Physical evaluation and risk assessment: Chapter 1

General stress reduction protocol: open communication, short morning appointments, preoperative sedation, intra-operative sedation, profound local anesthesia, post-op pain control, contact Pt later.


Clinical lab tests normal values: white bcs 4400-11000 per ml. Platelets 150,000-450,000/microliter. Bleeding time 2-8 minutes. Prothrombin time 10-13 seconds. Fasting glucose 70-110 mg/dl.


Infective endocarditis prophylaxis: Chapter 2

Infective endocarditis prophylaxis: Amoxicillin 2 grams or Clindamycin 600 mg 1 hour before or up to 2 hours after if miss inadvertently. Provide antibiotic prophylaxis for all dental procedures except: routine anesthetic injections, radiographs. Prophylaxis is necessary any time there is gingival manipulation, perforation of the oral mucosa (RD) or instrumentation beyond the apex.

Endocarditis JADA FEB 2008: Prophylaxis if: Prosthetic valve or prosthetic material to repair a valve, previous IE, cardiac transplant Pts with cardiac valve disease, congenital heart disease (CHD) including unrepaired cyanotic CHD including palliative shunt and conduits. Completely repaired CHD with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first six months after procedure. Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device which inhibit endothelialization. Cardiac x-plant pts who develop

Baumgartner: 1/30 or 3.3% had bacteremia 5 minutes after endo treatment. Aerobes and anaerobes cultured. 83% bacteremia for apical surgery.

Giglio: 16% bacteremia with suture removal.
**Eisenbud**: case report of endo then BE 2 months later. Little says usually BE occurs 2 weeks after bacteremia.

**Prosthetic joint infection**: Bacteremia from oral cavity can and do cause late implant infection. Pts with pins, plates and screws, or other orthopedic hardware that is not within a synovial joint are not at increased risk for hematogenous seeding by microorganisms. Pts with joint replacements are at increased risk. The American academy of orthopedic surgeons recommends prophylaxis of all Pts with prosthetic joint replacement

Jan 2015 Systematic review found no association between dental procedures and prosthetic joint infections. Based on this review, the 2014 Panel concluded that prophylactic antibiotics given prior to dental procedures are not recommended for patients with prosthetic joint implants.

The American Dental Association and the American Academy of Orthopaedic Surgeons (AAOS) recently released (Jan 2015) evidence-based guideline on the Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures. The guidelines are based on a systematic review of the literature. I read the full report and am convinced that the recommendations were developed using evidence-based science and worked extremely hard to prevent personal bias. The In 2014, the ADA Council on Scientific Affairs assembled an expert panel to update and clarify the clinical recommendations found in the 2012 evidence-based guideline, Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures.

As was found in 2012, the 2014 updated systematic review found no association between dental procedures and prosthetic joint infections. Based on this review, the 2014 Panel concluded that prophylactic antibiotics given prior to dental procedures are not recommended for patients with prosthetic joint implants. The ADA encourages dental professionals to review the full 2014 guideline and take this recommendation into account, consult with the patient's orthopedic surgeon as needed, and consider the patient's specific needs and preferences when planning treatment.

**Hypertension: Chapter 3**

**Dental risk**: delivery of care to Pt with severe uncontrolled HTN could result in angina, stroke or MI. Stress and anxiety related to dental visit may cause increase in blood pressure leading to angina, MI or stroke. In Pts using non-selective beta blockers, excessive use of vasoconstrictor can cause elevated BP.

**Classification of BP in adults**: <120 and <80 is normal. 120-139 or 80-89 pre-hypertension, recheck in 1 year. 140-159 or 90-99 is stage 1, confirm in 2 months. >160 or > 100 is stage 2, refer. Defer elective dental treatment if >180 or > 110 no elective dental care, immediate referral or within 1 week.
For Pts being treated for HTN consider: stress reduction protocol, oral sedative, excellent local anes, limit 1:100,000 epinephrine to 2 cartridges if taking non-cardio-selective beta blocker, consider intraoperative monitoring of BP for Pts with upper level stage 2 HTN and stop appointment if reaches 180/110. Make slow changes to chair position to avoid orthostatic hypotension.

**Systolic pressure:** pressure @ peak ventricular contraction.

**Diastolic pressure:** resting resistance in arterial system after passage of pulse force of left ventricle.

**HTN symptoms:** usually asymptomatic, headache, tinnitus, dizziness. Late stage HTN leads to kidney, brain, eye, and heart damage.

**Severe HTN:** >180/120. Medical emergency.

**3 elements of risk assessment for HTN:** 1- CV disease. 2-The Procedure. 3- Pts Functional Reserve.

**METS:** climbing a flight of stairs without being breathless= 4 METS. Vigorous sports like tennis 13 METS Usually any Pt with 4 MET ability and above has adequate functional reserve for my treatment.

**3 Benefits of vasoconstrictor:** reduce endogenous catecholamine release, delay systemic absorption of LA, and enhanced quality and duration of pain control. **2 Risks:** acute elevation in BP or arrhythmia.

**Adrenergic receptors: alpha 1 and alpha 2** in peripheral arterioles. When bound, lead to vasoconstriction. **Beta 1 in heart →** increase CO and HR. **Beta 2 in arterioles in sk. m. →** vasodilatation.

**Vasoconstrictor effects:** epinephrine→ potent stimulator of alpha and beta with a predominance of beta 2. So while epi will increase HR it also has smaller potentially pressure lowering effects peripherally. Levo-nordephrine→ primarily stimulates beta 1 with some alpha 1. So with levo, you do not get as much peripheral vaso dilation. Nor-epi we do not use per potent stimulator of alpha 1 and beta 1.

**Yagiela:** Meta-analysis: mean resting venous plasma concentration is 39 picograms/ml of catecholamine. This is **doubled** with injection of 1-2 carps of lido with 1:100,000 and will cause **little pharmacologic change.** This is due to a predominance of action upon beta 2 receptors and a decrease in diastolic BP with minimal increase in HR. With **3 carps** catecholamine plasma levels jump **5-6 fold.**

**Little:** “Thus, from the existing evidence it would appear that 1 or 2 cartridges are of little clinical significance in most Pts with HTN. Nor-epinephrine and levonordefrine should be avoided in HTN Pts due to comparative excess of alpha 1 stimulation.”
Vicker, Baumgartner 2002: N= 33. Ferric sulphate and epi impregnated cotton did not affect Pts BP or pulse.

Anxiolytic reactions with HTN meds: anxiolytic dosage must be decreased in Pts taking alpha blockers, alpha/beta blockers and diuretics.

NSAIDS and HTN drugs: Use of NSAIDS for a few days is of little concern for those on HTN drugs.

Little: Pts who’s BP is <180/110 can receive any indicated dental tx. Those with upper level stage 2 HTN should be referred to their physician.” But, the dentist must also consider other systemic risk factors in conjunction with HTN.”

Antibiotics and oral contraceptives: ok to use dental antibiotics. Most studies show no reduction in estrogen serum levels. Provider must advise as to potential risk.

Metronidazole and ethanol: severe disulfiram-like reaction. Avoid interaction.

Metronidazole and lithium: decreases excretion of lithium leading to toxicity. Avoid interaction.

NSAIDS and Lithium: Lithium toxicity. NSAIDS should not be prescribed to Pts on Lithium.

Macrolides (erythromycin, clarithromycin) interact with several drugs including Digoxin, warfarin, statins, prednisone, tegretol, and benzodiazapines) Look up interactions for any Pt on macrolide antibiotics or to whom you may prescribe macrolides drug.

Antibiotics and Digoxin: change in GI flora → retarded metabolism → toxicity in 10% of pts. Have digoxin levels monitored during antimicrobial therapy.

Aspirin, NSAIDS with Coumadin: increased risk of bleeding (GI and oral). Avoid interaction.

Aspirin, NSAIDS with alcohol: increased risk of GI/oral bleeds. Avoid interaction.

NSAIDS and Beta Blockers, ACE inhibitors: Decreased antihypertensive effect. Limit to 4 days.

NSAIDS and Alendronate: Increased risk for gastric ulcers. Use acetaminophen.

NSAIDS and Methotrexate: low dose for arthritis not a concern. High dose for cancer tx can cause toxicity. Avoid interaction.

Benzodiazapines interact with several drugs. Always look up interactions.

Epinephrine and nonselective beta blockers: initial dose of ½ carpule of 1:100k, aspirate, inject slowly. Monitor vitals, if no adverse change, up to two cartridges containing vasoconstrictor with 5 minute interval between the first and second carpules with monitoring. Or avoid.
Epinephrine and Cocaine: avoid epi until cocaine has been withheld for 24 hours.

Epinephrine and Tricyclic antidepressants like Elavil: Limit dose to 2 carpules of 1:100k. Aspirate, monitor vitals.

Epinephrine and MAOI inhibitors for depression: Limit to 2 cars of 1:100k. Aspirate. Monitor vitals.


Epinephrine and Parkinson’s drug Catechol-O-methyl-transferase inhibitors: Limit to 2 cars of 1:100,000k epinephrine. Aspirate. Monitor vitals.

Theophylline for COPD and asthma and any drug: need to look up for potential interactions especially antibiotics. Has low safe range.

Articaine in Pts with methemoglobinemia: a condition in which a cyanosis-like state develops in the absence of cardiac or respiratory abnormalities. The blood appears chocolate brown and clinical signs and symptoms, including respiratory depression and syncope may occur. It may occur through inborn errors of metabolism or may be acquired through the administration of drugs or chemicals that increase formation of methemoglobin. Articaine, prilocaine and benzocaine (topical) have been implicated. The O2 carrying capacity of the blood is reduced. Avoid articaine in susceptible patients.

Ischemic Heart Disease: Chapter 4

Unstable angina: defined as new onset of pain, pain that is increasing in frequency, more intense pain than before, pain that is precipitated by less effort than before, pain that occurs at rest. Key feature is the changing character or pattern of pain. Dental treatment should be limited to urgent care only such as tx of acute infection, bleeding, or pain. Elective dental care deferred. Necessary dental care in hospital setting with establishment of IV line, sedation, monitoring with EKG, pulse ox, blood pressure and oxygen, cautious use of vasoconstrictors, prophylactic use of nitroglycerine.

Stable angina: pain predictably reproducible and consistent over time. Pain is typically precipitated by physical effort such as walking or climbing stairs but also may occur with eating or stress. Any indicated dental treatment may be provided if appropriate management issues are considered. Elective care possible with the following management considerations: stress reduction protocol, oral or inhaled sedatives, pretreatment vital signs, availability of nitroglycerine, limited vasoconstrictor, <2
cartridges in those taking non-cardio-selective beta-blockers, excellent local anesthesia and post-op pain control, anticipation and management of bleeding for those on platelet inhibitors. No antibiotic prophylaxis for Pts with CABG, angioplasty or stent.

**Nitroglycerine:** vasodilator, predominantly venodilator, cornerstone of pharmacologic management of angina. Unknown mechanism. Used acutely for management of angina pain. Used prophylactically to prevent angina. Tablet, lingual spray, ointment, transdermal patch. Spray and tabs beneath tongue.

**Aspirin:** another cornerstone of angina therapy. Irreversibly acetylates platelets. Pts who take daily aspirin (160-325 mg) can expect some increase in surgical and post-op bleeding, but this is generally not clinically significant and can be controlled with local measures only. Discontinuation of these agents before dental treatment generally is unnecessary.” Study to quote is Maden 2005 JOMFS.

**Platelets: Live 7-12 days.** Acetylation by aspirin is irreversible.

**Clopidogrel:** anti-fibrinolytic agent.

**Stents:** become covered by endothelium within 2 weeks after placement. Newer stents coated with bioactive medications.

