Malamed Slide

Related To Medical Emergencies
Knowing Your Patient
Preparing Dental Staff for Emergencies in the Office
Preparing for Medical Emergencies
Basic Management of Medical Emergencies

Other Quality Resource Guidelines

BP monitoring in the Dental Setting
Cardiovascular Conditions Encountered in Dental Practice
Drug Interactions: Guide for Dentistry
Local Anesthetics
Mgt of Pt with Common Medical Conditions
Medical Health History in Dental Practice

Secondary HTN
Thyroid Dz
Kidney Dz – diabetes affects kidney filters, swollen glomeruli – filters, stenosis of renal arteries
Tumors of Kidneys or Adrenals.

ACE Inhibitor Slide

Kind to the kidneys. Diuretics cause potassium wasting which leads to all sorts of problems. Not so with ACE inhibitors.
Increase Blood Flow
Widen Blood Vessels

Angioedema is a rare but potentially life-threatening adverse effect of ACEIs. Angioedema occurs in 0.1% to 0.7% of patients on ACEIs, but the association is not always recognized (1,2). The effect is idiosyncratic and unpredictable. It is more likely to occur in black patients, those older than 65 years of age and in those with a history of drug-related rash or seasonal allergies (1). Although the onset typically occurs within the first weeks of ACEI therapy (3), cases with latencies ranging from several months to several years have been reported (4). In patients with such an atypical course, the diagnosis may be missed.

Sympathetic Nvs System

Sympathetic Nervous System
T1 to L2 or 3
Part of Autonomic Nervous system. This system up or down regulates the many organ systems.
Sympathetic nervous system prepares your body to deal with a threat or stress.
Sympathetic ganglion – acetyl choline
Post ganglionic neuron – norepi.
Adrenal gland – epi and norepi.
Epinephrine and norepinephrine interact with alpha and beta receptors on target organs to elicit a particular response.
Thiazide Diuretics
Act on distal tubule to prevent sodium resorption.
Major side effect is decrease potassium.
Many years the predominant first line agent for hypertensions was the diuretics. But side effects including elevation of cholesterol and propensity of arrhythmias with potassium depletion have encouraged the use of beta blockers and ACE inhibitors and calcium channel blockers.

Potassium Sparing Diuretic
Block aldosterone's effect and inhibit sodium reabsorbtion on the distal collecting tubule.

Loop Diuretic
Act on ascending limb of loop of Henle.
Much more potent natriuretic (sodium excretion), therefore more profound electrolyte disturbances.
Their use is in patients with impaired renal function who are relatively insensitive to the effect of thiazides.

Angina
Angina is chest pain as a consequence of the heart is denied the oxygen it needs.
This is reversible process, where decreasing demand, opening the coronary arteries or increasing the level of oxygen in the blood provides relief.
Pain and discomfort are the main symptoms of angina.
Pain from angina also can occur in the arms, shoulders, neck, jaw, throat, or back.
The pain may feel like indigestion. Some people say that angina pain is hard to describe or that they can't tell exactly where the pain is coming from.
Nausea, fatigue, shortness of breath, sweating, light-headedness, and weakness also may occur.
Women are more likely to feel discomfort in the neck, jaw, throat, abdomen, or back.
Shortness of breath is more common in older people and those who have diabetes.
Weakness, dizziness, and confusion can mask the signs and symptoms of angina in elderly people.

Nitro
Decreases preload.
Results in the reduction of myocardial workload and myocardial oxygen demand.
It also causes some vasodilatation of coronary arteries (limited by atherosclerosis) increasing perfusion of ischemic myocardium.
Note: Nitroglycerin relaxes all other types of smooth muscle.

