Emergency Medicine

CARDIOVASCULAR

**Acute / Subacute Bacterial Endocarditis**

- Mitral = MC valve involved; M>A>T>P
- HACEK: haemophilus, actinobacillus, cardiobacterium, eikenella, klingella  ➔ assoc. with lg. vegetations; IVDU think staph
- History and physical exam:
  - Fever (80-90% - including FUO), ECG conduction abnormalities, anorexia, weight loss
  - Peripheral manifestations:
    - Janeway lesions: painless erythematous macules on palms/soles (emboli/immune)
    - Roth spots (retinal hemorrhage with pale center)
    - Osler nodes: tender nodules on pads of digits
    - Splinter hemorrhages of proximal nail bed, clubbing, hepatosplenomegaly, petechiae
    - Septic emboli: CNS, kidneys, spleen, joints
- Diagnostic studies:
  - Blood cultures (before ABX initiation) – 3 sets at least 1 hour apart , EKG (for new arrythmias), echo (TEE = gold > TTE), CBC
- Diagnosis: 2 major OR 1 major + 3 minor OR 5 minor (80% accuracy)
  - Modified duke criteria:
    - Major:
      1. Sustained bacteremia (2 positive blood cultures)
      2. Endocardial involvement: a. positive echo showing vegetations / abscess OR b. clearly established new valvular regurg (AR/MR)
    - Minor:
      1. Predisposing condition (IVDU, indwelling cath)
      2. Fever (>38C / 100.4F)
      3. Vascular / embolic phenomena: janeway lesions, septic arterial or pulmonary embolic, ICH
      4. Immunologic phenomena: osler’s nodes, roth spots, positive RF, acute glomerulonephritis
      5. Positive blood culture not meeting major criteria
      6. Positive echo not meeting major criteria (ex. Worsening murmur)
- Tx: culture first ➔ duration of therapy = 4-6 weeks
  - Suggested empiric therapy:
    - native valve subacute bacterial endocarditis:
      - penicillin/ampicillin + gentamicin
      - vancomycin in IVDU
    - prosthetic valve:
      - vanco + gentamicin + rifampin (for s.aureus)
    - fungal: amphotericin B, caspofungin if severe + valve surgery / replacement (treat 6-8 weeks)
  - Indications for surgery:
    - Refractory CHF, persistent or refractory infection, invasive infection, prosthetic valve, recurrent systemic emboli, fungal infection

Angina Pectoris

- MOA: Insufficient oxygen supply to cardiac muscle, most commonly caused by atherosclerotic narrowing and less commonly by constriction of coronary arteries; CAD = MC cause
- **Stable angina**: syndrome of precordial discomfort of pressure from transient myocardial ischemia ➔ PREDICTABLE!
  - >70% stenosis; normal troponin/CK-MB; resting EKG normal; during episode >1mm ST depression +/- T wave
  - **Diagnosis**:
    - Symptoms
    - ECG: ST depression 1mm = positive test; inversion / flattening T waves; normal in 25%
    - myocardial imaging: exercise stress test (most useful / cost effective), echo, coronary angiography
  - **Treatment**: aspirin, nitrates, B-blockers, Ca channel blockers, ACE-I, statin, coronary angioplasty, CABG
    - B-blockers prolong life in patients with coronary disease and are first line therapy for chronic angina
- **Unstable**: when pain is less responsive to NTG, lasts longer, occurs at rest / less exertion – ANY CHANGE ➔ eval
  - **Diagnosis**: EKG = normal between attacks; stress test; angiography = gold (assess severity of coronary artery lesions when considering PCI or CABG)
  - **Treatment**: antiplatelets, B-blockers, NTG, CCB, revascularization, ACE-I, statins
- **Prinzmetal**: transient coronary artery vasospasm within normal coronary anatomy or site of atherosclerotic plaque
  - **Smoking = #1 RF!!**
**Diagnosis:** ACS work up (CK, CK-MB, troponins – may be normal / EKG – may have transient STE); coronary angiography with injection of provoking agents into coronary artery = gold

