The Medically Compromised Patient

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First and Foremost

- Office preparedness
- Many events are preventable
- Limit treatment time and difficulty
- Remember! Disease has no boundaries
Most Common Medical Emergencies on the Dental Practice

- Syncope
- Mild allergic reaction
- Angina Pectoris
- Postural Hypotention
- Seizures
- Asthmatic Attack
- Hyperventilation
- Epinephrin Reaction
- Insulin Shock
- Cardiac Arrest
- Myocardial Infarction
Equipment

- Blood Pressure Cuff
- Tourniquets
- Stethoscope
- First-aid Kit
- Emergency number call list
- Emergency Cart
- Oxygen tank (size E portable with low flow regulator)
- Nasal cannula
- Masks (non-rebreather and bag-valve mask)
- Syringes (I.M. or subQ disposable)
- Albuterol inhaler nebulizer
- Automated external defibulator
Dental Office Emergency Drugs

- Albuterol
- Aluminum Chloride
- Aminocaproic Acid
- Ammonia Spirit
- Aspirin
- Cellulose (Oxidized/Regenerated)
- Collagen
- Dexamethasone
- Dextrose
- Diazepam
- Diphenhydramine
- Epinephrine
- Flumazenil
- Gelatin (absorbable)
- Glucagon
- Glucose
- Hydrocortisone
- Lorazepam
- Morphine
- Naloxone
- Nitroglycerin
- Oxygen
- Promethazine
- Thrombin (topical)
Emergency Cart Supplies

- I.V. Supplies (fluids, tubing, access)
- Syringes and Needles
- Respiratory Support (Airways, cannulas and masks)
- Misc (ice packs and gauze)
Identifying the Patient at Risk

- Medical History or questionnaire (conditions, meds, allergies)
- Date of last Physical Examination, PCP?
- Laboratory tests
- Hospitalizations
- Medical consultation

- This is OUR responsibility to know everything
Antibiotic prophylaxis

The guidelines say patients who have taken prophylactic antibiotics routinely in the past but no longer need them include people with: mitral valve prolapse, rheumatic heart disease, bicuspid valve disease, calcified aortic stenosis, congenital heart conditions such as ventricular septal defect, atrial septal defect and hypertrophic cardiomyopathy.

Preventive antibiotics prior to a dental procedure are advised for patients with:

1. Artificial heart valves
2. History of infective endocarditis
3. Certain specific, serious congenital (present from birth) heart conditions, including: unrepaired or incompletely repaired cyanotic congenital heart disease, including those with palliative shunts and conduits, a completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first six months after the procedure, any repaired congenital heart defect with residual defect at the site or adjacent to the site of a prosthetic patch or a prosthetic device.
4. Cardiac transplant that develops a problem in a heart valve.
5. Stents, Prosthetic joints should confer with treating doctor
# Premeds

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Drug</th>
<th>Dosage Adults</th>
<th>Dosage Children</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td>Amoxicillin</td>
<td>2 g, 50 mg/kg</td>
<td>PO 1 hour prior to procedure</td>
<td></td>
</tr>
<tr>
<td><strong>Cannot take oral meds</strong></td>
<td>Ampicillin</td>
<td>2 g, 50 mg/kg</td>
<td>IM or IV within 30 min prior to procedure</td>
<td></td>
</tr>
<tr>
<td><strong>Allergic to Pen</strong></td>
<td>Clindamycin</td>
<td>600 mg, 20 mg/kg</td>
<td>PO 1 hour prior to procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cephalexin</td>
<td>2 g, 50 mg/kg</td>
<td>orally PO 1 hour prior to procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Azithromycin</td>
<td>500 mg, 15 mg/kg</td>
<td>PO 1 hour prior to procedure</td>
<td></td>
</tr>
<tr>
<td><strong>Allergic to Pen, cannot take oral meds</strong></td>
<td>Clindamycin</td>
<td>600 mg, 20 mg/kg</td>
<td>IV within 30 min prior to procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefzolin</td>
<td>1 g, 25 mg/kg</td>
<td>IM or IV within 30 min prior to procedure</td>
<td></td>
</tr>
</tbody>
</table>
ASA

Established on all patients undergoing surgery with either L.A or general anesthesia