**American Heart Association Cardiac Risk Stratification for Non-cardiac surgical procedures:** Little states that root canal therapy would be a LOW risk procedure which means reported cardiac risk would generally be less than 1%. He further states that periradicular surgery would be listed as low (easy short surgery) or intermediate risk (longer challenging surgery) with reported cardiac risk generally less than <5%. So, couple the risk category for surgery Pts with the severity of cardiac disease and the Pt’s functional reserve to arrive at a decision for treatment.

**Previous Myocardial Infarction**

**Previous MI Pts:** stress of dental visit could precipitate angina attack, MI or stroke. MI Pts may have: some degree of heart failure, pacemaker, medicated with non-cardioselective beta blocker, aspirin therapy, Coumadin therapy.

**MI < 1 month ago = MAJOR RISK:** elective dental care should be deferred. Absolutely necessary care should be coordinated with a physician with use of IV line, sedation, EKG, Pulse OX, BP, oxygen, cautious use of vasoconstrictors, and prophylactic nitroglycerin.

**MI > 1 month without symptoms – INTERMEDIATE RISK:** any care ok with stress reduction protocol, oral sedative, pre-tx vitals, have nitroglycerin readily available, limited vasoconstrictor, good anes, good post op pain control. If on Coumadin INR should be 3.5 or less prior to invasive procedures.
Pain referral: “In rare cases, Pts with coronary atherosclerotic heart disease with angina may have pain referred to the lower jaw or teeth. The pattern of onset of pain caused by physical activity and its disappearance with rest usually serves as a clue to its cardiac origin.”

Cardiac Arrhythmias: Chapter 5

Risk: the stress and anxiety of dental treatment or excessive amounts of epinephrine may induce life-threatening arrhythmias in susceptible Pts. Pts with existing arrhythmia could possibly have MI, angina, stroke, heart failure or cardiac arrest. Pts with pacemaker should not have electrosurgery unit or cavitron used near them. Pts taking non-selective beta blockers could have elevated BP with excessive epinephrine. Pts taking Coumadin for A-fib could have excessive bleeding. Pts taking digoxin are at risk for arrhythmia if epi is used; digoxin toxicity is also a potential problem. *Obtain medical consultation to confirm nature and severity of arrhythmia is not crystal clear from medical history.

High risk arrhythmia as determined by medical doctor: high grade AV block, symptomatic ventricular arrhythmia, supraventricular arrhythmia with uncontrolled ventricular rate. Elective dental care deferred. Emergency care provided in consultation with the physician. Establish IV line, sedation, monitoring with EKG/Pulse-ox, BP, Oxygen and caution with vasoconstrictor.

Intermediate and low risk: essentially all other arrhythmias. Elective dental care provided with consideration of stress reduction protocol: oral sedative, short morning appointment, monitor vitals, avoid excessive epinephrine, INR of 3.5 or less for invasive procedures with coumadin, avoid use of epi with digoxin because of increased risk of inducing arrhythmias.

Digoxin toxicity: nausea and vomiting, headache, drowsiness, visual distortions, with objects appearing yellow or green. Seen with Pts taking antibiotics per altered GI flora. Pts taking digoxin are also at risk for arrhythmia with epinephrine injection.

Sinus tachycardia: rate of >100 bpm.

Sinus bradycardia: rate of <60 bpm. Causes: Gram – negative sepsis, vasovagal syncope, during vomiting, drugs: digoxin, lithium, amiodarone, beta blockers, calcium channel blockers. Could also be a normal rhythm for that Pt.

AV heart block: High risk. Disturbance of impulse conduction that may be permanent or transient.

Heart Failure: Chapter 6

Risk: Providing dental treatment to a Pt with symptomatic or uncontrolled heart failure may result in worsening of symptoms, acute failure, arrhythmia, MI or stroke. Pts with HF may have difficulty breathing and may not tolerate supine chair position. HF may be due to underlying condition such as
coronary artery disease or HTN may require other management consideration. The use of epi in Pts taking digoxin may cause arrhythmia.

**Causes:** coronary heart disease, HTN, valvular disease, IE, CHD, pulmonary hypertension, pulmonary embolism.

**Symptoms:** dyspnea, fatigue, orthopnea, dyspnea that awakens Pt from sleep, pulmonary edema, exercise intolerance such as inability to climb a flight of stairs, dependent edema of feet/ankles after standing and walking, increased abdominal girth due to fluid accumulation, ascites, right upper quadrant pain from liver congestion, hyperventilation.

**Signs:** rapid shallow breathing, enlargement of cardiac silhouette on chest x-ray, distended neck veins tender liver, jaundice, peripheral edema, ascites, cyanosis, clubbing of fingers.

**Dental management of Pts with heart failure:** If uncontrolled, defer elective dental care. For Pts diagnosed and treated, confirm status with Pt or Physician. If **asymptomatic=compensated heart failure** then routine care. These Pts can generally climb a flight of stairs without a problem (4 METS). If **symptomatic=decompensated HF** then dentist must make a determination of the risk involved in providing dental treatment. Do the benefits outweigh the risks? Must discuss with physician. Decompensated HF constitutes a **major risk** for the occurrence of a serious event and thus these Pts are “are not candidates for elective dental care and treatment should be deferred until consultation with a physician.” Also must consider the functional reserve of the Pt and the nature of the procedure.

**Pulmonary disease: Chapter 7**

**Chronic obstructive pulmonary disease** is a general term for pulmonary disorders characterized by chronic airflow limitation from the lungs that is not fully reversible. The two most common diseases classified as COPD are chronic bronchitis and emphysema. **Chronic bronchitis:** excessive tracheobronchial mucous production, chronic cough with sputum production at least 3 months in at least 2 consecutive years. Sedentary, overweight, cyanotic, edematous, breathless, leading to blue bloaters. **Emphysema:** distention of the air spaces distal to the terminal bronchioles because of destruction of alveolar walls/septa at the acinar level. Barrel chested, lose weight, pursing of lips upon exhale. Treatment involves low-flow oxygen therapy, anticholinergics and beta 2 adrenergic bronchodilators. Second line drugs include inhaled corticosteroids combined with a long acting beta 2 antagonist in a single inhaler (Advair). Theophylline is a third line drug which relaxes bronchial smooth muscle cells weakly by blocking adenosine receptors. Theophylline has a narrow therapeutic range and can become toxic.
**Dental management of COPD:** Avoid tx if upper respiratory infection is present. Use upright chair position. Use of local anesthetic is ok, do not use rubber dam in severe disease, use pulse-ox, DO NOT USE NITROUS OXIDE-oxygen sedation in cases of severe emphysema. Use low-flow oxygen. Avoid narcotics. Use of low dose valium is acceptable. Additional steroid dose may be necessary in Pts who are taking systemic steroids. Avoid macrolides if taking Theophylline.

**Asthma:** airway hyper-responsiveness, dyspnea, coughing and wheezing. Induced by allergens, upper respiratory tract infection, exercise, cold air, certain medications (NSAIDS), anxiety, stress, nervousness. Extrinsic or allergic asthma from allergens, pollens, dust, house mites, animal danders. IgE mediated. May be precipitated by meta-bisulfite preservative in epi containing local anesthetic. Exercise-induce asthma induced by thermal changes. Infectious asthma from virus or bacteria.

**Status asthmaticus:** severe and prolonged asthmatic attack lasting longer than 24 hours that is refractory to usual therapy.

**Dental management of asthma:** risk is precipitation of acute asthma attack. Identify character of asthma (Allergic vs. non allergic), precipitating factors, age of onset, frequency and severity of attacks, how does Pt manage asthma, necessity for past emergency care, baseline Forced Expiratory Volume (FEV1) is stable, not decreasing in recent past,. Avoid precipitating factors. Consult with physician for severe persistent asthma. Have Pt bring medication/inhaler to appointments and prophylax with an inhaler prior to each appt for persons with moderate to severe persistent asthma. If Pt is on systemic steroids, additional dose may be necessary. Premedicate with nitrous oxide or diazepam for anxious patients, provide stress-free environment, use pulse ox, recognized signs of asthma attack. No TX planning modifications required. Local anes with epinephrine is just fine.

**Drugs to avoid in asthma:** Aspirin, NSAIDS, Narcotics. Macrolide antibiotics if on theophylline. Depending upon history and severity, may need to avoid bisulfite containing anesthetics.

**Smoking and Tobacco Use Cessation: Chapter 8**

Not summarized.

**Tuberculosis: Chapter 9**

**Tuberculosis** caused by Mycobacterium tuberculosis transmitted through an airborne droplet or saliva. Droplets are carried into the alveoli where bacteria are engulfed by macrophages. Replication occurs within alveolar macrophages, and spread of infection occurs locally to regional lymph nodes (hilar). Widespread infection with multiple organ involvement is called military tuberculosis. Treatment is usually with rifampin, isoniazid and pyrazinamide. A person with a positive skin test for TB should be viewed as having been infected with mycobacterium. The Pt should give a hx of being
evaluated for active disease by a physical exam and chest radiography. In the absence of clinically active disease, these Pts have latent TB and are not considered infectious. A regimen of prophylactic isoniazid may be administered for 6 to 9 months to prevent reactivation. Pts may be tx’d as normal.

**Management of the Patient with a history of Tuberculosis**

1) active sputum positive tuberculosis: consult, urgent care only in contained facility or hospital with special ventilation. 2) history of tuberculosis: approach with caution, obtain good hx of disease and its tx duration, obtain from Pt history of periodic chest radiographs and physical examination to rule out relapse. Consult with physician and postpone tx if there is questionable history of adequate treatment or lack of appropriate medical follow-up since recovery. 3) recent conversion to positive tb skin test: verify if evaluated by physician to rule out active disease, verify if receiving INH therapy for 6 months, treat as normal Pt. 4) signs or sx suggestive of TB: refer, postpone tx.

**Sleep related breathing disorders: Chapter 10**

**Obstructive Sleep Apnea:** Pts with untreated obstructive sleep apnea are at increased risk for HTN, stroke, arrhythmia, MI and diabetes. Causes of occlusion: Large tongue, long soft palate, large uvula, redundant paraphyngeal tissues, large tonsils, retrusive mandible. Pt may undergo any dental procedure but beware of sedation with patient.

**Liver disease: Chapter 11**

**Viral Hepatitis:** With chronic acute hepatitis, the Pt may have chronic liver dysfunction, which may be associated with a bleeding tendency or altered drug metabolism. For Pt with active hepatitis, consult with physician, treat on an emergency basis only. For Pts with a hx of hepatitis, consult with the physician to determine status, determine age of infection, type of hepatitis, source of infection. Consult with physician to determine status of liver dysfunction. With active Hepatitis, urgent care only, avoid drugs metabolized in the liver as much as possible or reduce dose if necessary; this induces them: local anesthetics, analgesics, acetaminophen, codeine, ibuprofen, sedatives, antibiotics....basically everything we use. Liver function tests measure bilirubin in urine indicating heme breakdown and is an indication of hepatobiliary disease. Can measure liver enzymes ALT, AST. Many coagulation factors are made by the liver: fibrinogen, prothrombin. Evaluate PTT, INR and platelet counts prior to surgical tx. Platelet x-fusion if count less than 50k or if INR is above 2. NSAIDS should not be used in end-stage liver disease due to low platelet counts and elevated INR and PTT counts. APAP/codeine or Vicodin are suitable alternatives in these Pts.
**Alcohol Induced Cirrosis:** risks include **bleeding** tendencies, unpredictable drug metabolism. Identify alcoholic Pts through hx, clinical exam, odor, friends/relatives. Consult with physician to determine status of liver dysfunction. Lab screening: CBC with differential, AST and ALT, platelet count, bleeding time, thrombin time, prothrombin time are sufficient in screening for potential problems. Minimize the use of drugs metabolized by the liver. Factor VII is often deficient. Vitamin K or platelets may be necessary for surgical procedures. Late stage cirrhosis= jaundice, ascites, clubbing fingers. Significant enzyme induction is likely to have occurred leading to increased tolerance to local anes and sedatives. Thus larger than normal doses of these medications may be required. However, with advanced liver destruction drug metabolism may be markedly diminished. Use drugs above with caution. Third area of concern is infection or spread of infection in the Pt with alcoholic liver. Bacteria are not as efficiently removed because of compromised reticuloendothelial system and altered cell-mediated immunity. Studies do not indicate that antibiotic prophylaxis should be provided before invasive dental procedures.