**Treatment:** nitrates and CCB; propranolol = contraindicated

**Variant:** transient, abrupt, marketed reduction in luminal diameter of coronary artery → symptomatic MI

**Long-acting nitrate should include daily 8-10 hour tx free interval to prevent drug tolerance**

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**Cardiac Arrhythmias**

- **Normal sinus:** normal rate (60-100) and rhythm; impulse originates in SA node; p waves upright; regular intervals
- **Sinus tach:** HR >100; exercise, excitement, illness
- **Sinus brady:** HR 50-60
- **Atrial fibrillation/flutter:** irritable sites in atria fire rapidly (400-600bpm); rapid pacemaking → atrial quivering; ventricles beat slower bc AV node blocks some atrial impulses
  - **Sx:** Elderly/alcohol use; syncope, dyspnea, palpitations
  - **Dx:** EKG: no discrete p waves; irregularly irregular
  - **Tx:** rate – CCB (diltiazem / verapamil) or beta blocker (metoprolol); rhythm (<48 hrs = cardioversion, amiodarone; >48 hrs = anticoagulate 21 days prior to cardioversion)
    - CHADS2 score (CHF, HTN, age >75, DM, stroke hx) – 2+ points = heparin → coumadin; 1 = aspirin or coumadin; 0 = no therapy or aspirin
- **AV block:**
  - 1st degree: PR >.2 – delay at AV node or bundle of His
  - 2nd:
    - 1: longer, longer, drop → Wenckebach (some impulses are blocked)
    - 2: some dropped (impulse blocked in bundle of His)
  - 3rd: p’s and q’s have no correlation – no atrial impulses transmitted to ventricles → complete AV dissociation
- **Bundle branch block:** QRS > .12sec; possible due to MI
  - Left: R and R’ (upward bunny ears) V4-V6
  - Right: R and R’ (upward bunny ears) V1-V3
- **Paroxysmal SVT:** HR 150-250
  - Paroxysmal SVT – no structural abnormalities; faster than normal HR begins above two lower chambers in atria, AV or SA node
  - AV nodal re-entrant tachy
  - WPW: impulse travels between atria and ventricles through bundle of kent;
    - EKG: bundle of kent fibers and delta wave on EKG; short PR, long QRS, delta wave
    - Don’t give adenosine or CCB
  - MAT: irregularly tachy, narrow QRS, abnormal 3 p waves with different morphology; HR >100
  - Tx: stable = Valsalva; symptomatic = adenosine; definitive = radiofrequency ablation
- **Premature beats:** usually benign; may cause palpitations/ increased frequency with caffeine
  - PVC = widened QRS; PAC = abnormal p wave earlier than expected; PJC: narrow QRS (<0.10 sec)
  - Every third beat = trigeminy; every 2nd = bigeminy
  - Tx: none or beta blocker if symptomatic
- **Sick sinus:** dysfunction in sinus node automaticity and impulse generation
  - Sinus brady, sinus pause <3 sec; sinus arrest >3 sec; tachy-brady = alternates
  - Tx: pacemaker
- **Sinus arrhythmia:** variation in SA nod pacing with phases of respiration; HR increases with inspiration and decreased with expiration
- **Torsades de pointes:** form of Vtach; twisting around a baseline; usually from hypokalemia or hypomagnesemia; tx = IV mag sulfate
- **Vtach:** 3 PVCs in a row = vtach; rate 120-200;
  - usually monomorphic
    - Stable: amiodorone / lidocaine
    - Unstable: CPR / defibrillation
  - Polymorphpoinc: vary in shape and size
- **Pacemaker rhythm:** vertical spikes of short duration; may be difficult to see in al leads

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**Cardiac Tamponade**

- fluid between pericardial sac + heart → distant heart sounds, distended jugular veins, decreased arterial pressure
• **beck's triad**: hypotension, muffled heart sounds, elevated neck veins (JVD)
• **pulsus paradoxus**: drop 10mmHg systolic pressure on inspiration, narrow pulse pressure
• **dx**: EKG shows electrical alternans (consecutive normally-conducted QRS complexes alternate in height) and low voltage QRS
  o DXR: water bottle heart (heart shaped like canteen)
• **Tx**: IV fluids to increase preload and prevent RV collapse
  o **Pericardiocentesis** = therapeutic
  o **Balloon pericardiotomy** and pericardial window may be warranted in cases of decompensation

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**Chest pain**

o Key physical exam: vital signs + BP in both arms; complete cardiovascular exam (JVD, PMI, chest wall tenderness to palpation, heart sounds, pulses, edema); lung and abdominal exams; lower extremity exam (inspection for signs of DVT)

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**Cardiac**

• **Myocardial infarction**:
  o Hx: hypertension, hyperlipidemia, smoking
  o Sx: sudden onset substernal heavy chest pain, radiation to left arm, dyspnea, diaphoresis, nausea
  o Labs: ECG, CPK-MB, troponin x3, CXR, CBC, electrolytes, helical CT, echo, cardiac catheterization
• **Angina**: ECG changes
  o Sx: retrosternal squeezing pain that lasts for 2 minutes and occurs with exercise; relieved with rest; not related to food intake
  o Labs: ECG, CPK-MB, CXR, CBC, electrolytes, exercise stress test (easiest / most affordable), upper endoscopy / pH monitoring, cardiac catheterization (coronary angiography = gold standard)
• **Aortic dissection**
  o Hx: uncontrolled hypertension
  o Sx: sudden onset severe chest pain that radiates to back
  o Labs: TTE, ECG, CPK-MB, troponin, CXR, CBC, amylase, lipase, CTA (chest with contrast), MRI/MRA (aorta), aortic angiography, upper endoscopy
• **Pericarditis**
  o Hx: viral infection
  o Sx: retrosternal stabbing, chest pain that improves when leaning forward, worsens with deep inspiration
  o Labs: ECG, CPK-MB, troponin, CXR, echo, CBC, upper endoscopy, ESR
• **CHF**
  o Sx: cough exacerbated by lying down at night and improved by propping with pillows, exertional dyspnea
  o Labs: CBC, CXR, ECG, echo, PFTs, BNP, CT-chest
• **Lung cancer**
  o Hx: heavy smoker
  o sx: 6 mo worsening cough, hemoptysis, dyspnea, weakness, weight loss
  o labs: CBC, sputum gram stain, culture, cytology, CXR, CT-chest
• **asthma**:
  o sx: SOB, cough, wheezing worse in cold air
  o labs: CBC, CXR, peak flow measurement, PFTs

