Medical Emergencies

Questions Session

What provides a baseline measurement?

a) Blood Pressure
b) Vital Signs
c) Medical Emergencies
d) The Dentist

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a) Blood Pressure

b) Vital Signs

c) Medical Emergencies

d) The Dentist

Vitals

- Obtaining vital signs provides a baseline measurement from which alterations in the patient's condition can be determined. This is a practice not frequently seen in dental offices. Blood pressure, pulse, respirations, and temperature-should be measured prior to each treatment
- Taking a temperature as part of the vitals check will often indicate if the patient has an infection. An oral temperature in excess of 99.6° Fahrenheit (37.5° Centigrade) is a good indicator of the presence of a viral or bacterial infection.

Figure 2. Medical Problems Which May Alter Dental Treatment	
Adrenal Insufficiency	If the patient is lacking cortisol, or on extensive steroid therapy, stress can induce a crisis.
Allergies	Patient with any type of allergic condition is more prone to drug allergies.
Asthma/COPD	Patient should bring their inhaler and keep it available during treatment, may need puff before treatment. Nitrous oxide sedation should be used with caution.
Breathing Problems	Patient may have difficulty lying supine.
Chemotherapy / Radiation Therapy / Organ Transplants	Consult any treating physicians before treatment, may be prone to infection or bone disorders.
Chest Pain	Sublingual nitroglycerin tablets should be available chairside.
Diabetes	If appointment is scheduled in morning, patient should be asked if they have eaten and taken their medication. Instant glucose should be available for hypoglycemic reactions.
Glaucoma	Atropine used as an antisialagogue could increase pressure in the anterior chamber of the eye. Caution must be used when prescribing medicines that could increase eye pressure.
Heart Problems	Noted chest pain, angina, or heart problem history should put the team on alert. Sublingual nitroglycerin tablets must be available chairside. Certain heart problems require antibiotic prohylaxis before any dental treatment.
Hemophilia	Consult M.D. before treatment which may result in bleeding.
High Blood Pressure / Hypertension	Anesthetics with epinephrine could elevate blood pressure.
Hyperventilation	Having patients breathe into a paper bag is no longer the preferred treatment. The patient should be talked through it and calmed while counting the number of breaths.
Jaundice	This should alert the team to complications such as hepatitis, liver disease, alcoholic cirrhosis.
Low Blood Pressure	Orthostatic hypotension may develop when moving patient from supine to sitting or standing position.
Pregnancy	Shield patient from radiation. Caution about drugs prescribed and anesthetics used due to placental transfer. Patient cannot be laid supine in the third trimester, may develop supine hypotension.
Psychiatric Problems	Prone to syncope, anxiety, bizarre reactions to common events. Nitrous oxide sedation may cause problems.
Seizure Disorders	Often associated with epilepsy, prepare for "triggers" to induce a seizure. Phenytoin prescribed meds will cause gingival hyperplasia.
Sinus Problems	Drainage and breathing difficulties can develop during treatment.
Syncope	Stress may provoke fainting spells, an ammonia inhalant should always be available at chairside.
Tuberculosis	Treatment should only be completed in a hospital setting and only for emergency procedures.

What pulse rate is 100-160 appropriate for?

A. Babies
B. Children up to age 10
C. Adults
D. Elderly

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Pulse

- Three assessments can be made concerning the pulse; rate, strength, and regularity. The number of pulsations in fifteen seconds is counted and then multiplied by four to obtain the pulse rate. For adults, the pulse is usually in the 60-100 range.
- In adults, a pulse exceeding 100 beats per minute is termed **tachycardia** and **bradycardia** if less than 60 beats per minute. Variations from this range are common. A person who exercises or runs regularly may normally have a resting heart rate less than 60, while a patient anxious about dental treatment may have a rapid pulse.
- Retaking the pulse in a few minutes often results in a more accurate value.

Continued

- The strength of the pulse is a rough measurement of the amount of blood ejected by the heart and the amount of constriction in blood vessels. A "weak, thready (small)" pulse is an indication of shock and low blood pressure, while a "bounding (strong)" pulse is an indication of anxiety or high blood pressure.
- Regularity is indicated by even spacing between the beats.
- An irregular pulse, which indicates a rhythm disturbance of the heart, is seen in some patients and is usually not severe.

What is considered normal blood pressure?

A. Above 160/90
B. 129/90
C. 120/80
D. 110/65

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What color is the nitrous cylinder?