**Gastrointestinal disease: Chapter 12**

**Peptic Ulcer Disease:** Risks include further injury to intestinal mucosa by NSAIDS or fungal overgrowth after systemic antibiotics. Avoid NSAIDS. Avoid corticosteroids. Stress free environment.

**Inflammatory Bowel Disease:** Ulcerative colitis and Crohn’s. These Pts may be treated with corticosteroids and under stress, Pts can have acute adrenal insufficiency. Additional steroids may be needed for surgery (consult physician to determine level of suppression). Non-surgical dental care should be ok if normal steroid dose taken 2 hours before appointment, and if adequate local anes and post op pain medication is provided. Schedule appointments during remissions. Avoid NSAIDS. Use Tylenol with codeing medications instead.

**Pseudomembranous Colitis:** C. difficile. Gram-positive, spore-forming rod overgrowth results from loss of competitive anaerobic gut bacteria, most commonly through the use of broad-spectrum antibiotics. Intense diarrhea and colitis. Diarrhea most common sx. Severe cases: bloody accompanied by abdominal cramps and tenderness and fever. Tx: Mild cases, removal of the antibiotic agent may be enough. In severe cases introducing an antibiotic that will eradicated C. Difficile (metronidazole 250 mg qid 10 days).

**Chronic renal failure and dialysis: Chapter 13**

**End Stage Renal Disease:** Risks: bleeding tendency, hypertension, anemia, intolerance to nephrotoxic drugs metabolized by the kidney, enhanced susceptibility to infection. Consult with the physician to determine status. Pre-surgical screening of prothrombin time, partial thromboplastin time, hematocrit, hemoglobin. Closely monitor blood pressure before, during and after treatment.
Avoid drugs excreted by the kidney and nephrotoxic drugs. Good surgical technique to minimize risk of abnormal bleeding or infection. Provide aggressive management of infection. No contraindications to treatment but extensive tx plans are not recommended.

**Hemodialysis: Risks:** Bleeding tendency, hypertension, anemia, drug intolerance, bacterial endarteritis of av fistula secondary to bacteremia, hepatitis, bacterial endocarditis. Consult with physician. Delay treatment for at least 4 hours following dialysis to avoid heparin effects (potential for excessive bleeding). Best to perform dental treatment on the day following dialysis. Avoid drugs metabolized by the kidney or nephrotoxic drugs. AHA does not recommend antibiotic prophylaxis for invasive dental procedures. There is some controversy regarding prophylaxis; physician consultation may be indicated. Avoid placing blood pressure cuff on shunt. No treatment planning modifications required. However, Pt may have other systemic disease (heart, diabetes, lupus) and after consultation with physician, Pt can be treated in hospital-like setting. Ibuprofen, triazolam are eliminated in the liver and so can be used in hemodialysis patients with no dose adjustment.

**Drug adjustments in chronic renal disease:** drugs excreted by the kidney will double in blood concentration during ESRD. Therefore dosages must be reduced. I will look at table in Little and Fallace if they ask. Can used lidocaine. Acetamenophen probably safer than NSAID in ESRD because APAP is metabolized and eliminated in the liver and has less nephrotoxicity.

**Sexually transmitted diseases: Chapter 14**

**Gonorrhea/Syphilis:** Possibility of transmission from oral or pharyngeal lesions of infected Pt. All Pts must be approached with standard precautions. No treatment modifications necessary. For Pts with signs/sx suggestive of G/S refer to physician for eval. Those who are on antibiotic therapy or who have resolved history may be treated without modification.

**Diabetes Mellitus: Chapter 15**

**Diabetes Mellitus:** Lack of insulin or insulin action allows glucose to accumulate in tissue fluids and blood. DM is a group of metabolic diseases characterized by hyperglycemia that results from defects in insulin secretion, insulin action or both. Sx: casual blood glucose >200 mg / dl or fasting blood glucose >126 mg/dl (normal fasting glucose is 110). Risks- infection, poor wound healing, insulin reaction, end organ damage to cv system, eyes, kidneys and nervous system. Angina, myocardial infarction, cerebrovascular accident, renal failure, peripheral neuropathy, blindness, HTN, congestive heart failure. Perio disease, poor healing, infection, numbness/burning of mouth. The increased susceptibility of diabetics to infection has been hypothesized as being due to PMN deficiencies resulting in impaired chemotaxis, defective phagocytosis, or impaired adherence. Management by appropriate pharmacologic regimens (insulin, oral anti-diabetic agent, comprehensive education, self-
management and monitoring, HbA1C monitoring for 2-3 month control with normal value of 7%.

**Dental management:** <70 mg/dl defer elective tx or give carbohydrates. >200 mg/dl defer elective treatment, give hypoglycemic or refer to physician. thorough hx determine glycemic control, drug management. Consult with the Pt’s physician if disease control is inadequate. Avoid peak periods of insulin activity when risk of hypoglycemia is greatest. Avoid lengthy appointments (morning better). Check blood glucose level just before treatment. Local with epi is tolerated well if no other cardiac condition. Postoperative antibiotic coverage may be necessary for patients with poor glycemic control who have significant oral infections or who have undergone extensive surgical procedures.

**Hypoglycemia:** Rapid onset! Precipitated by excessive insulin level, weight loss, increased physical activity/exercise, inadequate food intake. Diminished cerebral function, mood changes, lethargy, hunger, sweating, tachycardia, anxiety, agitation, bizarre behavior. Adverse sequellae: unconsciousness, seizures, hypotension, hypothermia. Management of hypoglycemic episode: terminate tx, administer 15 grams glucose (candy, soft drink), if lose consciousness, contact EMS, provide basic life support, IV dextrose or IM glucagon.

**Hyperglycemia:** Prolonged onset! Inadequate insulin level, weight gain, lack of exercise, pregnancy, hyperthyroidism. Polydipsia, polyphagia, polyuria, acetone fruity breath, dehydration, tachycardia, hypotension. Adverse sequellae: ketoacidosis, coma. Management of hyperglycemic episode: rare occurrence due to prolonged onset. Medical intervention and insulin administration. If diagnosis is uncertain and signs/symptoms are mistaken for hypoglycemia, it is generally safe to administer a small amount of glucose without adverse effects.

**Adrenal Insufficiency: Chapter 16**

**Adrenal Insufficiency:** Cortisol regulates carbohydrate, fat and protein metabolism, maintains vascular reactivity, inhibits inflammation, and maintains homeostasis during periods of physical or emotional stress. Regulation of cortisol secretion occurs via the hypothalamic-pituitary-adrenal axis. Hypothalamus releases corticotrophin releasing hormone which stimulates anterior pituitary to release ACTH which then stimulates the adrenal cortex to produce and secrete cortisol. Surgery itself is one of the most potent activators of the hypothalamic-pituitary access. Various stressors such as trauma, illness, burns, fever, hypoglycemia, and emotional upset can trigger this effect. The greatest response is noted in the immediate post-op period at time of local anes wearing off. Response can be reduced by long acting anesthetics and good post op pain control. Cortisol has opposite effective of insulin on glucose maintenance. Synthetic glucocorticoids used to tx arthritis, lupus, asthma, hepatitis, and inflammatory bowel disease can affect adrenal function. Aldosterone regulates physiologic levels of sodium and potassium (acts in kidney to retain sodium and excrete potassium). Overproduction of
adrenal glands results in Cushing’s syndrome: weight gain, moon-shaped face, buffalo hump, abdominal striae, hypertension, hirsutism, acne.

Insufficient production may occur primarily or secondarily. **Primary = Addison’s disease.** **Secondarily** due to administration of exogenous corticosteroids leading to down-regulation of adrenal production of cortisol. Addison’s disease → impaired metabolism of glucose, fat and protein as well as hypotension, excessive pigmentation and an inability to tolerate stress. Aldosterone deficiency leads to inability to conserve sodium and eliminate potassium and hydrogen ions leading to hypovolemia, hyperkalemia and acidosis. Topically applied and inhaled corticosteroids are rare inducers of adrenal suppression by absorption through the skin, mucus membranes or pulmonary alveoli.

Pt with either primary or secondary insufficiency may be unable to increase endogenous steroid production to respond appropriately to the stress of dental procedures. **Consultation** with the Pt’s physician is recommended to determine the extent of adrenal suppression and the need for steroid supplementation. There are no uniform guidelines for supplementation. **Most patients** who are managed with chronic corticosteroids and undergo routine dental therapy do not require supplementation as long as pain and anxiety are well controlled. Consult with physician! Surgeries that last longer than 1 hour are more stressful and should be performed with consideration of the need for steroid supplementation. Use **bupivacaine at end** of procedure. Check BP at 5 minute intervals. If **hypotension** occurs <100 or <60, administer 100 mg of hydrocortisone or 4 mg of dexamethasone IV and xport to medical facility. Adrenal insufficiency requires IV glucocorticoid.

**Thyroid disease: Chapter 17**

**Thyroid Gland:** Thyrotropin-releasing hormond (TRH) from the hypothalamus stimulates pituitary to release **TSH which causes release of T4 and T3 from the thyroid.** T4 and T3 feedback on the hypothalamus, the pituitary and the thyroid itself to regulate hormone levels. Thyroid hormone influences the growth and maturation of tissues, cell respiration, and total energy expenditure. Calcitonin is secreted by the thyroid and is involved in regulating serum calcium and phosphorus levels in conjunction with vitamin D and parathyroid hormone. **Radioactive iodine** can be used to directly detect thyroid function. **Thyroid hormone concentration** in the blood can be measured to determine thyroid status. Elevated levels usually indicate hyperthyroidism, and lower levels usually indicated hypothyroidism. **Serum TSH concentration** can help diagnose hyper and hypo states. In hyperthyroidism, TSH levels are almost always LOW or are not detectable. In hypothyroidism TSH levels are usually increased.
**Hyperthyroidism or Thyrotoxicosis**: excess of T4 and T3 in the bloodstream caused by Graves’s disease, ectopic thyroid tissue, multinodular goiter, thyroid adenoma, ingestion of thyroid hormone, or pituitary disease. **Graves disease** is the model for all of these diseases. In graves, thyrotoxicosis occurs as autoantibodies bind to TSH receptors mediating thyroid stimulation. T3 and T4 are high and so TSH in bloodstream is LOW or undetectable as a result of feedback on hypothalamus and anterior pituitary. Symptoms include nervousness, fatigue, rapid heartbeat, palpitations, heat intolerance, weight loss, thin hair, soft nails and eye symptoms-eyelid retraction, periorbital edema, exophthalmos. Increased metabolic activity causes increased circulatory demand, increased stroke volume and heart rate, palpitations, supraventricular cardiac dysrhythmias and sometimes congestive heart failure. Untreated and incompletely treated thyrotoxicosis Pts are highly sensitive to epinephrine and other pressor amines and these agents must not be administered. Once the Pt has been well-managed – euthyroid –administration of epinephrine can be resumed. Current practice is to screen Pts suspected of being hyperthyroid with measurement of TSH serum level and to measure the T4 concentration. A low TSH level and a high free T4 concentration indicate hyperthyroidism. The most common anti-thyroid agents in the United States are propylthiouracil and methimazole, both of which inhibit synthesis of thyroid hormone. Pts with Graves’ disease may be treated with radioactive iodine or subtotal thyroidectomy. Exophthalmos is usually irreversible.

**Medical problems of concern to the dentist treating hyperthyroid patients**: Adverse interaction with epinephrine, arrhythmias, congestive heart failure, thyrotoxic crises precipitated by infection or surgical procedures.