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>The patient is normal and healthy</td>
</tr>
<tr>
<td>II</td>
<td>The patient has mild systemic disease that does not limit their activities (e.g., controlled hypertension or controlled diabetes without systemic sequellae)</td>
</tr>
<tr>
<td>III</td>
<td>The patient has moderate or severe systemic disease, which does limit their activities (e.g., stable angina or diabetes with systemic sequellae).</td>
</tr>
<tr>
<td>IV</td>
<td>The patient has severe systemic disease that is a constant potential threat to life (e.g., severe congestive heart failure, end-stage renal failure).</td>
</tr>
<tr>
<td>V</td>
<td>The patient is morbid and is at substantial risk of death within 24 hours.</td>
</tr>
<tr>
<td>E</td>
<td>Emergency status: In addition to indicating underlying ASA status (1-5), any patient undergoing an emergency procedure is indicated by the suffix &quot;E&quot;</td>
</tr>
</tbody>
</table>
ASA

- ASA I & II patients not considered high risk
- ASA III & IV require attention. Time limitations and DRUG limitations
  - Limit Epi
  - Consult with PCP
  - Review any labs/meds
  - Stress management essential
    - Diazepam, lorazepam, diphenhydramine and escort
Hypertension

- The most common primary diagnosis in the United States
- Affects 50 million Americanos
  - 30% unaware of condition
  - Only 59% are being treated
  - Only 34% are controlled to JNC 7 guidelines
- HTN underlies most cardiovascular disease
Hypertension Sequele

- Transient Ischemic Attack
- Stroke
- Angina
- Myocardial Infarction
- Renal Disease
- Claudication
Hypertension

• Signs
  – Early
    • Increased BP
    • Narrowed retinal arteries
    • Retinal hemorrhages
  – Advanced
    • Papilledema
    • LVH
    • Hematuria
    • Proteinuria

• Symptoms
  – Occipital headache
  – Failing vision
  – Tinnitus
  – Dizziness
  – Weakness
  – CHF
  – Angina pectoris
  – Renal failure
Management of HTN

• Identification
• Monitoring
• Stress and anxiety reduction
• Avoidance of orthostatic hypotension
• Avoidance of vasopressors
• Avoidance of drug interactions
• Avoid gag reflex
• Hemostasis
• Management of drug effects on the oral tissues
## BP Classification

### Blood Pressure Classification in Adults

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 130</td>
<td>&lt; 85High</td>
</tr>
<tr>
<td>Normal</td>
<td>130-139</td>
<td>85-89</td>
</tr>
<tr>
<td>Mild Hypertension</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Moderate Hypertension</td>
<td>160-179</td>
<td>100-109</td>
</tr>
<tr>
<td>Severe Hypertension</td>
<td>180-209</td>
<td>110-119</td>
</tr>
<tr>
<td>Hypertensive Crisis</td>
<td>&gt; 209</td>
<td>&gt; 119</td>
</tr>
</tbody>
</table>
Blood Pressure

• Higher blood pressures are normal during exertion or other stress. Systolic blood pressures below 80 may be a sign of serious illness or shock.

• Blood pressure should be taken in both arms on the first encounter. If there is more than 10 mmHg difference between the two arms, use the arm with the higher reading for subsequent measurements.

• It is frequently helpful to retake the blood pressure near the end of the visit. Earlier pressures may be higher due to the "white coat" effect.
MI

- Delay dental treatment for 6 months. That’s the normal time for muscle response/healing
- Avoid Epi
- Check Medicines *Many drugs can interact with digitalis, higher chance of toxicity (Epi, Macrolides, Tetracycline, ASA, NSAIDS)
- Keep anxiety low.
- Provide oral sedation, assess pretreatment vitals
MI/ Angina

- Short list of suspicion
- **M**orphine
- **O**xygen
- **N**itroglycerin
- **A**spirin
- Activate EMS!!
Pulmonary Disease

• Asthma
  – Normal lung volume, air can come in but difficulty getting it out
  – Productive cough and wheezing
  – Cyanosis
  – Increased anxiety, BP, pulse
  – PCN, ASA, NSAIDS can precipitate attack

• COPD
  – Bronchitis
  – Emphysema
  – Decreased functioning lung surface area
  – Lower Oxygen saturation
Management of Asthma

- Eliminate precipitating factors, premedicate
- Avoid macrolides with beta 2 meds (metaproterenol, albuterol, terbutaline, perbutol, salmeterol), Methylxanthines (theophylline, aminophylline), Leukotriene receptor antagonist (monteleukast)
- Position patient (upright)
- Oxygen
- Beta 2 inhaler (Albuterol),
- Activate EMS if no improvement
- Epinephrine 0.3mg sub Q q 10 min
Management of COPD

• Avoid narcotics, diazepam, lorazepam due to respiratory depression.
• Avoid nitrous as it expands, could burst “blebs”
• Oxygen o.k.
• Do not use Epi?
• Avoid treatment if upper respiratory infection present
• Additional steroid may be needed if already taking
Diabetes