Arrhythmia
A damaged heart where the normal electrical system has been lost or scarred. The damage can be from heart attack, cardiac hypertrophy, or heart failure from a damaged valve.
Hormone imbalance, such as too much thyroid hormone in hyperthyroid.
Drugs: Caffeine, Epi, Herbal remedies (creatine, guarana, cola nut, ephedra)

Coumadin

Coumadin: works on Vit K dependent clotting factors.  2, 7, 9 and 10.
INR prothrombin time (pt) platelet tissue factor added to blood, the # is the clotting time.
Extrinsic pathway – vessel wall damaged

Heart Valves

Your heart valves lie at the exit of each of your four heart chambers and maintain one-way blood flow through your heart.
The four heart valves make sure that blood always flows freely in a forward direction and that there is no backward leakage.
Blood flows from your right and left atria into your ventricles through the open tricuspid and mitral valves.
When the ventricles are full, the tricuspid and mitral valves shut. This prevents blood from flowing backward into the atria while the ventricles contract.

Common Causes of Valve Disease

Rheumatic Fever: late consequence of bacterial infection. Heart valve becomes inflamed and sticky.
Then become scared and rigid.
Common germs that enter the bloodstream and get carried to the heart can sometimes infect the inner surface of the heart, including the heart valves. This rare but serious infection is called infective endocarditis (IE).
MVP: Valve and chordae degenerate allowing valve to collapse inward/prolapse.

Diabetes

Syndrome of disorderd glucose metabolism either from
  Absolute insulin deficiency
  Reduction of biologic effectiveness of insulin
7 % of US population, with 50% increase in last 2 decades.
Pg. 252 One study showed dental practice with 2000 patients has 40 to 70 people with diabetes and 1/3 are unaware of this.

Insulin/Diabetes Meds – move glucose from bloodstream to muscle, liver and fat.
Tests for Diabetes

Fasting blood glucose level -- diabetes is diagnosed if it is higher than 126 mg/dL twice. Levels between 100 and 126 mg/dL are called impaired fasting glucose or pre-diabetes. These levels are risk factors for type 2 diabetes.
Hemoglobin A1c test --
Normal: Less than 5.7%
Pre-diabetes: 5.7% - 6.4%
Diabetes: 6.5% or higher
Oral glucose tolerance test -- diabetes is diagnosed if glucose level is higher than 200 mg/dL after 2 hours. (This test is used more often for type 2 diabetes.)

Complication of Diabetes

One cause of microangiopathy is long-term diabetes mellitus.
In this case, high blood glucose levels cause the endothelial cells lining the blood vessels to take in more glucose than normal (these cells do not depend on insulin). They then form more glycoproteins on their surface than normal, and also cause the basement membrane to grow thicker and weaker. The walls of the vessels become abnormally thick but weak, and therefore they bleed, leak protein, and slow the flow of blood through the body. Then some cells, for example in the retina (diabetic retinopathy) or kidney (diabetic nephropathy), may not get enough blood and may be damaged. Nerves, if not sufficiently supplied with blood, are also damaged which may lead to loss of function (diabetic neuropathy).

Chronic Bronchitis

It is defined clinically as a persistent cough that produces sputum (phlegm) and mucus, for at least three months per year for two years.

Vital Signs

Vital signs give first hand objective information about the patient. Vitals should be gotten at the initial visit to form a baseline.

2 Reasons for this:
1. Determine the patients ability to withstand the stress of dental appointment.
2. Serve as a baseline during emergencies

Take it in carotid artery in emergency.
Carotid brings blood to the brain therefore you want to know if O2 in blood getting to the brain.
Press hard enough to feel the pulse but not hard enough to occlude the vessel.
Use index finger not thumb to take pulse as thumb has it’s own pulse and may lead to errors.

Heart Rate

Rate: recorded as beats per minute (bpm).
As mentioned, a normal rate is 60 to 100, with higher rates in children.
Athletes can have quite low resting heart rates in the 40's.
If you have a non-athletic adult with a rate less than 50, or above 110, a medical consultation should be considered.

Taking a BP

To get a proper reading:
Patient in an upright position
Arm supported
Patient rest for 5 min prior to taking BP
Breathing Rate

Tachypnea – increase rate most likely due to stress, one disease state Metabolic Acidosis – increased breathing to get rid of CO2 thereby bring down blood acid level.