**Thyrotoxic Crisis or Thyroid Storm**: A rare condition seen in Pts with chronic thyrotoxicosis usually with a precipitating factor such as infection, trauma, surgical emergencies and operations. Early symptoms of extreme **restlessness, nausea, vomiting, and abdominal pain** are followed by **fever, profuse sweating, marked tachycardia, arrhythmias, pulmonary edema, and congestive heart failure**. The Pt appears to be in a **stupor, and coma** may follow. **Severe hypotension** develops and death may occur. Immediate treatment is large doses of anti-thyroid drugs, potassium iodide, propranolol, hydrocortisone, dexamethasone, IV glucose, wet packs, fans, ice packs and CPR as needed.

**Dental treatment modifications for the thyrotoxicosis Pt**: Once under good medical management, the Pt may receive any indicated dental treatment. If acute infection occurs, the physician should be consulted regarding management. Always refer Pts with unmanaged or poorly managed thyroid disease. Avoid any dental tx until good medical management. Avoid epi and other pressor amines in untreated or incompletely treated Pts. Recognize early stages of thyrotoxic crisis: fever, abdominal...
pain, delirious, obtunded, or psychotic. Initiate early response, **cool with towels, ice packs**, hydrocortisone 100-300 mg, monitor vitals, start CPR.

**Hypothyroidism**: Congenital or acquired decreased T3 and T4 levels—radiation of the thyroid gland (radioactive iodine), surgical removal, excessive anti-thyroid drug, thyroid dysgenesis or agenesis, and autoimmune thyroiditis. **Hashimoto’s thyroiditis** is the most common cause of primary hypothyroidism in the US. It is an autoimmune asymptomatic diffuse goiter with high titers of circulating thyroid autoantibodies. Early in the disease course the thyroid becomes enlarged and firm and may have nodular consistency; late in the disease the thyroid is no longer palpable. Neonatal creatinism is characterized by dwarfism, obesity, brad flat nose, wide set eyes, slowing of mental activity, slurred, hoarse speech, anemia, constipation, cold sensitivity. **Myxedema** is the accumulation of subcutaneous fluid in Pts with hypothyroid status. Hypothyroidism is treated with synthetic preparations continuing levothyroxine (T4) or levothyroxine (T3).

**Medical problems of concern to the dentist treating hypothyroid Pts**: exaggerated response to sedatives, narcotic analgesics. Myxedematous coma can be precipitated by CNS depressants, infection and surgical procedures.

**Dental treatment modifications for the hypothyroid Pt**: Must manage increased tongue size. **Avoid narcotics, sedatives** in untreated pts. Postpone elective dental care if possible until symptoms of hyperthyroidism have cleared. Recognize initial stage of hypothyroid (myxedema) coma: hypothermia, bradycardia, hypotension, epileptic seizures. Activate EMS, seek medical aid, and administer hydrocortisone 100-300mg, CPR as needed.

**Dental treatment modifications for thyroid cancer Pt**: Possible thyrotoxicosis due to synthetic T4 replacement therapy. For most Pts the dental tx plan is not affected unless Pt has been txd by external radiation or chemotherapy.

**Pregnancy and breast feeding: Chapter 18**

**Pregnancy**: 3 concerns for harm to the developing fetus—ionizing radiation, drug administration, stress. **Supine hypotension** for mother late in pregnancy. Transmission of drugs to fetus through breast milk is of concern. Endocrine changes can cause fatigue, syncope, postural hypotension. During late pregnancy can have supine hypotensive syndrome with fall in BP, bradycardia, sweating, nausea, weakness and air hunger when Pt is supine. Roll to left side to get gravid uterus off inferior vena cava. **Anemia** occurs in pregnancy because blood volume increases more than RBC production. Increased gag reflex due to vulnerability to nausea and vomiting from hormonally mediated altered taste. Normal pregnancy lasts 40 weeks. First trimester organ formation makes fetus susceptible to teratogenic effects of drugs and radiation. After 1st trimester, the majority of organ formation is
complete and the remainder of pregnancy is devoted to growth except in the developing teeth. **Preeclampsia**: HTN, proteinuria, edema, blurred vision → seizures and coma. Because of immature liver and enzyme systems, the fetus has a limited ability to metabolize drugs. Pharmacologic challenge of the fetus is to be avoided if possible. **Dental Management**: thorough history, contact physician if concerns, avoid elective care during 1st trimester and late 3rd trimester. Second trimester and most of the third trimester are the best times for elective treatment. Avoid drugs known to harm fetus. Do not place Pts in supine position in later 3rd trimester. Avoid aspirin and NSAIDS which have been implicated in premature closure of ductus arteriosis.

**Medications in pregnancy**: American Academy of Pediatrics Guidelines: Pregnancy risk factor B means animal studies have not indicated fetal risk, and human studies have not been conducted. Risk factor B drugs: Acetaminophen, Lidocaine with epinephrine, Penicillin, Clindamycin. Best analgesic to use with pregnant Pt is **Acetaminophen**. NSAIDS and Aspirin are risk factor C (shown risk factors in animals, not tested in humans), as are Benzodiazepines and most narcotics. Nitrous oxide sedation may be used for up to 30 minutes in pregnant mothers. An increased dose or more frequent administration may be required if an infection is not readily brought under control with antibiotic uses (more blood volume, less [ ] drug).

**Lactating mothers**: Most drugs are of little pharmacologic significance to lactation because only 1–2% of drug is secreted in breast milk. Have Pt take drugs just after breast feeding. Drugs that are ok with breastfeeding: Acetaminophen, Lido w/ epi, Ibuprophen, Pen VK, clindamycin. Avoid benzodiazepines. Nitrous Oxide is ok in lactating mothers.

**AIDS/HIV Infection, and Related Conditions: Chapter 19**

**HIV infected asymptomatic Pt**: Pts with decreasing **CD4 lymphocytes** may have significant immune suppression and be at increased risk for infection. Pts with decreasing CD4 lymphocytes may be thrombocytopenic and hence, potential bleeders. Increased risk for oral candidiasis, hairy leukoplakia, lymphadenopathy. Must establish platelet status and immune status of Pts with decreasing CD4 lymphocytes before performing invasive dental procedures. No treatment planning modifications indicated if CD4 levels above 400.

**Immunosuppression-related diseases**: > 400 most Pts have no signs of immunosuppression-associated disease. 300-400 start to see bacterial skin infections-staphylococcal. 200-300 TB, candidiasis, oral hairy leukoplakia. 100-200 TB pneumocystis carini pneumonia histo, coccidioidomycosis, toxoplasmosis, HSV.

**Tx Planning in HIV/AIDS**: 3 main things concerned with: 1) Neutropenia 2) thrombocytopenia, 3) CD4 count. A major consideration in tx of the pt with HIV/AIDS involves determining the current CD4+
lymphocyte count and level of immunosuppression. Other points of emphasis are level of viral load which may indicate susceptibility to opportunistic infections and rate of progression. AIDS by definition is <200 CD4 cells and these Pts have increased susceptibility to opportunistic infection and may be effectively medicated with prophylactic drugs. “Root canal treatment can carry a slightly increased risk for postoperative infection in patients with advanced HIV disease. Infection can be treated through local and systemic measures.” Pts with severe thrombocytopenia <50000 may need platelet replacement before any surgical procedures. Prophylaxis may be required for invasive procedures in cases with neutropenia (<500 PMN count) and CD4 <200. Medical consultation is necessary for symptomatic HIV-infected pts before surgery to determine platelet count and white blood cell count.

Brian T. Quesnell 2005 JOE The Effect of Human Immunodeficiency Virus on Endodontic Treatment Outcome. Clinicians do not have to alter their expectations for healing and resolution of periradicular lesions based solely on the HIV status of their patients.

Allergy: Chapter 20

Anaphylaxis: A severe Type I IgE mediated reaction following administration of agent to Pt who is allergic: drugs, local anesthetic, and latex. Identify reaction, place in supine position, check airway, administer oxygen, check vital signs. If vitals depressed or absent, administer .3-.5 mL of epinephrine 1:1,000 IM into the tongue. Provide CPR. Repeat injection in 5 minutes if no response.

Allergic reaction signs/symptoms: Urticaria (hives), swelling, rash, chest tightness, dyspnea, rhinorrhea, conjunctivitis.

Local anesthetic allergy: True allergic reactions to the local anesthetics (amides) most often used in dentistry are rare. Fainting during a shot is not an allergy. Para-aminobenzoic acid (PABA) esters (Procaine and Tetracain) have highest incidence of allergy because they are metabolized to PABA which instigates a reaction. Cross reaction does not occur between ester and amide local anesthetics except in historical preparations where a germicide, methylparaben, was used in the amide as a preservative. Lidocaine that does not contain methylparaben can now be readily obtained and should be used for Pts with an allergic history to procaine. FDA mandated removal of methylparaben from anes in 1984. What if the Pt cannot recall which anes they are allergic to and no records are available? 1) 1% Benadryl with 1:100,000 epi mixed by pharmacist but must confirm that methylparaben is not used as a preservative, can give up to 50 mg or 5 mL of this solution in a single appointment. 2) Send Pt to allergist for provocative dose testing of your anesthetic of choice to verify safety. If you know a Pt is allergic to a specific anes and you are going to try a different anes: aspirate, place 1 drop of solution, wait 5 minutes. If no reaction, give more. ***Epinephrine containing anesthetics containing
bisulfite should not be used on Pts who have a bisulfite allergy. However these anesthetics can be used in Pts who have a sulfa drug allergy.

**Penicillin allergy:** 5-10% of US population. Most incidences of anaphylaxis occur with IV Pen G, not oral Pen VK. Oral administration results in sensitization of only about 0.1% of patients. Cephalosporins cross-react in 5-10% of penicillin-sensitive patients.

**Analgesics:** NSAIDS are inhibitors of prostaglandin formation, platelet aggregation, and prothrombin synthesis. Most have the potential for cross-sensitivity in Pts who exhibit an asthma-like reaction to aspirin. NSAIDS should not be given to Pts with certain types of asthma, Pts with an ulcer or hemorrhagic disease, and those who are pregnant (premature closure of ductus arteriosus).

**Aspirin:** The effects of aspirin are irreversible for the life of the platelet (10-12 days); thus, this effect continues until new platelets have to replace the old.

**NSAIDS:** The effect of the other NSAIDs on platelets is reversible and lasts only as long as the drug is present in the plasma.

**Rheumatologic and connective tissue disorders: Chapter 21**

**Dental management with Rheumatoid Arthritis:** short appointments, frequent positional changes as needed. If Pt has not undergone recent labs, a CBC with differential white blood cell count and bleeding time should be ordered. If corticosteroids are used for prolonged periods, the potential for adrenal suppression exists.

**Prosthetic Joints:** “Recommendations to place dental patients on prophylactic antibiotics have been made empirically by orthopedic surgeons, although little evidence suggests that dentally induced bacteremia may cause PJI.” “Unfortunately many orthopedic surgeons have persisted in requesting that patients receive antibiotic prophylaxis for dental procedures.” “ADA and AAOS 2013 statement: The systematic review found no association between dental procedures and prosthetic joint infections. Based on this review, the 2014 Panel concluded that prophylactic antibiotics given prior to dental procedures are not recommended for patients with prosthetic joint implants.

prophylaxis MAYBE be considered for some “higher-risk” patients such as immunosupressed Pts as in rheumatoid arthritis, systemic lupus or radiation-induced suppression or in other situations like: Type 1 diabetes, first 2 years after joint replacement, previous prosthetic joint infections, malnourishment, hemophilia. The opinion of the authors of this book is that no Pt with a prosthetic joint requires antibiotic prophylaxis to prevent PJI caused by dentally induced bacteremia. However, if by informed consent, the patient selects to be given prophylaxis, then Amoxicillin 2g or Clindamycin 600 mg 1 hour before can be used.
**SLE:** Because SLE is such a varied disease with so many potential problems caused by the disease or its treatment, pre-treatment consultation with the Pts physician is advised. Leukopenia associated with SLE usually is not associated with a significant increase in infection; however, when combined with corticosteroids or cytotoxic drugs, the likelihood of infection increases and prophylactic antibiotics may be used with periodontal or oral-surgical procedures. Abnormal bleeding time due to thrombocytopenia is a potential problem. Check platelet count (>50,000), PTT (as long as under 20 minutes, you are ok). SLE Pts may have heart valve issues but prophylaxis is never indicated according to AHA 2007 guidelines. SLE induced renal failure may have potential for altered drug metabolism. Manage Sjogrens Pts similar to SLE.