- Type I (IDDM) juvenile onset, insulin and diet
- Type II (NIDDM) adult onset, diet and oral hypoglycemia agents

- Symptoms
  - Polyuria, polydipsia, polyphagia, weight loss, loss of strength
  - Bed wetting, skin infections, irritability, headache drowsiness, malaise, xerostomia
Blood Tests for Diabetes

• Fasting Blood Sugar (FBS) < 125 mg/dl
  – Current more stringent guidelines <100 mg/dl
• Post Prandial (PP) < 140 mg/dl
• HbA1C (4-6%) > 8% uncontrolled in the past 2-3 months
Management of DM

• Maximum of 2 carpules in poorly controlled patient. Epi causes glycogen breakdown which increases hyperglycemia
• Use full dose of antibiotics after major procedure or management of infections.
• Treat only acute dental issues and delay treatment for routine procedures for poorly controlled diabetic
• Control blood glucose first
• A normal NIDDM can undergo all dental procedures unless diabetic complication exists
• Avoid chronic use of NSAIDS and Steroids
Oral Complications of Diabetes

- Xerostomia
- Infection
- Poor healing
- Increased incidence and severity of periodontal disease
- Burning mouth syndrome
- Oral fungal infections
- Enamel hypoplasia
## Anemia

**Complete blood count (CBC)  Adults**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/dl)</td>
<td>13.5 – 16.5</td>
<td>12 - 15</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>41-50</td>
<td>36-44</td>
</tr>
<tr>
<td>RBC’s (x 10⁶/ml)</td>
<td>4.5-5.5</td>
<td>4 – 4.9</td>
</tr>
<tr>
<td>WBC’s (x 1000)</td>
<td>4 – 10</td>
<td></td>
</tr>
<tr>
<td>MCV</td>
<td>80 -100</td>
<td></td>
</tr>
<tr>
<td>MCH</td>
<td>26 - 34</td>
<td></td>
</tr>
<tr>
<td>MCHC%</td>
<td>31 - 37</td>
<td></td>
</tr>
<tr>
<td>Platelet</td>
<td>100000 - 450000</td>
<td></td>
</tr>
</tbody>
</table>
Anemia Values

- RBC count usually decreased
- Measurements such as Hct, Hb, MCV, MCH, RDW can diagnose the type of anemia and treatment
- Mild anemia down 25% from normal
- Moderate 25-50%
- Severe > 50% decrease from normal
- Defer dental treatment in severe cases
Management of the Anemic patient

- Avoid prilocaine and septocaine (methemoglobinemia)
- Avoid ASA, NSAID (platelet dysfunction, acidosis, gastritis)
- Determine type of anemia (G6PD, Sickel cell, Fe deficiency)
- Hypoxia, dehydration can cause crisis.
- Treat infection aggressively
- Control pain
Platelets

• Normal platelet count 150,000 to 400,000/mm³
• Primary hemostasis needs adequate number and function
• VWF enhances platelet cohesiveness
• Thrombocytopenia
  – Counts should be above 75,000/mm³
  – Spontaneous bleeding occurs at 20,000
  – Minor dentistry, platelet counts should be over 50,000
Hemostasis

- Adequate platelet count
- Adequate platelet function (Bleeding time)
- Adequate levels of VWF
- Adequate levels of all clotting factors (Pt/INR, PTT)
- Adequate blood vessel response
Clotting Cascade

- **Intrinsic Pathway (I.P)**
  - XII → XI → IX → VIII

- **Extrinsic Pathway (E.P)**
  - VII → VII → X + V

**Prothrombin (II)**

**Thrombin**

- Fibrinogen (I) → Fibrin

**Clot Formation**

**PTT**: measures I.P

**PT/INR**: measures E.P

**Factor XIII**
Bleeding Causes

- Clotting factor deficiencies
- Chronic liver disease: Cirrhosis
- Chronic Small bowel disease: Crohn’s or celiac disease
- Anti-coagulants: Heparin or Coumadin
- Platelet dysfunction: NSAIDS, ASA, von Willebrand’s disease
- Thrombocytopenia
- Broad spectrum antibiotics which destroy intestinal flora that synthesize vitamin K
Management of anticoagulated patient

• Blood tests
  – Pt/INR, (extrinsic pathway) Coumadin
  – PTT, (intrinsic pathway) Heparin
  – Bleeding time
  – CBC

• Delay elective procedures without lab values.
• Use local measures (pressure, oxidized cellulose, topical thrombin, Epi, absorbable collagen, suture)
• INR of 3 – 4.5 required for patients with mechanical heart valves, DVT, recent MI, A Fib, PE
Hold anticoagulant?