A. Yellow
B. Blue
C. Green
D. White

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Oxygen-green; Nitrous- blue; Carbon Dioxide- Gray; Compressed Air- Yellow; Nitrogen- Black; Helium- brown

((Nitrous oxide = laughing gas))

A level of altered consciousness that may lead to loss of consciousness ?

A. Heart Attack
B. Stroke
C. Postural Hypotension
D. Hypertension

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Attacks of sudden onset, during which the patient's airways narrow?

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B. Syncope
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Abnormal decrease in the glucose level in the blood?

A. Diabetes
B. Acid attack
C. Hypotension
D. Hypoglycemia

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Inserting a tube into the trachea as an emergency airway is?

A. To Intubate
B. A Triage
C. Called a Stat
D. CPR

Inserting a tube into the trachea as an emergency airway is?

A. **To Intubate**
B. A Triage - Accessing the emergency care needed by patients
C. Called a Stat - Immediate transport to an emergency dept.
D. CPR

What is heat exhaustion?

A. Extreme fatigue due to heat occurs as the result of sodium & water depletion
B. Not drinking enough water
C. Exercising too much
D. Being outside in the sun

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B. Low blood pressure
C. Fainting
D. Absence of a heartbeat

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What results from severe hyperglycemia ?

A. Death
B. Diabetic Coma
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Sweating (diaphoresis), nausea or indigestive, cold and clammy skin, general malaise?

A. Signs of the flu
B. Signs of allergic reaction
C. Signs of a heart attack
D. Signs of cancer

((General malaise = not feeling well))

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Cardiac drug treats arrhythmias and congestive heart failure?

A. Atropine
B. Lidocaine
C. Digoxin
D. Nitroglycerin

Cardiac drug treats arrhythmias and congestive heart failure?

A. **Atropine** - decreases secretions , increases respiration and heart rate and is a smooth muscle relaxant….treats - bradycardia and asytole

B. **Lidocaine** - Intravarenously treats cardiac arrythmia and as an anesthetic, sodium bicarbonate corrects metabolic acidosis that occurs after the cardiac arrest -- injectable, spray

C. **Digoxin**

D. **Nitroglycerin** - is a vasodilator that is given to relieve angina-- it acts by dilating the coronary arteries so an increased volume of oxygenated blood can reach the myocardium.

Blood Pressure

- Systolic pressures less than 20 mm Hg of the patient's normal reading may indicate hypotension. Since the diastolic pressure is the "resting" pressure of the heart, it is closely monitored for the development of hypertension.
- Several factors, including stress and anxiety, can raise the blood pressure and variations in blood pressure can be noted throughout the day.
- Before a diagnosis of hypertension is made, **blood pressure should be taken on different days at different times.** Lowering blood pressure to less than **120/80** may help prevent other serious health problems as well.
- **Hypertension is anything over 140/90**

Office Emergencies

- They happen! **PREVENTION IS KEY**
- The office emergency plan should be updated and practiced regularly at periodic staff meetings or following annual CPR training sessions.
- Mock scenarios of various emergency situations can be developed which will allow each staff member to act out their assigned roles;
- Later, staff members can evaluate their performance and develop modifications to the office emergency plan as needed
- Additions to the office staff should be included in the emergency plan, and their role should be covered as part of their orientation to the office. New staff should
  - (1) review the written office emergency manual;
  - (2) be given a specific emergency assignment;
  - (3) be shown the location of all emergency equipment; and
  - (4) participate in practice situations. With careful planning and frequent practice of the office emergency plan, confusion and panic can be significantly reduced during an actual emergency

CPR

- **Here is a step-by-step guide for the new CPR:**

1. Call 911 or ask someone else to do so.

2. Try to get the person to respond; if he doesn't, roll the person on his or her back.

3. Start chest compressions. Place the heel of your hand on the center of the victim's chest.

Put your other hand on top of the first with your fingers interlaced.

4. Press down so you compress the chest at least 2 inches in adults and children and 1.5 inches in infants. "One hundred times a minute or even a little faster is optimal," Sayre says. (That's about the same rhythm as the beat of the Bee Gee's song "Stayin' Alive.")

5. If you've been trained in CPR, you can now open the airway with a head tilt and chin lift.

6. Pinch closed the nose of the victim. Take a normal breath, cover the victim's mouth with yours to create an airtight seal, and then give two, one-second breaths as you watch for the chest to rise.