**Organ and bone marrow transplantation: Chapter 22**

**Intravascular Access Devices:** High rate of infection, but the role of transient dental bacteremias that cause these infections has not been established. The CDC does not recommend antibiotic prophylaxis for invasive dental procedures.

**Organ transplantation:** Potential problems: cyclosporine, azathioprine, prednisone suppression of the immune system, acute rejection, chronic rejection. Bleeding problems. Potential for drug over dosage in liver and kidney. Osteoporosis, psychoses, anemia, leucopenia, thrombocytopenia, gingival hyperplasia, adrenocortical suppression, increased risk for cancer, poor healing, infection. Laboratory findings of particular importance to the dentist include bleeding time, differential white blood cell count, prothrombin time, hematocrit, partial thromboplastin time, blood urea nitrogen, liver enzyme tests and testing for urine proteins.

**Screening Laboratory Tests:**

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>White blood count</td>
<td>4400-11000</td>
</tr>
<tr>
<td>Platelet count</td>
<td>150,000-450,000</td>
</tr>
<tr>
<td>Abnormal if less than 80,000</td>
<td></td>
</tr>
<tr>
<td>Hemoglobin Male</td>
<td>13g/dL</td>
</tr>
<tr>
<td>Hemoglobin FM</td>
<td>12 g/dL</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>43-47%</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>1-3%</td>
</tr>
<tr>
<td>Basophils</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>20-34%</td>
</tr>
</tbody>
</table>
Monocytes 3-7%
Prothrombin Time (PT) 10-13 seconds
aPTT 25-35 seconds
Thrombin Time (TT) 9-13 seconds

**Immediate post-transplant period (6 months):** provide emergency dental care only but consult with physician first.

**Stable graft period (>6 months without signs of rejection):** Schedule medical consultation on the following topics—**need for antibiotic prophylaxis**, need for precautions to avoid **excessive bleeding**, need for **supplemental steroids**, selection of **drugs and dosage**. Examine for clinical evidence of organ failure or rejection, or **over-immunosuppression**. Monitor blood pressure at every appointment. Staff to use universal precautions. Vaccinate staff against HBV.

**Chronic rejection period:** perform immediate or emergency dental care only. Follow guidelines for stable graft when treatment is performed.

**Heart transplant special considerations:** Pt may be on long-term anticoagulation therapy—have INR of 3.5 or less prior to surgery. Graft atherosclerosis may occur so increased risk for MI—consult with physician to establish status of coronary vessels of transplanted heart, manage accordingly. No nerve supply exists to the transplanted heart, thus pain will not be a symptom of MI or angina—beware of MI sx other than pain. Some Pts may have pacemaker. Cardiac valvular disease may develop—the AHA recommends that antibiotic prophylaxis be considered for cardiac transplant patients who develop cardiac valvular disease—Amox 2 g 1 hour prior to dental appointment.

**Standard Prophylactic regimen for dental/oral procedures in post transplant patient:** Amoxicillin 2 g orally 1 hour prior plus metronidazole 500 mg orally 1 hour before. Clindamycin should not be used in most organ transplant patients because of acute liver toxicity. Use IV vancomycin instead if allergic.

**Liver transplant special considerations:** Avoid drugs which are toxic to the liver. If on anticoagulation medication INR should be below 3.5 prior to surgery. The need for prophylactic antibiotics for invasive dental procedures in patients with stable liver transplants should be determined on an individual patient basis through medical consultation.

**Kidney transplantation special considerations:** Drugs that are toxic to the kidney must not be prescribed. The need for **prophylactic antibiotics** for invasive dental procedures in patients with stable kidney transplants should be determined on an **individual patient basis** through medical consultation.
Pancreas transplantation special considerations: The need for prophylactic antibiotics for invasive dental procedures in patients with stable pancreas transplant should be determined on an individual patient basis through medical consultation.

Bone marrow transplantation special considerations: Prior to transplant, conditioning therapy involving total body irradiation, cyclophosphamide, and busulfan result in immune suppression. This results in increased risk of infection, bleeding and poor healing during this period. After transplant, infection, bleeding and osteoradionecrosis can occur. Avoid dental treatment during conditioning and critical phases of transplantation. Prophylaxis is indicated if tx must be performed on an emergency basis during conditioning or critical phases of bone marrow transplantation. Need should be determined through medical consultation.

Disorders of Red Blood Cells: Chapter 23

Anemia: a reduction in the O2 carrying capacity of the blood usually associated with decreased number of RBC or abnormality in Hb contained within the RBC. Underlying causes: decreased production of RBCs (iron deficiency, pernicious anemia, folate deficiency or blood loss, or increased rate of destruction of circulating RBCs (hypersplenism, auto-immune destruction). The kidney serves as the primary sensor for determining the level of oxygenation. If the level is low, the kidney releases erythropoietin which stimulates bone marrow to release RBCS. For minimal medical complications, the Pt’s Hb should be above 11 g/dL.

Iron deficiency anemia: Usually no potential problems related to dental care. In rare cases can have issues with bleeding and infection. In Pts with dysphagia, increased incidence of carcinoma of the oral and pharyngeal areas. In women, most cases are caused by physiologic process of menstruation or pregnancy. In men most cases are the result of underlying disease, peptic ulcer, carcinoma of colon etc requiring referral to the Pt’s physician.

G-6-PD Deficiency: Blockage of the hexose monophosphate shunt pathway in individuals with G-6-P-dehydrogenase deficiency results in accumulation of harmful oxidants within RBCs leading to hemolysis of the RBC. Potential problem is accelerated hemolysis of red blood cells. Prevention of problems by control of infection. Avoid: certain antibiotics, aspirin or acetaminophen which may increase risk for hemolytic anemia. Usually no treatment planning modifications unless anemia is severe. NSAIDS OK.

Pernicious anemia: is caused by a deficiency of intrinsic factor, as substance secreted by the stomach parietal cells that is necessary for absorption of vitamin B12. Potential problems include infection, bleeding, delayed healing, paresthesias of oral tissues, burning tingling, numbness, petechial hemorrhages. No treatment modifications once Pt is under medical care.
**Sickle Cell Trait** is the heterozygous state in which the affected individual carries one gene for HbS. Approximately 8-10% of African Americans carry the trait. Sickle cell crisis are rare in individuals with sickle cell trait. Individuals with sickle cell trait **generally have no sx** unless they are placed in situations in which abnormally low concentrations of oxygen are present (unpressurized airplane or poor general anesthesia technique). **Only 20-45%** of their hemoglobin is HbS so they are much more resistant to sickling stimuli. Pts with sickle cell trait are not at risk during dental treatment unless severe hypoxia, severe infection, or dehydration occurs.

**Sickle Cell Anemia:** HbS results from substitution of a single amino acid (valine for glutamic acid). SSA is the homozygous state resulting in **up to 80%** of Hb being HbS. The RBC in sickle cell anemia becomes sickle shaped when blood experiences **lowered oxygen tension** or **decreased pH** or when the patient becomes **dehydrated**. Distortion of the RBC into a sickled shape results from deoxygenation or decreased pH, causing partial crystallization, polymerization and realignment of HbS. This results in erythrostasis, increased blood viscosity, reduced blood flow, hypoxia, and increased adhesion of RBCs, vascular occlusion, and further sickling. Potential problem is SICKEL CELL CRISIS. Oral manifestations are loss of trabecular pattern, pallor of oral mucosa, jaundice of oral mucosa bone pain. Prevention of problems: consult with Pt’s physician to ensure condition is stable. Avoid long, complicated procedures as these may produce acidosis or hypoxia triggering crisis. **Avoid narcotics** because suppression of the respiratory center may occur, leading to acidosis which can precipitate acute crisis. **Use benzodiazepine** instead. Avoid excessive use of salicylates which may cause acidosis. Codeine and acetaminophen in moderate dosage can be used for pain control. Nitrous oxide may be used provided that 50% oxygen is supplied at all times. For nonsurgical procedures, use local without vasoconstrictor; for surgical procedures. Use 1:100,000 epinephrine in anesthetic solution. Aspirate, inject slowly, use no more than two cartridges, Use prophylactic antibiotics for major surgical procedures. Manage any infection aggressively with: HEAT, INCISION AND DRAINAGE, ANTIBIOTICS, PULPECTOMY. Avoid dehydration. Summary, routine dental care can be rendered for Pt’s with sickle cell trait and for those whose disease is in a non-crisis state. Sickle cell vaso-occlusive events can promote **asymptomatic pulpal necrosis**.

**Anemia in Pts with renal disease:** The kidney produces the hormone **erythropoietin** which stimulates RBC production by the bone marrow. If significant renal damage occurs, lack of production of hormone results in anemia. For renal failure and dialysis Pts, erythropoietic drug therapy is necessary.

**Disorders of white blood cells: Chapter 24**

**Leukocytosis:** an increase in the number of circulating WBCs to more than 11,000/mm3. Can be physiologic induced by exercise, pregnancy, stress or pathologic induced by infection, neoplasia and necrosis. Pyogenic infections induce a type of leukocytosis that is characterized by an increased
number of **neutrophils**. Leukemia is marked by an increase in the numbers of circulating immature leukocytes.

**Leukopenia**: a reduction in the number of circulating WBCs to <4400/mm³. Leukopenia is a common complication that results from the use of **chemotherapeutic drugs**. Pts with leukocytosis or leucopenia may have bone marrow abnormalities that can cause **thrombocytopenia**. All Pt with diagnosed or suspected leukopenia should have consultation with the treating physician.

**Agranulocytosis** is reduction of granulocytes (PMNS, Eosinophils, Basophils). During periods of low blood count, provide emergency care only. Treatment should include the use of antimicrobial agents and supportive therapy for oral lesions. In agranulocytosis, **avoid drugs which have higher incidence of agranulocytosis such as penicillins and cephalosporins**.

**Pan cytopenia** is a decrease in WBCs and RBCs that results from the toxic effects of drugs and other chemicals.

**Cyclic neutropenia** is a cyclic depression of circulating neutrophils manifest by a 40% drop in number about every 21 to 28 days and during this period the patient is **susceptible to infection**. Pt can have periodontal disease, oral infection, oral ulceration. Antibiotics should be given to prevent infection. Serial white blood cell count should be performed to identify the safest period for dental treatment (ie when wbc is closest to normal level). Modifications to tx are not required when WBC are normal. If the WBC is depressed severely, **antibiotics should be provided** to prevent post operative infection.

**Leukemia** is a cancer of the WBCs that affects the bone marrow and circulating blood with exponential proliferation of a clonal myeloid or lymphoid cell line and occurs in both acute and chronic forms. Acute leukemia is a rapidly progressive disease that results from accumulation of immature, functionless WBCs in the marrow and blood. Chronic leukemias have a slower onset, which allows production of larger numbers of more mature functional cells. There are 4 main types of leukemia: 1) acute lymphocytic, 2) acute myeloid, 3) chronic lymphocytic, 4) chronic myeloid. Potential problems related to dental care include: Infection, Bleeding, Delayed healing, Mucositis. Oral manifestations include gingival swelling, mucosal/gingival bleeding, oral infection. Prevention: medical consultation, complete blood count to determine risk for anemia, bleeding and infection. Pts under 45 may receive bone marrow transplant preceded by high-dose chemotherapy and full body radiation. Treatment planning modifications include 1) inspect head and neck and radiographs for undiagnosed or latent disease and infections prior to chemotherapy, 2) eliminate infections prior to chemotherapy, 3) extractions should be performed at least 10 days before initiation of chemotherapy, 4) implement plaque control measures and chlorhexidine during chemotherapy, 5) use prophylactic antibiotics if
WBC count is <2000 or if neutrophil count is < 500. Platelet replacement may be required if platelet count is <50,000.