Serious embolic complications, including death, were 3 times more likely to occur in patients whose anticoagulant therapy was interrupted than were bleeding complications in patients whose anticoagulant therapy was continued.

• Cessation of anticoagulant therapy is not necessary prior to extraction.
  • INR of <3.0 is preferred and should not exceed 4.0
  • No surgical procedure should be done with an INR >5.0
  • When encountered, bleeding is encountered with periodontally involved teeth, maxillary teeth and multiple extractions.
  • Granulation tissue must be removed at the time of extraction, local measures are effective at controlling post-op bleeding.

Wahl, MJ: Myths of Dental Surgery in Patients Receiving Anticoagulant Therapy. JADA 131:77, 2000
Liver patient

- Cirrhosis
- Hepatitis – inflammation of the liver that may result from infectious (viral, mononucleosis, syphilis, TB) or other toxic causes (drugs, alcohol, APAP)
- Hepatocellular carcinoma
Liver Function Tests (LFTs)

Total Bilirubin (conjugated, unconjugated)
ALT
AST
Albumin
LDH
Alk Phos
INR
PTT
Platelets
Clotting factors (vit K)
Hepatitis Screen
Tox screen
Oral manifestations

- Bleeding
- Ecchymosis
- Petechiae
- Glossitis
- Angular cheilosis
- Impaired healing
- Parotid enlargement
- Xerostomia
Management of Hepatitis

- Standard Universal precautions
- Poorly or untreated should be given only emergency care
- Minimize use of drugs metabolized in the liver
- Monitor patient and platelet count on chronic active hepatitis and potential of excessive bleeding
- Consult physician to determine ability to undergo care
Renal Disease

• Kidneys regulate fluid volume, acid/base balance of plasma, excrete nitrogenous waste, synthesize erythropoietin, 1,25 dihydroxy-cholecalciferol, and renin

• Responsible for drug metabolism

• Target organ for parathormone (Ca++) and aldosterone (Na+)

• Disease progression leads of ESRD (End Stage Renal Disease)
Renal Disease

**Labs** BUN/creatinine (0.4 – 1.2 mg/dl) rarely elevated until destruction has occurred. Urinalysis

- Once ESRD has occurred, dialysis needed

**Problems** Bleeding, HTN, Anemia, Intolerance to drugs, susceptibility to infection

**Oral signs** mucosal pallor, xerostomia, metallic taste, ammonia breath, stomatitis, loss of lamina dura, bone radiolucencies, bleeding tendency
Management of the Renal patient

- Discuss treatment with PCP
- Try to schedule treatment day after hemodialysis (heparin)
- Avoid drugs metabolized by kidney
- Minimize risk of bleeding
- Monitor pressure
- Aggressive management of infection
- Preach good oral hygiene
- Avoid ASA, NSAIDS, propoxyphene, meperidine, PCN, tetracycline, acyclovir as they are nephrotoxic
- Lido, Amoxicillin (1/2), Clindamycin(1/2), erythromycin, doxycycline, diazepam are safe
Local Anesthetic

• Amides metabolized in the liver
• Esters are metabolized in the plasma
• Amides with Epi
  – 2% lido
  – 4% prilocaine
  – 0.5% bupivacaine
  – 4% septocaine
• Amides without Epi
  – 3% mepivicaine
  – 4% prilocaine
• Ester - propoxycaine, good for cirrhosis, mostly topicals
Epinephrine versus

- CVD, HTN, ASA III-IV patient
- MAO-I
- Antipsychotics
- PTU
- Digitalis
- Theophyline
Analgesics

• ASA, APAP, NSAIDS all OTC and work peripherally
• Narcotics work centrally
• ASA affects platelets and effect can be seen 10 days
• NSAIDS effect can be 3-7 days
• Acetaminophen (APAP) can interact with coumadin and the effect can be worsened by dehydration, alcohol, liver disease
• All meds are metabolized in the liver and excreted through kidney
• Low dose APAP with codeine, oxycodone, or hydrocodone are acceptable with liver and kidney disease
# Antibiotics

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCN</td>
<td>Kidney</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Liver</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>Kidney</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>Liver</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Kidney, Liver, Plasma</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Liver</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>Liver, Plasma</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Liver</td>
</tr>
</tbody>
</table>
Antibiotics

Avoid in Renal Disease

- PCN
- Cephalosporins
- Full dose Clindamycin
- Clarithromycin
- Gentamycin
- Metronidazole
- Vancomycin

Avoid in Liver Disease

- Ampicillin
- Macrolides
- Full dose Clindamycin
- Tetracycline
- Full dose Doxycycline
- Metronidazole
Adrenal insufficiency