7. Continue compressions and breaths – 30compressions, two breaths – until help arrives.

An early sign of a medical emergency could be:

A. Breathing has stopped
B. Patient is choking
C. Pale skin
D. Fainting

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Prevention

- Physical signs and symptoms that may indicate an incipient medical emergency include **chest pain, pale skin, sweating, vomiting, irregular respiratory rate, altered or unusual sensations, hemorrhage, and changes in pulse and blood pressure.** When an emergency situation is recognized, dental treatment should be stopped immediately and assistance summoned.
- If the patient was receiving nitrous oxide, it should be discontinued.
- ****100% oxygen should be given in its place in every case but *hyperventilation.*
- Establish patient responsiveness by shaking and asking in a loud voice "Are you okay?" Lay the patient in a supine position. If the situation appears serious, call 911 immediately.

Drug	Recommended dosage for adults
Alprazolam	4 mg / day
Diazepam	2-10 mg
Flurazepam	15-30 mg
Midazolam	Rarely used
Oxazepam	10-30 mg
Triazolam	125-250µg
Eszopiclone	2-3 mg
Zaleplon	5-10 mg
Zolpidem	10 mg

Situation	Agent	Regimen
Standard general prophylaxis	Amoxicillin	Adults: 2g Children: 50mg/kg orally 1 hour before the procedure
Inability to take oral medications	Ampicillin	Adults: 2g Children: 50 mg/kg IM/IV 30 min before procedure
Allergy to penicillin	**Clindamycin** or Cephalexin/Cefadroxil or Azithromycin/ Clarithromycin	Adults 600 mg Children 20 mg /kg Adults 2g Children 50mg/kg Adults 500 mg Children 50 mg/kg Orally 1 hour before the procedure
Allergy to penicillin and inability to take oral medications	**Clindamycin** or Cefazolin	Adults 600mg Children 20mg/kg IV 30 min before Adults 1g Children 25 mg/kg IM/IV 30 min before

ASA Physical Status Classification

- Class 1: Healthy patient with no systemic disease.
- Class 2: Mild Systemic disease with no limits on activity.
- Class 3: Severe systemic disease that limits activity.
- Class 4: Incapacitating systemic disease that is life threatening.
- Class 5: Refers to emergency of any kind.

ESSENTIAL EMERGENCY DRUGS

IN YOUR KIT

Category	Generic drug	alternative	quantity	Availability
Allergy – anaphylaxis	Epinephrine	None	1 preloaded syringe +3x1 ml ampules	1:1000 (1mg/ml)
allergy – histamine blocker	Chlorphenira mine	Diphenhydra mine (Benadryl)	3x1 ml ampules	10 mg/ml

Oxygen	Oxygen		1 "E" cylinder	
Vasodilator	Nitroglycerin	Nitrostat sublingual tablets	1 metered spray bottle	0.4 mg /metered dose
Bronchodilator	Albuterol	Metaproterenol	1 metered dose inhaler	Metered aerosol inhaler
Antihypoglycemic	Sugar	Insta – glucose gel	1 bottle	
Inhibitor of platelet aggregation	Asprin	None	2 packets	325mg/tablet

Equipment	Recommended	Alternative	Quantity
Oxygen delivery system	Positive pressure and demand valve Pocket mask	Oxygen delivery system with bag valve mask device	Minimum: 1 large adult, 1 child 1 per employee
Automated electronic defibrillator(AED)	Many		1 AED
Syringes for drug administration	Plastic disposable syringes with needles		3x2 ml syringes with needles for parenteral drug administration
Suction and suction tips	High volume suction Large diameter, round ended suction tips	Non electrical suction system	Office suction system Minimum 2
Tourniquets	Robber and Velcro tourniquet; rubber tubing	spygmomanometer	3 torniquets and 1 spygmomanometer
Magill intubation forceps	Magill intubation forceps		1 pediatric Magill intubation forceps

SECONDARY DRUGS

IN YOUR KIT

Category	Generic Drug	Alternative	Quantity	Availability
Anticonvulsant	Midazolam	Diazepam	1x5 ml vial	5 mg/ml
Analgesic	Morphine sulphate	Meperidine	3x1 ml ampules	10 mg/ml
Vasopressor	Phenylephrine		3x1 ml ampules	10 mg/ml
Antihypoglycemic	50% dextrose	Glucagon	1 vial	50 ml ampule
Corticosteroid	Hydrocortisone sodium succinate	Dexamethasone	2x2 ml mix- o – vial	50 mg/ml
Antihypertensive	Esmolol	Propranolol	2x100 mg/ml vial	100 mg/ml
Anticholinergic	Atropine	Scopolamine	3x1 ml ampules	0.5 mg/ml
Respiratory stimulant	**Aromatic ammonia**		**2 boxes**	**0.3 ml/vaporole**
Antihypertensive	Nifedipine		1 bottle	10mg/capsule