Response to Med Consult

I have reviewed your letter regarding Mr. X. I do not think there are any contraindications to the extraction of the two teeth. I will check in with his blood pressure control. We have an appointment coming up and review the procedure with him. If you have any concerns please don’t hesitate to call.

Stress Reduction Protocol

Based on belief that prevention or reduction of stress should begin before appointment, continue into appointment and post op if necessary.

100 year olds in America

1960 3000 100 year olds in US
Today 70000 in US
By 2050 there will be 1 million.

Emergency Team

Member #1 is the first person at the scene of the emergency. When the situation develops in the dental chair this might be the doctor, hygienist or assistant. Where the situation occurs in the reception area it is the ‘front office’ people who will respond first. Thus the earlier recommendation that all office personnel be BLS-HCP trained.

Member #1 (1) remains with the victim; (2) administers BLS, as needed; and (3) activates the dental office emergency team (e.g. Yells for help!).

Member #2 is assigned to immediately ‘bring the stuff’ to the site of the emergency. The oxygen cylinder, emergency drug kit, and automated external defibrillator (AED) are kept together in an easily accessible location (e.g. near a telephone).

Member #3 is, in fact, the remaining members of the office staff. Possible duties include: activation of EMS; waiting outside for arrival of EMS and escorting them to the office; ‘holding’ the elevator in the lobby for EMS; monitoring vital signs; preparing emergency drugs for administration; keeping a written record of the event, including a time line and treatment (e.g. 10:15 AM – EMS called; 10:21 EMS arrives in dental office); and assisting in BLS.

The dentist remains the team leader, the one legally responsible for the health and safety of the patient (e.g. victim). Tasks may be delegated as long as the person performing the task is capable of doing it well under the dentist’s supervision.

MERP Training

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Emergency Drugs

Epinephrine
Most important drug
Alpha adrenergic and Beta adrenergic effects
Alpha Andrenergic Effect Mimic Sympathetic nerves on peripheral vasculature
  - Cutaneous and mucosal splanchnic vasculature with a net total increase in vascular resistance
Beta effects
  - Mimic sympathetic nerve activity on the heart beta1 and lungs beta2
    - Beta1 - increase heart rate, increase contractility
    - Beta2 – bronchodilation, constrict arteriols with redistribution of blood to the systemic circulation
Rapid activity but short activity. Therefore, observe long enough to see if it needs to be repeated.
Caution with tachy arrythmias but realistically only give in life threatening anaphylaxis, therefore no reason not to give it.
Histamine Blockers
Competitive antagonist of histamine.
Allergen reacts with Basophils of the blood and mast cells located immediately outside the small blood vessels to release histamine.
  - Does not prevent release from cells in response to injury, drugs or antigens but does prevent histamines access to its receptor site thereby blocking response of effector cell to histamine.
  - Benadryl causes sedation in 50% of individuals.

Bronchodilators
Although epi is the drug of choice for bronchospasm. The wide ranging effects of epi resulted in the development of Beta2 adrenergic agonists.
Beta2 adrenergic agonists. – have bronchial smooth muscle relaxing properties and little to no beta1 activity (increase rate and contractility)
When these drugs fail to dilate the bronchiols other bronchodilators such as epi, proterenol, or aminophyline.
Aspirin
Works on platelet to decrease clot formation. Irreversibly acetylates platelet cyclooxygenase removing all cyclooxygenase activity from the life span of the platelet.
  - Stops production of Thromboxane A2.
  - Works on cyclooxygenase in vascular endothelium thereby decreasing vessel wall thrombosis.
  - 160 to 325mg given with acute MI. Decrease mortality by 23% alone and 42% with other thrombolytics.