Lymphoma is a cancer of the lymphoid organs and tissues that presents as discrete tissue masses. Three types are most common: Hodgkin’s disease, non-Hodgkin’s lymphoma, and Burkitt’s lymphoma. Another common lymphoma is a plasma cell malignancy called multiple myeloma. These diseases are of importance to the dentist because initial signs often occur in the mouth (Waldeyer’s ring) and in the head and neck region. Hodgkin’s disease is a neoplasm of B lymphocytes and a characteristic tumor cell called Reed-Sternberg cell and enlarging tumorous nodes in the lung, vascular obstruction, and enlarged mediasinal nodes causing cough, shortness of breath or dysphagia. 90% cure rate with radiation and chemotherapy. Non-Hodgkin’s lymphoma is a lymphoproliferative disorder classified as of B cell or T cell origin. It can be highly proliferative or be tolerated for 10 to 20 years. Survival is 80% at 15 years after radiation and chemotherapy. Burkitt’s lymphoma is the most common lymphoma of childhood and is an aggressive B-cell (non Hodgkin’s) lymphoma. The malignancy is very aggressive. Tumors can double in size every 3 days with propensity to spread to the CNS. Remission is achieved in 90% of patients after chemotherapy. All lymphomas have the following potential problems: risk of infection, and excessive bleeding in Pts treated by chemotherapy, minor risk of osteonecrosis in patients treated by radiation to the head and neck region. Oral manifestations include cervical lymphadenopathy, petechiae or ecchymoses if thrombocytopenia present because of tumor invasion of the bone marrow. Prevention of problems through identification, referral and consultation for patients with extanodal tumors, osseous lesions, lymphadenopathy. Dentists can biopsy extranodal or osseous lesions to establish a diagnosis. Treatment modifications include: terminal phase Pts receive only supportive tx. Pts under “control” may receive any indicated tx; complex restorative care may not be indicated in Pts with poor prognosis. Platelet replacement may be needed for pts with thrombocytopenia.

Multiple myeloma: is a lymphoproliferative disorder characterized by overproduction of cloned malignant plasma cells that results in tumors scattered throughout the skeletal system. The most prominent feature of MM is observed radiographically with multiple punched out lesions or mottled areas which represent areas of tumor that appear in the spine, ribs, and cortical regions of the skull. The most prominent symptom is persistent bone pain. Diagnosis with increased serum calcium, increased immunoglobulin, and abnormal immunoglobulin (Bence-Jones proteins). Pts are treated with high dose chemotherapy. Average survival is 2 ½ to 5 years based on severity. Potential problems include excessive bleeding, risk of infection due to decreased normal lg, risk of osteonecrosis in patients who are taking bisphosphonates, especially intravenously. Oral findings include osteolytic lesions, amyloid deposits in soft tissues, unexplained mobility of teeth, exposed bone. Prevention of problems: biopsy oral soft tissue lesions, adequate medical history, beware of and take precautions
for bisphosphonate induced osteonecrosis. Treatment planning modifications include: supportive care for in terminal stages. Long-term prognosis is poor so extensive procedures may not be indicated. If thrombocytopenia or leucopenia is present, special precautions (platelet replacement, antibiotic therapy) are needed to prevent bleeding and infection when invasive dental procedures are performed. Patients may be bleeders because of the presence of abnormal immunoglobulin M which form complexes with clotting factors, thus inactivation clotting factors.

**Bleeding disorders: Chapter 25**

**4 Phases of hemostasis:** Vascular phase, platelet phase, coagulation phase, fibrinolysis. The coagulation phase has an intrinsic and extrinsic pathway.

**Platelet count:** evaluates for disorders of the platelet phase. Quantitative: just tells you the numbers of platelets. 150,000-450,000.

**Prothrombin time (PT):** evaluates EXTRINSIC coagulation pathway. 11-14 seconds. Used for monitoring Coumadin anticoagulation therapy and liver disease. INR standardized PT ratio.

**Partial thromboplastin time (PTT):** evaluates INTRINSIC coagulation pathway. 25-35 seconds. Evaluates for inherited coagulation disorders. Factors VIII and IX, liver disease and Heparin anticoagulation.

**PFA-100:** Platelet function analyzer-100. In vitro system for detection of platelet dysfunction. Quantitative measure of plate function in anticoagulated whole blood. Highly accurate in discriminating normal from abnormal platelet function.

**Thrombocytopenia:** risks include prolonged bleeding, infection. Recommended test is PFA-100 and platelet count. In general dental procedures can be performed if the platelet count is **30,000/mm^3** or higher. Extractions and minor surgery can be performed if the platelet count is **50,000/mm^3** or higher. Pts with neutropenia of **500/mm^3** or less may require antibiotics for certain surgical procedures. Platelet transfusion needed if counts are lower.

**Local blood loss control through:** Pressure, pressure, pressure. Topicals: gelfoam placed in extraction site with topical thrombin. Microfibrillar collagen “Colla plug” in site with topical thrombin.

**Hemophilia A:** 1/5000 live births. **Factor VIII** deficiency. Danger is excessive bleeding during dental procedures. Consultation and referral should be provided for diagnosis and treatment and for preparation before dental procedures are performed. Factor VIII replacement will be necessary depending on severity of disease and recommendation of physician. Antifibriolytics may also be necessary to prevent clot breakdown. Examples are Epsilon-aminocaproic acid EACA (Amicar) and
Tranexamic acid given as rinses after procedure then for 4-7 days. In general, **block anesthesia, lingual infiltrations or injections into the floor of the mouth, and intramuscular injections** must be avoided unless appropriate replacement factors have been used in Pts with moderate to severe factor VIII deficiency. Complex restorative procedures usually require replacement therapy. **Avoid aspirin and NSAIDS.** No dental procedures unless the pt has been prepared on the basis of consultation with the hematologist.

**Hemophilia B or Christmas disease:** 1/30,000 live births. Factor IX deficiency. Manage similar to hemophilia A.

**Von Willebrand’s disease:** Platelets lack vWF factor with 2 consequences: 1) platelets do not adhere properly and 2) plasma factor VIII does not get bound to platelets because of lack of vWF so these Patients may also show symptoms of hemophilia A. Factor VIII does not survive for long if unbound thus lack of platelet vWF has similar effect as low factor VIII. Pts are susceptible to spontaneous bleeding, prolonged bleeding following dental procedures that injure soft tissue or bone, petechial, hematomas. **BEST test is PFA-100.** Consultation and referral should be provided for diagnosis and treatment and preparation prior to dental procedures. Outpatient treatment is possible on the basis of results of consultation. Local measures for control of bleeding include splints, gelfoam with thrombin, avoid aspirin and NSAIDS. No invasive dental procedures unless Pt has been prepared on the basis of consult. Most dental procedures including complex restorations can be offered to these Pts. Acetaminophen with or without codeine may be used for post operative pain control.

**Anticoagulation with coumarin type drugs:** These drugs are **vitamin K antagonists.** Vitamin K is a fat soluble vitamin that is needed for modification of certain proteins required for blood coagulation (prothrombin, factors II, VII, IX, X). The literature clearly supports the continuation of warfarin anticoagulation therapy for minor oral surgery and other similarly invasive dental procedures if the INR is 3.5 or less. Ask the Pt is your INR where your physician wants it to be?

**Heparin therapy:** Heparin acts as an anticoagulant, preventing the formation of clots and extension of existing clots within the blood. While heparin does not break down clots that have already formed, it allows the body's natural mechanisms to work normally to break down clots that have formed. Heparin is generally used for anticoagulation for the following conditions: Used in Pts who have received **prosthetic knee or hip replacement** for approximately 2 weeks. Can cause excessive bleeding, anemia, fever, thrombocytopenia, petechiae, ecchymosis, excessive bleeding. Delay procedure until Pt is off medication. Have physician stop medication and perform surgery the next day; once hemostasis is obtained, have the physician resume medication.
**Fibrinogen receptor therapy**: ie clopidogrel Plavix. Used for prevention of recurrent myocardial infarction and stroke. Usually no treatment alteration necessary unless there are other medical problems such as recent MI or stroke.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Defect</th>
<th>Medical Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemophilia A</td>
<td>F-VIII</td>
<td>F-VIII, porcine F-VIII, steroids</td>
</tr>
<tr>
<td>Hemophilia B</td>
<td>F-IX</td>
<td>F-IX</td>
</tr>
<tr>
<td>Liver disease</td>
<td>Multiple coagulation factors and thrombocytopenia</td>
<td>Vitamin K</td>
</tr>
<tr>
<td>Von Willebrand’s disease</td>
<td>Deficiency or defect in vWF</td>
<td>F-VIII replacement that retains vWF</td>
</tr>
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**Cancer and oral care of the patient: Chapter 26**

**Cancer staging**: T=size (T4 is massive, T1 is <2cm). N=regional lymph node involvement (N3 bilateral nodal involvement, N0 is no palpable nodes). M=metastases (M1 is distant metastases, M0 is no known distant metastasis). Cancer is staged as 0, I, II, III, IVA, IVB or IVC based upon the TNM values. Stage I is T1, N0, M0. Stage II is T2, N0, M0...the only stage with metastasis is IVC.

**Bisphosphonate-associated osteonecrosis (BON)**: Bisphosphonates are synthetic analogs of inorganic pyrophosphate that have a high affinity for calcium and are also potent inhibitors of osteoclastic activity. They accumulate over extended periods in mineralized bone matrix and may remain in the body for years. They are used in osteoporosis, Paget’s disease of bone, and hypercalcemia of malignancy. In osteoporosis, they arrest bone loss and increase bone density. They are given to patients with cancer to help control bone lose caused by metastatic skeletal lesions. BON can occur with oral administration of bisphosphonates but is rare. Injected bisphosphonates carry a much higher risk for BON. IV bisphosphonates include Zometta, Aredia, Didronel. During bone remodeling, the drug is taken up by osteoclasts and internalized in the cell cytoplasm, where it inhibits function and induces cell death. It also has anti-angiogenic properties. As a result, bone turnover becomes profoundly suppressed and, over time, the bone shows little physiologic remodeling, becomes brittle and unable to repair physiologic microfractures that occur in the skeleton as a result of daily activity. It is
theorized that in a patient who is taking a bisphosphonate, resultant microdamage is not repaired, thus setting the stage for osteonecrosis. BON results from a complex interlay of bone metabolism, local trauma, and increased demand for bone repair, infection and hypovascularity.

**Management of Pts on bisphosphonates:** consultation with physician as to the reason for tx, the drug, administration route, dose and duration. Colleagues for Excellence 2007: **IV bisphosphonate pts:** higher risk, preventive procedures important, care might include caries control, conservative periodontal and restorative tx, and if necessary, appropriate endodontic tx which includes NSRCT of teeth that would otherwise be extracted. Surgical procedures such as endodontic surgical procedures appear to impose an increased risk for developing BON and should be avoided if possible.

**Oral bisphosphonate pts:** Have a relatively low risk of developing BON from surgery or soft tissue procedures. Colleagues for Excellence stopped short of saying endo surgery is ok if indicated but, reading between the lines...

**Gerald Glickman 2009:** 34 cases of pts taking long-term oral bisphosphonates vs. control group. No ss difference in healing of periapical lesions after NSCRT. Thus, root canal treatment may be considered a safe and realistic alternative to extraction in patients on bisphosphonate therapy.