Category	Generic Drug	Alternative	Quantity	Availability
Cardiac Arrest	epinephrine		3x10 ml preloaded syringes	1:10,000 (1mg/10ml syringe)
Analgesic	Morphine sulphate	$N_2O - O_2$	3x1 ml ampules	10 mg/ml
Antidysrhythmic	Lidocaine	Procainamide	1 preloaded syringe and 2x5 ml ampules	100 mg/ syringe
Symptomatic Bradycardia	Atropine	Isoproterenol	2x10 ml syringes	1.0 mg/10 ml
Paroxysmal Supraventricular Tachycardia	Verapamil		2x4 ml ampules	2.5 mg/ml

Antidotal Drugs

IN YOUR KIT

Category	Generic Drug	Alternative	Quantity	Availability
Opioid antagonist	Naloxone	nalbuphine	2x1 ml ampules	0.4 mg/ml
Benzodiazepine antagonist	Flumazenil		1x 10 ml vial	0.1 mg/ml
Anticholinergic toxicity Antiemergence delirium	Physostigmine		3x2 ml ampules	1 mg/ml

Syncope is a general term referring to a sudden, transient loss of consciousness that usually occurs secondary to a period of cerebral ischemia.

- Fright
- Anxiety
- Emotional stress
- Receipt of unwelcome news
- Pain especially sudden &unexpected
- Sight of blood/ surgical/ dental instruments
- (e.g. local anesthetic syringe)

Prevention: Proper positioning and Anxiety relief

Pre-syncope

- Warm feeling in face and neck.
- Pale or ashen coloration.
- Sweating.
- Feels cold.
- Abdominal discomfort.
- Lightheaded or dizziness.
- Mydriasis (Pupillary dilatation.)
- Yawning.
- Increased heart rate.
- Steady or slight decrease in blood pressure.

Stress

⬇

Catecholamines release

⬇

Decreased peripheral vascular resistance & ↑ blood flow to peripheral muscles

⬇

↓ venous return

⬇

↓ circulatory blood vol. & drop in arterial B.P.

⬇

Activation of Compensatory mechanisms

⬇

Reflux bradycardia develops (< 50)

⬇

Significant drop in cardiac output associated with fall in B.P below the critical level

⬇

Cerebral ischemia & loss of consciousness

- POSTURAL HYPOTENSION
- Administration and ingestion of drugs e.g. antihypertensives like sodium depleting diuretics, calcium channel blockers &ganglion blocking agents, sedatives and narcotics, histamine blockers, levodopa
- Prolonged period of recumbency or convalescence
- Inadequate postural reflex
- Late stage pregnancy
- Advanced age
- Venous defects in legs (e.g. varicose veins)
- Recovery from sympathectomy
- Addison's disease
- Physical exhaustion and starvation
- Chronic postural hypotension (Shy – Drager syndrome)

- Precipitous drops in blood pressure and lose consciousness whenever they stand or sit upright
- Do not exhibit any prodromal signs and symptoms
- May become lightheaded, or develop blurred vision
- Clinical signs and symptoms - precipitating drugs
- Blood pressure during syncopal period is quite low
- Un like vasodepressor syncope , heart rate during postural hypotension remain at the baseline level or somewhat higher
- **Consciousness returns rapidly once the patient is returned to the supine position**

Pathophysiology:

When patient moves into an upright position

⬇

SBP drops and approaches 60 mm Hg in one minute

⬇

DBP also drops

⬇

Slight changes in heart rate and not at all

⬇

Cerebral blood flow drops below the critical level

⬇

May lose consciousness

⬇

Once the patient is placed into supine position, reestablishment of cerebral blood flow occurs

ACUTE ADRENAL INSUFFICIENCY : (ADRENAL CRISIS)

A third potentially life - threatening situation that may result in the loss of consciousness. The condition is uncommon, is potentially life – threatening, but is readily treatable.

Predisposing factors:

- **Lack of gluco-corticosteroid hormones**
- *Mechanism 1:* sudden withdrawal of steroid hormones in the patient who suffers **primary adrenal insufficiency (Addison's disease)**
- *Mechanism 2:* After the sudden withdrawal of steroid hormones from a patient with normal adrenal cortices but with a temporary insufficiency resulting from cortical suppression through prolonged exogenous gluco-corticosteroid administration (**secondary insufficiency**)
- *Mechanism 3:* **Stress** either physiologic or psychological.