- Inability to tolerate stress
- Delayed healing
- Susceptibility to infection
- Steroid supplement.
  - Hypertension with steroid use
  - Characteristic look “moon facies, buffalo hump”
  - Decreased muscle mass
  - Osteoporosis, periodontal bone loss
  - Peptic ulcer disease
Corticosteroids

- Stress fighting hormones and increased in fear, fever, infection, inflammation, trauma, or bleeding
- Endogenous secretion can be inhibited if the patient has taken exogenous steroids for 2 weeks within the past 2 years

- Determine the maximum amount of steroid taken within the past 2 years.
- 60 mg of Prednisone should be the maximum amount prescribed
- Consult with PCP but generally double the routine dose
HIV/ AIDS

• Infections disease transmitted through intimate sexual contact or parenteral pathway
• Retrovirus that attacks CD4 lymphocyte
• 1.8 million Americans infected with HIV with 950,000 deaths from disease
• No vaccine exists but therapy has improved through use of combination anti-retrovirals
• No dental worker has been infected with HIV through occupational exposure, although 6 have been infected by HIV infected dentist
HIV/ AIDS labs

- CBC with differential
- Platelet count
- CD4 count and viral load
- PT/ INR

- CD4 count to determine immune status and response to therapy. <200 is AIDS
- Viral load is predictor of disease progression
Management HIV patient

- Immunocompromised
- Antibiotic coverage for opportunistic infections
- Standard Universal Precautions
- Exam for oral lesions (candida, Kaposis sarcoma, lymphadenopathy, primary or recurrent herpes, necrotizing ulcerative periodontitis, zoster, aphthous, fungal infections).
- Treat patient normal of WBC count normal
Thyroid

Hyperthyroid treated with Propyl Thio Uracil (PTU), surgery or radioactive Iodine
- PTU can cause agranulocytosis, thrombocytopenia, vit K factors (check CBC)

Hypothyroid treated with Levothyroxine hormone replacement
Limit Epi, stress management with nitrous or diazepam
Thyrotoxicosis (thyroid storm) can be triggered by Infection, trauma, stress, surgical procedures
- Increased risk of HTN, MI, Arrythmia
- Recognize and consult physician
Pregnancy

- Restrict excessive radiographs, use lead shield, thyroid collar
- Full mouth survey should be fine dose < 1 rad
- Second trimester best for dental treatment
- Get consent for treatment
- Left lateral or semi-sitting position during third trimester, prevents compression on inferior vena cava
- Limit Epi, 2 carpules. Bupivicaine and mepivicaine are category C agents
- No Nitrous (teratogenic)
- PCN, cephallexin, Azithromycin, clindamycin are safe
- Use same rules for lactation as pregnancy
Radiation

- Prior to radiation, complete all dental treatment. Provide fluoride trays
- Extract all questionable and close to questionable teeth.
- Bone becomes hypoxic, hypocellular, hypovascular.
- May require pre med with chemo port
- WBC level will decrease. Anaerobic bacteria may flourish. Broad spectrum antibiotics
- >6500 Rads (65 Gray) Chance of ORN ↑↑↑↑
  - Hyperbaric oxygen, antibiotics, resection if needed
Organ Transplant

- Azathioprine, Cyclosporine, Tacrolimus, Prednisone are anti-rejection drugs
- Suppression and susceptibility to infection
  - Use antibiotics judiciously
  - Steroid boost
  - Cyclosporin induced gingival hyperplais
  - Premedicate
- Always discuss plan with treating physician
Herpes

• Valacyclovir
  – Cold sores 1 g. Take 2 PO q12 hours for 1 day only
  – Zoster 1 g. Take 1 PO t.i.d for 7 days
  – Recurrent herpes 500 mg. 1 PO qd or b.i.d for 6-12 months depending on immunity

• 5% Acyclovir ointment
  – 15 g tube, apply 5-6 times a day

• Acyclovir
  – 200 mg. Take 2 PO b.i.d.
SUMMARY
Problem Identification

• Antibiotics
• Anesthesia
• Anxiety
• Bleeding
• Chair Position
• Drugs
• Devices
• Equipment
• Emergencies
SUMMARY

Treatment Modifications

• Pre-op
  – Prophylactic antibiotics
  – Sedatives/ anxiety reduction
  – Food intake

• Intra-op
  – Chair position
  – Anesthesia, limitation of Epi
  – Nitrous oxide
  – Hemostatic measures

• Post-op
  – Analgesics
  – Antifibrinolytics
  – Antibiotics
EXIT