**Hargreaves Lecture:** Bisphosphonate T ½ is 10 years. Risk factors 1)oral vs. iv, 2)trauma (ill-fitting denture, extraction), 3) duration taking drug. For reasons we do not understand, BPH tend to accumulate in the mandible and maxilla. Avoid patency filing and traumatic RD placement. IV Zometa (Zolendronate) has the greatest relative potency: 100,000 vs. oral Alendronate (Fosamax)= 1,000 and Ibandronate (Boniva) = 10,000.

**Bamias 2005 J. Clin Oncol:** Curve for BON jumps at 10 months after taking the drug. “The length of exposure appears to be the most important risk factor for this complication.”

In 2013, An expert panel assembled by the ADA’s Council on Scientific Affairs developed recommendations for dental management of patients receiving medications for the prevention and treatment of osteoporosis. Because there currently is no data from clinical trials evaluating dental management of patients on antiresorptive therapy, the recommendations are based on expert opinion alone. The report contains recommendations related to general dentistry, periodontal disease management, implant placement and maintenance, oral and maxillofacial surgery, endodontics, restorative dentistry and prosthodontics, and orthodontics. The panel also discusses C-terminal telopeptide (CTX) testing and drug “holidays.”

The panel advises that clinicians ask questions about osteoporosis, osteopenia and the use of one of the various antiresorptive agents, during the health history interview process. However, routine dental treatment generally should not be deferred solely due to use of antiresorptive agents as the risks and consequences of no treatment likely outweigh the risk of developing ARONJ.
All patients should receive routine dental examinations. Patients who are prescribed antiresorptive agents and are not receiving regular dental care would likely benefit from a comprehensive oral examination before or early in their treatment. While neither the physician nor the dentist can eliminate the possibility of ARONJ development, regular dental visits and maintaining excellent oral hygiene are essential parts of risk management.

In 2014 AAOS Special Committee recommends changing the nomenclature of bisphosphonate-related osteonecrosis of the jaw (BRONJ). The Special Committee favors the term medication-related osteonecrosis of the jaw (MRONJ). The change is justified to accommodate the growing number of osteonecrosis cases involving the maxilla and mandible associated with other antiresorptive (denosumab) and antiangiogenic therapies.

**Radiation:** therapy induces cell necrosis, microvascular damage, and parenchymal and stromal damage. It causes mucositis, vascular changes, intimal thickening, luminal stenosis, decreased blood flow, muscle fibrosis, vascular changes, decreased numbers of osteocytes and osteoblasts with decreased blood flow, salivary gland atrophy, pulp necrosis. **Management** of secondary infection: use culture, cytologic study, antibiotics, antifungal agents and antiviral agents as necessary. Once radiation treatment has been completed and more than 6000 cGy used, every effort must be made to avoid osteonecrosis: teeth should not be extracted, diseased teeth should be treated endodontically. If extraction is absolutely necessary, use low/no epi, prophylactic antibiotics for 7 days, hyperbaric O2 before and after. May need to do Akinosi block due to trismus.

**Akinosi:** inferior alveolar, incisive, mental, lingual, mylohyoid. 25 or 27 ga long needle, insert in soft tissue overlying the medial border of the ramus directly adjacent to the maxillary tuberosity at the height of the mucogingival junction. This injection is below the gow gates area but above the inferior alveolar area.

**Gow gates:** place needle at MP cusp tip max second molar on a line between the tragus and the corner of the mouth aiming for the neck of the condyle; picks up IAN, mental, incisive, lingual, mylohyoid, auriculotemporal and B (in 75% of Pts).

**Chemotherapy:** potential problems include excessive bleeding, infection, anemia because of bone marrow suppression, mucositis, xerostomia, poor healing. Physician consultation. Consider culture and sensitivity of exudates from areas of infection when clinical course shows little or no improvement over several days. Beware of bisphosphonates. Perform only emergency dental treatment during chemotherapy. On basis of underlying disease, consider limiting dental tx to only immediate care. Watch white blood count prior to any tx.

**Other Cancer Considerations:** Patients with cancer have indwelling catheters that are susceptible to infection. However, these infections are not related to dental treatment bacteremias. Prosthetic implants (breast, penile, oral) that have been placed to restore esthetics or function are not
considered at risk for bacterial seeding from oral invasive procedures and do not require abx prophylaxis.

**Neurologic disorders: Chapter 27**

**Epilepsy:** discrete episodes that tend to be recurrent and are often unprovoked in which movement, sensation, behavior, perception, and consciousness are disturbed. Symptoms are produced by excessive temporary neuronal discharging, which results from intracranial or extracranial causes. Pts may become **hypoxic and acidotic**. Complications include trauma to head, neck and mouth and aspiration pneumonia. **Status epilepticus** is a serious acute occurrence of repeated seizures over a short period of time without a recovery period and is caused by abrupt withdrawal of anticonvulsant medication. Pts become hypoxic and acidotic. Some seizures have aura first which is a alteration in sight, taste or smell.

**Dental management of epilepsy:** Assess frequency of seizures and history of past injuries as well as any known precipitating factors. If pt is not well controlled, is not taking meds, physician consult is indicated. **Phenytoin (dilantin), carbamazepin, and valproic acid** may cause bone marrow suppression, leukopenia and thrombocytopenia → increased bleeding and infection. NSAIDS should not be administered to Pt taking valproic acid because they can further inhibit platelet aggregation, leading to hemorrhagic episodes. Pts taking valproic acid should have a PFA-100 test prior to surgery. No contraindication has been identified to the use of local anesthetics in proper amounts in these patients. Schedule Pts within a few hours of taking their seizure medication.

**Management of a seizure:** Sx of impending seizure: irritability, aura. If can identify before (rare) can administer benzodiazepine sublingual or IV. Always insert a mouth prop during treatment of these patients. If pt has seizure, do not attempt to bring to ground. Support the dental chair and only restrain Pt to prevent from hitting things. Manage airway. Seizures generally do not last longer than a few minutes. Afterward Pt may fall into a deep sleep. Administer 100% oxygen.

**Stroke:** a serious and often fatal neurologic event caused by sudden interruption of oxygenated blood to the brain causing focal necrosis of brain tissue this leads to debilitated motor function, speech, mentation (rarely) and death. Risk factors include astherosclerosis, smoking, hyperlipidemia, stress, and high dietary fat, previous stroke, physical inactivity, HTN, elevated hematocrit. Deficits include unilateral paralysis, numbness, sensory impairment, dysphasia, blindness, diplopia, dizziness. Return to function is unpredictable and usually takes place over several months.

**Signs and symptoms of stroke:** TIA = numbness of the face, arm or leg on one side, weakness, tingling, numbness, speech disturbances that usually last less than 10 minutes. Most commonly a major stoke is preceded by one or 2 TIAS. Signs of stroke include: loss of speech, trouble in speaking or understanding speech, temporary dimness or loss of vision, unexplained dizziness, unsteadiness or
sudden fall. In most patients with stroke, the intellect remains intact. Laboratory findings: urinalysis, blood sugar level, CBC, ESR, cholesterol, chest radiographs, EKG, CT, MRI. Many pts will be on aspirin 81-325 mg and a statin.

**Stroke, Dental Management:** Risk is that dental treatment could precipitate or coincide with a stroke. Bleeding is caused by drug therapy used to prevent clots. Identify stroke-prone pts from history (htn, CHF, diabetes, TIA and age >75 years. For past hx of stroke: possible recent TIA=no elective care until physician evaluation. **Delay elective care for 6 months** as recurrence of stroke within this window is high. If Pt is on Aspirin can order pretx PFA-100 prior to surgical procedures. Warfarin requires INR below 3.5 for surgery. Monitor BP. Short morning appts. Minimal vasoconstrictor in LA. Oral hygiene may be a big issue. Mechanical tooth brush, frequent recalls.

**Parkinson’s disease:** a progressive neurodegenerative disorder of neurons that produce dopamine primarily in the substantia nigra. 80% of the dopamine in these neurons must be depleted before sx of disease arise. Toxic protein accumulation leads to degeneration and loss of dopaminergic neurons and loss of circuitry to the limbic motor and autonomic systems. The disease is chronic and progressive. Risk factors include: genetics, head injury (I’m the king of the world) stroke, tumor. Signs include: resting tremor, muscle rigidity, slow movement, facial impassiveness, pill rolling tremor, walking with foot dragging, orthostatic hypotension, masklike face, stare, sweating drooling.

**Parkinson’s Dental Management:** Mechanical tooth brush. Sedation may be required to overcome muscular rigidity to facilitate dental treatment. Always look at Parkinson’s medications as some like Tolcapone may limit LA with epi to 2 cartridges.

**Dementia (Alzheimer’s prototype):** Slow, progressive, chronic decline in intellectual abilities that includes impairment in memory, abstract thinking and judgment. Cause is unknown but appears to involve loss of cholinergic neurons and deposition of beta-amyloid plaques. Management involves understanding stage of disease: early stage, middle stage or late stage. General dental care becomes complicated in middle and late stage. Early stage can receive routine dental care. Positive nonverbal communication is essential with direct eye contact. Family members may need to be involved in decisions. For late stage patients, sedative medication should be selected in conjunction with Pts physician.

**Multiple Sclerosis:** most common autoimmune disease of the nervous system. Chronic and continuous demyelination of the corticospinal tract neurons in two or more regions of the brain. 85% of Pts have a relapsing/remitting course. Loss of touch, pain, temperature and proprioception, numbness, pins and needles, and FATIGUE. Symptoms are exacerbated by heat and dehydration. Intellectual function remains intact. Pts who are experiencing relapse are unfit for routine dental care. Emergency dental care can be provided but is affected by the Pt medications. In particular corticosteroids are immunosuppressive and stressful surgical procedures may necessitate increased dose. Optimal time for tx is during remission periods. Treatment planning changes are dictated by...
levels of motor impairment and fatigue. Patients with stable disease and little motor spasticity or weakness can receive routine dental care.

**Cerebrospinal Fluid Shunts:** CSF shunts do not appear to increase the risk of infection by hematogenous seeding of bacteria after dental procedures. The American Heart Association has issued a statement indicating that antibiotic prophylaxis is not recommended for Pts with CSF shunts who are undergoing dental procedures.

**Behavioral and psychiatric disorders part 1: Chapter 28**

**Anorexia:** nutritional deficiency, with serious medical complications. Consult with physician. Avoid elective dental procedures until Pt is stable from a cardiac standpoint.

**Bulimia:** serum electrolyte disturbances, gastric rupture, esophageal tears, cardiac arrhythmia and death. Consult with physician. Avoid elective dental procedures until Pt is stable from a cardiac standpoint. Complex restorative procedures avoided in bulimic patients until the purging has stopped.

**Anxiety:** Extreme apprehension, avoidance of dental care, elevation of BP, precipitation of arrhythmia, adverse effects and drug interactions with agents used in dentistry. Behavior management: effective communication, be open and honest, explain what is going to happen, make procedures as pain free as possible, encourage Pt to ask questions, use relaxation techniques, oral sedation, nitrous oxide, analgesics for pain control. Postpone complex dental procedures until Pt is more comfortable in dental environment. Develop trust and establish communication.

**Post-traumatic stress disorder:** Signs and symptoms that occur after exposure to a traumatic event outside the usual range of human experience, such as combat exposure, a holocaust experience, rape, or a civilian disaster such as a hurricane. Three cardinal features: hyperarousal, intrusive symptoms or flashbacks of the initial trauma and psychic numbing.