If the **adrenal gland cannot meet the increased demand**, clinical signs and symptoms of adrenal insufficiency develop.

- *Mechanism 4:* After bilateral adrenalectomy
- *Mechanism 5:* After sudden destruction of pituitary gland.
- *Mechanism 6:* Injury to the both adrenal glands (trauma, infection, thrombosis, or tumor)

Prevention:

- History of rheumatic fever, asthma, TB, emphysema, other lung diseases, arthritis and rheumatism
- Allergic history to drugs, food, medications, latex

Rule of TWOs

- In a dose of 20 mg or more of **cortisone** or its equivalent
- Via oral or parenteral route for a continuous period of two weeks or longer
- Within 2 years of dental therapy

Symptom	Sign	Laboratory finding
1. Weakness, tiredness, fatigue 2. Anorexia 3. GI symptoms like nausea vomiting constipation, abdominal pain, diarrhea 4. Salt craving 5. Postural dizziness 6. Muscle or joint pain	1. Weight loss 2. Hyperpigmentation 3. Hypotension (<110 mm Hg systolic 4. Vitiligo 5. Auricular calcification	1. Electrolyte disturbance: ▪ Hyponatremia ▪ Hyperkalemia ▪ Hypercalcemia 1. Azotemia 2. Anemia 3. Eosinophilia

Management :

Conscious

⬇

Terminate dental treatment

⬇

P – Position patient comfortably if asymptomatic;

Supine with legs elevated slightly, if symptomatic

⬇

A→B→C – Assess & open airway (head tilt &chin lift); assess airway patency& breathing; assess circulation (palpation of carotid pulse)

D – Definitive care:

Monitor vital signs

Summon medical assistance

Obtain emergency kit and O_2

Administer glucocorticosteroid

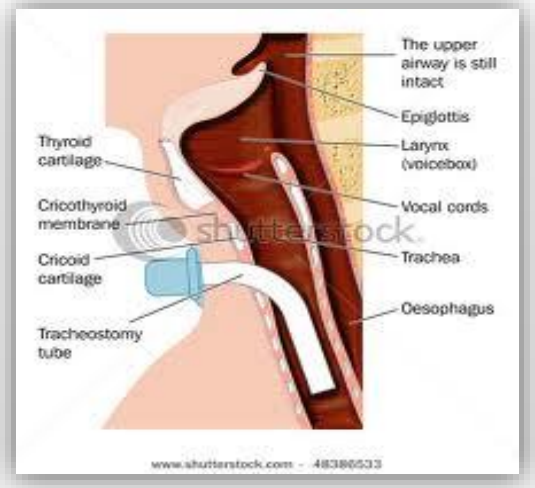
What do you do first if a patient is in respiratory distress?

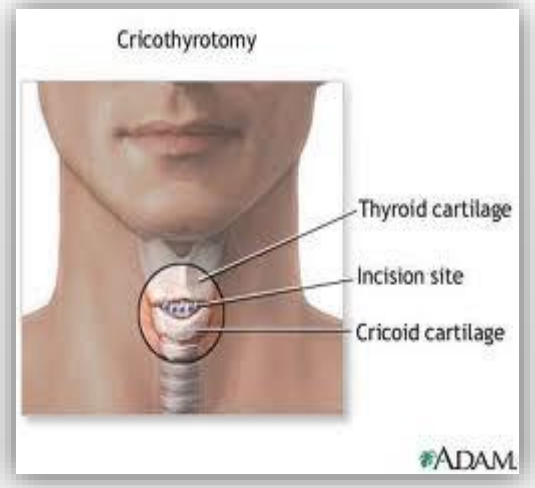
A. Perform the abdominal thrusts
B. Perform CPR
C. Check for any foreign objects
D. Call 911

What do you do first if a patient is in respiratory distress?

A. Perform the abdominal thrusts
B. Perform CPR
C. **Check for any foreign objects**
D. Call 911


Cover your fist with your other hand and thrust up and in with sufficient force to lift the victim off his feet
A.D.A.M.


The upper airway is still intact
Epiglottis
Larynx (voicebox)
Vocal cords
Trachea
Oesophagus
Thyroid cartilage
Cricothyroid membrane
Cricoid cartilage
Tracheostomy tube
shutterstock
www.shutterstock.com · 48386533


Cricothyrotomy
Thyroid cartilage
Incision site
Cricoid cartilage
A.D.A.M.

