and itching.
B. Urticaria is the result of vasoactive substances (e.g., histamine) released by mast cells in the subcutaneous area resulting in intradermal edema caused by capillary and venous vasodilation.
C. Angioedema is considered anaphylaxis of the subcutaneous tissues and results from mast cell and basophil activation in the deeper dermis and subcutaneous tissues.
D. The causes of acute angioedema, which may be accompanied by pruritus and urticaria, include drugs and other allergens.

35. All the following statements are correct with respect to the appropriate emergency response to pruritus, urticaria, or angioedema EXCEPT which one?

A. If the working diagnosis is generalized pruritus, urticaria, or mild angioedema, stop exposure to suspected precipitating agents and administer oral diphenhydramine (an oral H1-receptor antagonist), 25 to 50 mg, four times daily.
B. Angioedema may be pruritic or non-pruritic and may be accompanied by urticaria.<
C. If the working diagnosis is severe angioedema stop exposure to suspected precipitating agents and administer prednisone 30 to 40 mg, once a day.
D. If the working diagnosis in a child is severe angioedema with oropharyngeal and/or laryngeal edema with stridor and wheezing stop exposure to suspected precipitating agents, notify EMS, and administer epinephrine (1:1000) – 0.3 mg. IM (anterolateral thigh).

36. All the following statements related to anaphylaxis are correct EXCEPT which one?

A. Anaphylaxis is a type I hypersensitivity reaction.
B. In anaphylaxis, the initial exposure to an allergen results in antigen-specific antibody production.
C. Following re-exposure, IgG antibodies bind to mast cells and basophils associated with mucosal and epithelial tissues.
D. The simultaneous binding of an antigen to antibodies fixed to Fc receptors triggers degranulation of mast cells and basophils resulting in the release of histamine, leukotrienes, prostaglandins, chemokines, enzymes and cytokines in target tissues.

37. All the following statements related to the emergency response to anaphylaxis are correct EXCEPT which one?

A. The onset of anaphylaxis is 1 to 15 minutes following exposure to a specific allergen characterized by pruritus, urticaria, angioedema; coughing, stridor, dyspnea, wheezing; agitation, flushing, palpitation; unresponsiveness, convulsion; and hypotension, and cardiogenic shock.
B. If the working diagnosis in an adult is anaphylaxis, place patient in a supine position; immediately administer epinephrine 1:1000 - epinephrine (EpiPen), 0.3 mg, IM (anterolateral thigh), and notify EMS.
C. If a patient with anaphylaxis does not respond to an initial dose of epinephrine a repeat dose may be administered in 5minutes.
D. If at any time a patient with anaphylaxis becomes unresponsive, no normal breathing, and no palpable pulse consider the diagnosis of cardiac arrest and initiate CPR and defibrillation congruent with current recommendations.

38. All the following statements related to Type IV delayed hypersensitivity reactions are correct EXCEPT which one?

A. Type IV, delayed hypersensitivity reactions are closely related to cellular immunity in that specifically sensitized CD4+ T-lymphocytes initiate the reaction.
B. With Type IV hypersensitivity, sensitization develops rapidly following exposure to a specific allergen.
C. Once sensitized, upon reexposure immunologically committed lymphocytes react with the allergen (antigen) and release cytokines (i.e., lymphokines).
D. Lymphokines activate macrophages resulting in the release of histamine, leukotrienes, prostaglandins, chemokines, enzymes, and cytokines in target tissues.

39. All the following statements are correct with respect to delayed hypersensitivity reaction EXCEPT which one?

A. Identify drugs and other potential allergens to which the patient may have been exposed to in the clinical process.
B. Verify that the onset of signs and symptoms was 6 to 48 hours after the initiation of pharmacological or clinical intervention.
C. In the absence of respiratory distress prescribe diphenhydramine hydrochloride, 25 to 50 mg, PO, q.i.d; and arrange supervision of patient for at least 6 hours.
D. Instruct patient or caretaker that if wheezing develops to call you immediately.

40. All the following statements related to seizures are correct EXCEPT which one?

A. Seizures are a group of neurological disorders caused by excessive discharge of neurons in the medulla oblongata.
B. Seizures may lead to focal (motor, sensory (somatic, visual, auditory, olfactory), or psychomotor (automatisms, psychical); or generalized myoclonic, absence (petit mal), and tonic-clonic or grand mal seizures.
C. The cause of seizure may be genetic; or head trauma, hypoxia, infection (fever) pregnancy, drug or alcohol overdose or withdrawal.
D. Seizures may result from sensory input (e.g., sound, light, touch, and smell), hypoglycemia, circulatory disturbances, degenerative disorders, and tumors.

41. All the following statements related to the emergency response to grand mal seizure are correct EXCEPT which one?

A. Place patient in an upright position; protect patient from injury, i.e., guide the extremities during seizure, but do not restrain.
B. After the seizure is complete suction oral cavity if needed; position patient on his/her side (recovery position); administer oxygen, 4 to 6 L/min by nasal cannula.
C. Monitor vital signs: if at any time the patient becomes unresponsive, no normal breathing, and/or no palpable pulse notify EMS.
D. Signs of deterioration include persistent unconsciousness and respiratory depression progressing to respiratory arrest.

42. All the following statements related to stroke are correct EXCEPT which one?

A. Cerebrovascular accident or stroke is a syndrome associated with the interruption of blood supply to a portion of the brain causing neurologic deficit.
B. A stroke may be secondary to an evolving blood clot associated with atherosclerosis that progressively blocks a cerebral artery.
C. Most commonly, stroke is the result of an embolus that lodged in a cerebral artery obstructing blood flow or result from subarachnoid or intracerebral hemorrhage into brain tissue.
D. Stroke-like symptoms lasting less than 1 hour are termed transient ischemia attacks (TIA).

43. All the following statements related to the emergency response to a case of suspected stoke are correct EXCEPT which one?

A. Ask patient to smile – if the patient is experiencing stroke one side of face does not move at all.
B. Ask patient to raise both arms - if the patient is experiencing stroke one arm drifts compared to the other.
C. Ask the patient to repeat "you can't teach an old dog new tricks," – if the patient is experiencing stroke the words are slurred or inappropriate, or mute.
D. If the patient shows any abnormal symptoms compatible with stroke, place patient in a supine position and notify EMS.

44. All the following statements are correct with respect to local anesthetic toxicity EXCEPT which one?

A. Nonselective voltage-gated sodium channel blockade is responsible for LAs toxic properties.
B. Toxic reactions may result from an excessive initial dosage, or repeated doses.
C. Most commonly, toxic reactions result from rapid absorption or unintentional intravascular injection.
D. Toxic reactions may be due to low plasma protein binding, and slow metabolism or elimination of the LA or its metabolites.

45. Which of the following statements is correct with respect to the emergency response to local anesthetic toxicity?

A. Place patient in an upright or semi-reclining position.
B. Administer oxygen, 4 to 6 L/min by nasal cannula; notify EMS; monitor vital signs.
C. Signs of recovery: mental state improves, vital signs return to baseline values.
D. Signs of deterioration: altered consciousness progressing to coma; progressive respiratory and/or cardiac depression.

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Additional Resources

- No Additional Resources Available.

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