**Psychiatric disorders part 2: Chapter 29**

**Mood disorders:** Reduced brain concentrations of norepinephrine and serotonin for some time have been believed to cause depression. It is also thought that depression can result from stress reaction that has gone on too long. The psychoanalytic hypothesis suggest that unconscious mental conflicts and incomplete psychological development are important factors in the development of depression. Diagnostic criteria for depression: depress mood most of the day. Loss of interest or pleasure in most or all activities, weight gain or loss, insomnia, psychomotor agitation, fatigue, loss of energy, feelings of worthlessness, excessive guilt, inability to think or concentrate, indecisiveness, recurrent thoughts of death. **Major depression (unipolar):** marked gain/loss of weight, usually lasts 8-9 months if individual is not treated. Seasonal affective disorder may occur in areas of the country that have limited amounts of sunlight during the winter. **Bipolar disorder:** the essential feature is a manic
episode with inflated self-esteem, grandiosity, a decreased need for sleep, excessive speech, flight of ideas, distractibility, psychomotor agitation, and excessive involvement in pleasurable activities, euphoric or cheerful high. Bipolar patients have a greater number of episodes, hospitalizations, divorces, and suicides compared with unipolar patients. **Treatment:** first line is a selective serotonin reuptake inhibitor (SSRI). These drugs are used for unipolar and bipolar patients. The mainstays of drug therapy for bipolar are the mood-stabilizing drugs that generally act on mania and depression—lithium, valproate, and carbamazepine. It takes 7-10 days for lithium to reach full therapeutic effectiveness. With lithium, 1/3 Pts are cured, 1/3 has markedly reduced episodes and 1/3 continue to have frequent and severe episodes. 30,000 suicides occur annually in the US and about 70% of these involve individuals with major depression.

**Depression, dental management:** total lack of hygiene may be evident along with xerostomia from medications. Only small amounts of epinephrine should be used in local anesthesia because more concentrated forms of epinephrine can cause severe hypotension. Sedative medication may have to be given in **reduced dosages** to avoid over-depression of the CNS. No medical contraindication exists for dental treatment during a depressive episode. However, most depressed patients may be best managed when only their immediate dental needs are met during the depression. Once the pt has responded to medical tx, more complex dental procedures can be performed.

**Bipolar, dental management:** Lithium can cause xerostomia and stomatitis. The only known drug interactions in dentistry are **NSAIDS and erythromycin which can cause lithium toxicity.** If Lithium does not work, Pts may take a phenothiazine drug which can potentiate the sedative action of sedative medications and serious respiratory depression may occur. Epinephrine used in normal amounts in local anes usually will produce no adverse effects.

**Somatoform disorder:** physical complaints for which no general medical cause is present. Somatization therefore is defined as the manifestation of psychological stress in somatic symptoms. Many patients with **pain disorder** describe a history of a physical injury that precedes later onset of pain. Pain onset is often accompanied by environmental stress or emotional conflict. In patients with pain disorder, no organic disease can be identified. Pain often results in secondary gain in the form of increased attention and sympathy from others. Treatment of Pts with somatoform disorder often requires multiple therapeutic modalities, including psychotherapy for their interpersonal and psychological problems. Medication for the treatment of underlying depressive disorder also may be needed. Group therapy is beneficial in some cases. Unneeded medical or surgical treatment must not be rendered and will not correct the problem. **Dental management:** oral sx may be burning tongue, painful tongue, numbness of soft tissue, tingling sensations of oral tissues, and pain in the facial region. The diagnosis of somatoform disorder should be made only under the following circumstances: clinical search has failed to provide any evidence of a disease process that could explain the symptoms, 2) the symptoms have been present long enough that if they were related to a disease process, a lesion would have developed, 3) the sx have not followed known anatomic distribution of nerves, 4) underlying systemic conditions that could produce symptoms have been
ruled out. Pt should be referred to a physician or psychiatrist. No dental treatment should be rendered.

**Cannabis:** Autonomic effects of marijuana include tachycardia, reduced peripheral resistance, and with large doses, orthostatic hypotension. Marijuana used by individuals with ischemic heart disease or cardiac failure may be harmful. Bottom line, don’t treat a high patient.

**Cocaine:** Pts who are “high” on cocaine should not receive any dental treatment for at least 6 hours after the last administration of cocaine. Patients with substance abuse should not be prescribed addictive substances. No epi until cocaine withheld for 24 hours.

**Methamphetamine:** “High” pts should not receive dental treatment for at least 8 hours after the last administration of a drug, and to be safe delay for 24 hours. **Pain control:** drug abusers often take their favorite drug to counteract dental fears and anxiety before dental appointments. Treatment of pain and anxiety in the recovering substance abuser is problematic. Many pts will refuse mood-altering drugs. In addition, the dentist should never administer a drug, or another of its class, that has been abused by the Pt in the past. For control of anxiety in these pts, oral propranolol (beta blocker) may be considered. NSAIDS can usually be used to manage post-operative pain.

**Schizophrenia:** Consultation with the Pts physician is recommended. It is suggested that the dentist ask the Pts psychiatrist’s opinion regarding the Pts medico-legal competence to sign a consent form. Routine dental treatment of the schizophrenic pt should not be attempted unless the Pt is under medical management.

**Tricyclic antidepressants:** many of the heterocyclic antidepressants can cause: hypotension, orthostatic hypotension, tachycardia, and cardiac arrhythmia. When combined with sedatives, hypnotics, and narcotic, severe respiratory depression may occur. Bottom line: up to two cartridges of 1:100,000 epi are ok. Careful with narcotics and sedatives (may need to lower dose).

**MAO inhibitors:** used to treat depression. Only 3 on market today. They are non-selective and irreversible. Significant drug interactions may occur with opioids and sympathomimetic amines (epinephrine). MAO inhibitors potentiate the depressant activity of opioids and can precipitate hypertensive crisis when combined with large amounts of epi. Bottom line: up to two cartridges of 1:100,000 epi are ok. Careful with narcotics and sedatives (may need to lower dose).

**Antipsychotic drugs:** Bottom line: up to two cartridges of 1:100,000 epi are ok. Careful with narcotics and sedatives (may need to lower dose).

**Dental management of older patients: Chapter 30**
Older adults are easily stressed by dental treatment. Late morning or early afternoon appointments are best for this group of patients. Medical complications are more common in these patients in the early morning as their blood pressure is rising. By late afternoon, they may be stressed by the day’s activities. See these pts early in the week so that if a complication arises they can be seen later in the week. Blood pressure and pulse should be monitored at the start of the dental appointment and several times during the appointment. Long appointments should not be scheduled. Stress reduction with oral, inhalation sedatives. CHF or COPD treat in semi-upright position. Orthostatic hypotension is common in older adults. If you start a new drug, use a smaller dosage. Compliance may be an issue. Sedatives and hypnotics must be used with extra care in the older adult because they may precipitate cognitive impairment. Short acting agents like triazolam are suggested. Be aware of all medications and medical conditions these folks have.

Top 50 drugs prescribed in 2008

#1. Hydrocodone (with acetaminophen) vicodin, lortab
#2. Lisinopril (hypertension)
#3. Simvastatin(lipid lowering)
#4. Levothyroxine(thyroid)
#5. Amoxicillin(bacterial infection)
#6. Azithromycin(bacterial infection)
#7. Lipitor(cholesterol)
#8. Hydrochlorothiazide
#9. Alprazolam (depression)
#10. Atenolol
11. Metformin (diabetes)
12. Metoprolol succinate (hypertension)
13. Furosemide (edema, hypertension)
14. Metoprolol tartrate (hypertension)
(if both formulations of metoprolol are considered, it is the 3rd most prescribed)
15. Sertraline (depression)
16. Omeprazole (ulcers, reflux)
17. Zolpidem/Ambien (insomnia)
18. Nexium (reflux, ulcers)
19. Lexapro (depression)
20. Oxycodone (pain)
21. Singulair (asthman, allergies)
22. Ibuprofen (pain, inflammation)
23. Plavix (blood clotting)
24. Prednisone (allergies, inflammation)
25. Fluoxetine (depression)
26. Synthroid (hypothyroidism)
27. Warfarin (blood clotting)  
28. Cephalexin (bacterial infection)  
29. Lorazepam (anxiety)  
30. Clonazepam (anxiety)  
31. Citalopram (depression)  
32. Tramadol (pain)  
33. Gabapentin (epilepsy, pain)  
34. Ciprofloxacin (bacterial infection)  
35. Propoxyphene-N (pain)  
36. Lisinopril (hypertension)  
37. Triamterene (edema, hypertension)  
38. Amoxicillin with clavulanic acid (bacterial infection)  
39. Cyclobenzaprine (muscle injury, spasm)  
40. Prevacid (ulcers, reflux)  
41. Advair (asthma)  
42. Effexor XR (depression)  
43. Trazodone (depression, insomnia)  
44. Fexofenadine (allergies)  
45. Fluticasone nasal spray (allergies)  
46. Diovan (hypertension)  
47. Paroxetine (depression, anxiety)  
48. Lovastatin (hypertension)  
49. Crestor (high cholesterol)  
50. Trimethoprim (bacterial infection)

**Top 25 Drugs 2014**

1. Ibuprofen Motrin, Advil Non-steroidal Anti-Inflammatory  
   Arthritis/Dysmenorrhea/Pain PO  
   • • •  
2. Trazadone Desyrel Anti-Depressant  
   Major Depression PO  
   Black box warning: Increased Child/Adolescent Suicide  
   • • •  
3. Gabapentin Neurontin Anti-Convulsant  
   Neuropathic pain/Seizures PO  
   • • •  
4. Oxycodone + Acetaminophen Endocet, Percocet, Tylox Narc + Non Narc Pain Reliever  
   Moderate to Severe pain Schedule II PO  
   • • •  
5. Carvedilol Coreg Beta Receptor Blocker (b1+b2)
Hypertension/CHF/Post M.I PO

6. Hydrochlorothiazide HCTZ Microzide Thiazide Diuretic Hypertension/Edema PO

7. Metformin Glucophage/Glucophage XR Anti-diabetic Type 2 Diabetes PO Black box warning: Lactic acidosis

8. Alprazolam XANAX, XANAX XR Benzodiazepine Anxiety/Panic disorder PO

9. Escitalopram Lexapro SSRI Major Depression/Anxiety Disorder PO Black Box: Increased Child/Adolescent Suicide

10. Amlodipine Norvasc Calcium Channel Blocker Hypertension/Coronary Artery Disease PO

11. Amoxillin Amoxil, Trimox Penicillin Antibiotic Infection PO

12. Albuterol Inhaler Proventil, Ventolin, ProAir HFA Beta Antagonist (B2) Bronchospasm Inhalation

13. Omeprazole Prilosec Proton Pump Inhibitor GERD, Esophagitis, H.Pylori, Ulcers PO

14. Esomeprazole Nexium Proton Pump Inhibitor GERD, Esophagitis, H.Pylori PO

15. Rosuvasin Crestor HMG-CoA Reductase Inhibitor Hypercholesterolemia/Hypertriglyceridemia PO

16. Atenolol Tenormin Beta Blocker (B1) Hypertension/Angina/Acute M.I PO or IV Black Box: Don’t stop abruptly

17. Montelukast Singulair Leukotriene Inhibitor Asthma Maintenance PO
18. **Clpidogrel Plavix Platelet Aggregation Inhibitor**  
Acute Coronary Syndrome/Clot Prevention PO [..]  

19. **Metoprolol Lopressor, Toprol XL**  
Beta Receptor Blocker (B1)  
Hypertension/ Post M.I treatment PO or IV [..]  

20. **Azithromycin Zithromax Macrolide Antibiotic**  
Infection PO or IV [..]  

21. **Atorvastatin Lipitor HMG-CoA Reductase Inhibitor**  
Hypercholesterolemia PO [..]  

22. **Simvastatin Zocor HMG-CoA Reductase Inhibitor**  
Hypercholesterolemia PO [..]  

23. **Lisinopril Prinivil, Zestril ACE Inhibitor**  
Hypertension/ Congestive Heart Failure PO  
Black box: Not for pregnant women [..]  

24. **Levothyroxine Synthroid, Levothroid, Levoxyl**  
Hormone Replacement (Thyroid) Use: Hyperthyroidism  
PO, IM, IV Black Box: Not for weight loss [..]  

25. **Acetaminophen +Hydrocodone Lorcet, Vicodin, Vicodin ES**  
Narc + Non-Narc Pain Reliever  
Pain Relief Schedule III PO