Hyper Ventilation

- It is defined as **ventilation in excess** of that required to maintain normal blood pa O_2 (arterial oxygen tension) and pa CO_2 (arterial carbon dioxide tension). It is produced by **increase in frequency or depth of respiration, or both.**
- Common emergency occur in dental office , almost always occur is a result of **extreme anxiety.**
- ****Paper bag or their own hands**

Prevention:

- Through prompt recognition and management of anxiety
- Physical evaluation of the patient
- The vital signs of apprehensive patients may deviate from normal. Recording the vital signs at the patient's initial visit
- Stress reduction protocol is the primary means of preventing hyperventilation

Anxiety

↓

Increased rate and depth of respiration

↓

↑ exchange of O_2 & CO_2 by lungs

↓

↑ blowing off of CO_2 and $paCO_2$ decreases

↓

Hypocapnia

↓

↑ in blood pH

↓

Respiratory alkalosis

Asthma

Extrinsic or allergic asthma,

- The allergens may be airborne – house dust, feathers, animal dander, furniture stuffing, fungal spores, or plant pollens.
- Food and drugs – cow's milk, egg, fish, chocolate, shellfish, tomatoes, penicillins, vaccines , asprin, and sulfites.
- Type I hypersensitivity reaction – Ig E antibodies produced in response to allergen
- Approximately, 50% asthmatic children become asymptomatic before reaching adulthood

Heart Failure and Acute Pulmonary Edema

- ASA I – no dyspnea and fatigue with normal exertion. No special dental modifications.
- ASA II – mild dyspnea and fatigue during exertion. Stress reduction protocol should be considered
- ASA III – dyspnea and fatigue with normal activities - Medical consultation, stress reduction protocol, other treatment modifications.
- ASA IV – dyspnea, undue fatigue and orthopnea at all times. Only elective procedures – dental emergencies managed with medication – physical intervention only in hospital dental clinics.

Hypoglycemia

- Addison's disease
- Anorexia nervosa
- Decrease in usual food intake
- Ethanol
- Factitious hypoglycemia

- Hepatic impairment
- Hyper and hypothyroidism

- Increase in usual exercise
- Insulin

- Islet cell tumors

- Incorrectly used insulin pump
- Malnutrition
- Old age
- Oral hypoglycemic agents
- Over aggressive treatment of ketoacidosis
- Pentamidine, Phenylbutazone, Propranolol
- Recent change in dose
- Salicylates
- Sepsis

ASA physical status	Treatment considerations
II	▪ Eat normal breakfast and take usual insulin dose in the morning ▪ Avoid missing meals before and after surgery ▪ If missing meal is unavoidable, consult phycisian or ↓ insulin dose by half
III	▪ Monitor blood glucose levels more frequently for several days following surgery and modify insulin accordingly ▪ Consider medical consultation
IV	▪ Consult physician before treatment

Early stage – mild reaction

- Diminished cerebral function
- Changes in mood
- Decreased spontaneity
- Hunger
- Nausea

More severe stage

- Sweating
- Tachycardia
- Piloerection
- Increased anxiety
- Bizarre behavioral patterns
- Belligerence
- Poor judgment
- Uncooperativeness

Later severe stage

- Unconsciousness
- Seizure activity
- Hypotension
- Hypothermia

Hyperglycemia

- Prolonged lack of insulin (type I) or prolonged lack of tissue response (type II)
- Blood glucose levels remains elevated for longer time coz of **glycogenolysis and ↓ uptake by peripheral tissues**
- Glucose exceeds 180mg/100 ml – **glucosuria**
- Because of its large molecular size, glucose in urine carries away large volumes of water and electrolytes (Na^+ & K^+) – **polyuria**
- Dehydrated state – skin dry and flushing - **polydipsia**
- Weight loss due to depletion of water, glycogen, triglyceride(TGA) stores
- Loss of muscle mass due to aminoacids → glucose and ketone bodies
- TGA → free fatty acids (FFA) in the liver
- FFA – acetoacetate and β – hydroxybutyrate (BHA) – **diabetic ketoacidosis**
- **↓ cardiac contractility, catecholamine response, respiratory alkalosis**
- **Diabetic coma**

Management: Hyperglycemia

Recognize problem (lack of response to sensory stimulation)

⬇

Discontinue dental treatment

⬇

Activate office emergency team

⬇

P – Position, **supine position with legs elevated**

⬇

A → **B** → **C –**Assess and perform basic life support as needed

⬇

D – Definitive care:

Establish IV infusion, 5% dextrose and water or of normal saline

Summon EMS

Administer O_2

Transport to hospital

Hypoglycemia – conscious patient

Recognize problem (altered consciousness)