Epilepsy
10 million Americans suffer from seizures.
Epilepsy is not a specific disease it is a symptom of some primary form of brain dysfunction.
Three main causes:
  - Hyperexitable neurons in brain discharge randomly, ie, epileptic focus.
  - Metabolic disturbance – O2, glucose, or Ca2+ deficiencies (with Ca2+ this decrease causes a membrane instability therefore it fires.)
As seizures occur
- O2 demand goes up
- CO2 production goes up leading to acidosis

After 20 min this could lead to neuronal destruction.
Post ictal phase

What to do Post Seizure

- D/C to home/physician/hosp
- Return to baseline vitals
- No confusion or disorientation
- Escort to take them

Hypoglycemia  treatment in unconscious pt

Unconscious – IV dextrose solution.
- Glucagon 10 to 20 min onset
- Epi will increase glucose but has a host of unwanted effects (increase rate, BP and dysrhythmias.)

Hyper ventilation

Anxiety leads to increase in catecholemaine excretion – therefore increase breathing – respiratory alkylosis. 7.55 pH/decrease CO2 in brain.
- Decreased CO2 in brain leads to cerebral ischemia which leads to light headedness and dizziness.
- Decreased ionized Ca2+ in blood – therefore tingling in hands/feet/face, cramps, convulsions.
Treatment is to cup hands over face.

Allergy

Allergy: Hypersensitivity of immune systme to an otherwise innocuous exposure to a substance called the allergen leads to an exaggerated immune response.
Complex reaction: Allergen presented to T, B then Plasma cell. This activates a Mast cell to release histamine.
Immediate response: histamine release leads to heat, swelling, pain, itching, redness of skin we typically associate with mild allergy.
Later response: IL-4 (interleukin 4) this amplifies or propigates the response to other areas or organ systems.

Many different classifications:
Immediate - seconds to hours of exposure. Delayed - hours to days later. Localized - one organ system, most commonly the skin, but can be respiratory system, GI system, Cardiac system. Generalized - defined as all the systems above affected at once.
In general the more rapid the appearance of a reaction the more intense it will be.

Anaphylaxis
Anaphylaxis
Wide spread histamine release into circulation causes wide spread vasodilation and increased permeability of capillaries and marked loss of plasma from circulation. Therefore shock with in minutes. Also released form cells is SRS of anaphylaxis. This causes smooth muscle spasm of bronchiols elicit an asthma like attack and death by suffication. Treatment with epi to counteract the circulatory effects and bronchospasm.

Drug related emergencies

Adverse Drug Reactions
These account for 3 – 20% of hosp admissions.
5 – 40% admitted for something else experience an ADR in hospital
10-18% admitted for ADR have another one in hosp resulting in doubling of their hospital stay.

Local Anesthetics

All dental locals are amide locals except Benzacaine, it’s an ester.
Amides developed to combat high allergy to ester anesthetics.
300 million cartridges per year given by dentists.
Vasoactivity:
Each local anesthetic has
Lipid solubility
Protein binding
Vascular activity – vasodilation.
More lipid solubility and more protein binding more safe the drug. More vasodilation the higher the levels in the blood, therefore, less safe.

Biotransformation:
Happens in blood and liver. Pt with liver failure that are ambulatory probably have enough liver function to deal with normal doses of local anesthetic. Only 1 to 3% biotransformed in kidneys. Therefore, kidney failure/dialysis not a problem for administration of local.

7 cartridges of Articaine
8.5 cartridges of Lidocaine
5.5 cartiridges of Mepivicaine – Carbocaine
9.7 cartridges of Bupivicaine - Marcaine

Epinephrine Overdose

Symptoms are the same as acute anxiety response.
Short acting drug so overdose rarely lasts more than a few minutes
Liver makes MAO, that biotransforms epi. Pts on MAO inhibitors have increase levels of epi available in bloodstream when given.
Pts on beta blockers can not increase heart rate. There fore BP increases, but with increase BP and compensatory decrease in heart rate.

Mgt:
Parallels CVA and is supportive. You could decrease BP with NTG. Mech. NTG main use is to dilate cardiac vessels but a side effect is postural hypotension. However you should monitor BP with this.