⬇

Discontinue dental treatment

⬇

Activate office emergency team

⬇

P – Position**, patient comfortably**

⬇

A → **B** → **C –**Assess and perform basic life support as needed

⬇

D – Definitive management:

Administer oral carbohydrates

Stroke

- Length of time elapsed since the CVA – should not undergo elective dental care within 6 months of the episode
- Minimization of stress – morning appointments, effective pain control, psych sedation during treatment
- Assessment of bleeding – most of CVA patients on antiplatelet or anticoagulant therapy

Clinical manifestations:

- **Common signs and symptoms –** headaches, dizziness, vertigo, drowsiness, chills, nausea, vomiting. Loss of consciousness and convulsive movements are less common. Weakness or paralysis of extremities occurs in contralateral side. Speech defects may be seen
- **Neurological signs and symptoms –** paralysis of one side of body, difficulty in breathing and swallowing, inability to speak or slurring of speech, loss of bladder and bowel control, unequal pupil size
- **Infarction –** gradual onset of signs and symptoms whereas **embolism and hemorrhage –** abrupt onset of signs and symptoms

Stroke Classes

Classification:

1. **cerebral ischemia and infarction** – atherosclerosis & thrombosis, cerebral embolism
2. **Intracranial hemorrhage –** arterial aneurysms & hypertensive vascular disease
3. **Others – TIA –** transient ischemic attacks

Cerebrovascular ischemia and infarction	Hemorrhagic CVA
•At cellular level, ischemia •Anaerobic glycolysis with production of lactate •Mitochondrial dysfunction → disruption of membrane and vascular endothelium •BBB breaks down and edema forms •Edema ↑ tissue mass in cranium causes mild headache •Severe edema may forces the portions of cerebral hemisphere into tentorium cerebelli •Ischemia and infarction of upperbrain stem (medulla) •Loss of consciousness and fatal	•Subarachnoid hemorrhage – ruptured aneurysms •Intracranial hemorrhage – hypertensive vascular disease •Once vessels rupture •Arterial blood supply fills the cranium •↑ in intracerebral blood pressure •Rapid displacement of brain stem into tentorium cerebelli •Ultimately death

Seizures

- *Simple partial seizure –* individual remains conscious while a limb jerks for several seconds
- *Complex partial seizures –* altered consciousness with altered behavioral patterns (automatisms) like some uncoordinated purposeless activities (lip smacking, chewing or sucking)
- *Absence seizure –* sudden immobility and a blank stare and minor facial clonic movements

TONIC-CLONIC

1. *preictal phase:* ↑in anxiety and depression , appearance of aura and soon loses consciousness, a series of myoclonic jerks occur (epileptic cry)

↑ HR, B.P, bladder pressure, piloerection, glandular hypersecretion, mydriasis, apnea

1. *Ictal phase:* series of generalized skeletal muscle contractions progresses to a extensor rigidity of extremities and trunk – **tonic component**

Generalized clonic movements, heavy stertorous breathing, alternate muscle relaxation and violent flexor contractions – **clonic component**

1. *Postictal phase:* tonic – clonic movements cease, breathing returns to normal, consciousness gradually returns

Drug Overdose Reactions **Local Anesthetic and Epinephrine Toxicity**

Signs and Symptoms of Epinephrine Toxicity

- Agitation, weakness, and headache.
- Pallor, tremor, palpitation.
- Sharp rise in blood pressure and heart rate.

Signs and Symptoms of Local Anesthetic Toxicity

- Agitation.
- Muscular twitching and tremors.
- Increased blood pressure and heart rate.
- Light-headedness.
- Visual and auditory disturbances (Tinnitis, Difficulty focussing.)
- If moderate to high overdose of Local anesthetic can also have convulsions and depression of blood pressure, heart rate, and respiration.

MANAGEMENT OF TOXIC REACTIONS TO EPINEPHRINE:

- Toxic effect of epinephrine is transitory rarely lasting more than a few minutes
- Stop dental treatment.
- Place patient in most comfortable position.
- Monitor vital signs.
- **Consider administering oxygen.**
- Allow time for the patient to recover.

- Due to its cardiovascular effects limit use in patients with history of heart disease or stroke.
- **Can cause uterine contractions in the pregnant female.**
- Possible drug interactions (Especially MAO inhibitors and Cocaine.)
- Remember the patient has endogenous epinephrine production of this is increased in stressful situations.

MANAGEMENT OF TOXIC REACTIONS TO LOCAL ANESTHETIC: treatment varies with the onset and severity of the reaction.

MILD REACTION/RAPID ONSET (Example is an intravascular injection)

- Reassure patient.
- Administer Oxygen.
- Monitor and record vital signs.
- Allow for recovery; determine if patient can be allowed to leave unescorted.

MILD REACTION/SLOW ONSET

- Toxic reaction with a delayed onset is most likely a result of impaired biotransformation.
- Evolves slowly, use caution.
- Monitor patient, record vital signs.

Treatment Considerations to Avoid Adverse Drug Reaction

- Prevention is the key. Take a complete medical history. Determine if there are any diseases present that affect the use of a drug.
- Know what medications the patient is taking and possible drug interactions.
- Careful injections make sure to aspirate to avoid an intravascular injection.

Maximum Recommended Doses of Local Anesthetic

- Lidocaine "Plain" 4.4mg/kg
- Lidocaine 2% with 1:100k Epinephrine 7.0mg/kg
- Mepivicaine "Plain" 4.4mg/kg
- Mepivicaine with 1:20k Neocobefrine 6.6mg/kg
- Bupivicaine with 1:200k Epinephrine 3.2mg/kg

Maximum Recommended Doses of Epinephrine

- Healthy Adult 0.2mg
- Cardiac Patient 0.04mg

Allergic Reaction

Signs and Symptoms of an Allergic Reaction

- **Cutaneous** reactions are the most common occurrence and include urticarial, exanthematous, and eczemoid reactions. Itching is common and can also find exfoliative dermatitis and bullous dermatosis.

- **Angioedema** (Swelling) this varies from localized slight swelling of the lips, eyelids, and face to more uncomfortable swelling of the mouth, throat, and extremities.

- **Respiratory** (Tightness in chest, sneezing, bronchospasm) bronchospasm is a generalized contraction of bronchial smooth muscles resulting in the restriction of airflow. This may also be accompanied by edema of the bronchiolar mucosa.
- Bronchospasm is more common with pre-existing pulmonary disease such as asthma or infection but can also be caused by the inhalation of a foreign substance.
- **Ocular** reactions include conjunctivitis and watering of eyes.
- **Hypotension** can occur with any allergic reaction.

Anaphylaxis:

Signs and symptoms include:

- Cardiovascular shock including; pallor, syncope, palpitations, tachycardia, hypotension, arrythmias, and convulsions.

- Respiratory symptoms include; sneezing, cough, wheezing, tightness in chest, bronchospasm, laryngospasm.
- Skin is warm and flushed with itching, urticaria, and angioedema.
- Nausea, vomiting, abdominal cramps, and diarrhea also possible.

Evaluation of Allergic Reactions: Things to remember.

- Skin manifestations may precede more serious cardiorespiratory problems.
- Recognition of skin reactions and early treatment may abort more serious problems.
- **Most important factor is assessing the seriousness of the condition is the rate of onset.**
- Reactions that occur greater than one hour after the administration of the allergen will usually be of a non-emergent nature.

General Treatment

- ABC's
- Maintain airway, administer oxygen, and determine possible need for intubation or surgical airway.
- Monitor vital signs.
- If in shock put patient in a horizontal or slight Trendelenburg position.

Mild Reactions

- Antihistamines usually effective. (Benadryl 50-100mg or Cholpheniramine maleate 4-12 mg IV, or IM.)
- Identify and remove allergen.
- Follow up medications in 4-6 hours

Severe Reactions

- If available start IV Fluids
- **Epinephrine is drug of choice**. Usually prepackaged 1:1,000 in 1mg vials or syringe
- If IV in place titrate 1:1,000 solution to effect.
- If drop in blood pressure is minimal, start with 0.5ml (0.5mg.)

- If drop in blood pressure is severe start with 2ml (2mg.)
- Repeat after 2 minutes if needed.
- If no IV use 1:1,000 (1mg/CC) IM 0.3 to 0.5mg (0.3-0.5CC.)
- For an adult repeat this dose in 10 to 20 minutes.
- If the patient is intubated can give epinephrine endotracheally
- If Asthma, edema, or pruritis (Itching) are present can use Corticosteroids. However these drugs are to slow acting to be used for an emergency situation.
- Hydrocortisone sodium succinate (Solu-cortef) 100-500mg IV or IM. Dexamethasone (Decadron) 4-12mg IV or IM.
- Repeat dose at 1, 3, 6, and 10 hours as indicated by severity of symptoms.

Other Considerations

- Monitor and record vital signs.
- Seizures are possible as a result of circulatory or respiratory insufficiency.
- Most severe allergic reactions require hospitalization and observation for 24 hours.

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