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**Pulmonary**

• **Costochondritis**
  o Hx: viral infection
  o Sx: stabbing chest pain that worsens with deep inspiration, relieved by aspirin
  o Exam: chest wall tenderness
  o Labs: ECG, CXR, CPK-MB, troponin, CBC
• **Pneumonia**
  o Hx: heavy smoker + COPD
  o sx: 1 week pleuritic chest pain, fever, chills, cough with purulent yellow sputum
  o labs: CBC, sputum gram stain and culture, CXR, CT – chest, ECG, quantiferon TB gold
• **Pulmonary embolism**
  o Hx: recent immobilization (e.g. surgery)
  o Sx: acute onset SOB at rest and pleuritic chest pain, tachycardia, hypotension, tachypnea, mild fever
  o Labs: d-dimer, CTA – chest with IV contrast, CXR, ECG, ABG, CPK-MB, troponin, CBC, electrolytes, BUN/Cr, glucose, doppler U/S (legs)
• **Pneumothorax**
• COPD exacerbation (bronchitis)
  o Hx: COPD, smoker
  o Sx: increased dyspnea and sputum production
  o Labs: CBC, CXR, ABG, PFTs, sputum gram stain and culture, CT-chest, echo
• TB
  o Hx: contact with TB pts, healthcare workers, traveling
  o Sx: worsening cough of 6 weeks, weight loss, fatigue, night sweats, fever
  o Labs: CBC, PPD/quantiferon-TB gold, sputum gram stain, acid fast stain and culture, CXR, CT-chest, bronchoscopy, HIV antibody, lymph node biopsy
• Pulmonary edema:
  o Sx: worsening dyspnea of 6 hours + cough with pink, frothy sputum
  o Labs: CXR, ECG, CBC, ABG, PFTs, BNP

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• GERD
  o Sx: retrosternal burning sensation that occurs after heavy meals and when lying down; relieved by antacids
  o Labs: ECG, barium swallow, upper endoscopy, esophageal pH monitoring, H. pylori stool antigen
• Esophagitis
• Peptic ulcer disease
• Esophageal spasm

Other
• Sickle cell disease – acute chest syndrome
  o Hx: African American pt. with hx of sickle cell disease
  o Sx: acute onset severe chest pain with hx of sickle cell disease
  o Labs: CBC with retic count and peripheral smear, LDH, ABG, d-dimer, CXR, CPK-MB, troponin, ECG, CTA – chest with IV contrast

Conduction Disorders
• Clinical significance depends on how much it impairs cardiac output / how likely it is to deteriorate into more serious disturbance
• Presentation ranges: asymptomatic → hemodynamic instability, shock, death
• Unstable: chest pain, dyspnea, altered mental status, hypotension
• Diagnostic studies: ECG monitoring, event recording, measurement of HR variability, signal-averaged ECG, exercise stress testing, electrophysiologic testing, autonomic testing
• Tx: antiarrythmic drugs
  o Stable = treated with medications; unstable = treat with electricity

• Supraventricular arrhythmias
  o Types:
    ▪ Sinus brady: <60 – well conditioned athletes / sinus node pathology with increased risk ectopic rhythm
      o Unstable – give vagolytic (atropine) or positive chronotropic (epinephrine, dopamine)
      o Transcutaneous / transvenous pacing indicated / may need permanent pacing
    ▪ Sinus tach: >100 – fever, exercise, pain, emotion, shock, thyrotoxicosis, anemia, HF, drugs – causes symptoms when >150
      o Unstable – synchronized cardioversion
      o Medications: amiodoarone, B-blocker (esmolol) / procainamide may be indicated
      o Regular narrow complex tachy usually represents AV nodal reentry tachy such as PSVT
        o 1. Stable pt. = Valsalva / carotid sinus massage 2. Rapid IV adenosine push 3. B-blocker / CCB can be used if adenosine doesn’t work
        o Sustained / recurrent PSVT → refer for catheter ablative therapy
    ▪ Atrial premature beats – benign (no treatment in absence of symptoms)
    ▪ Paroxysmal supraventricular tachy: most common of the paroxysmals, pt. complains of “racing heart”
    ▪ Afib (“irregularly irregular”): MC chronic arrhythmia – can lead to decrease in CO and MC cause of embolic cerebrovascular accidents – called “holiday heart” when caused by excessive alcohol use or withdrawal
      o Tx depends on presentation: 1. Maintain normal ventricular rate to decrease sx and restore sinus rhythm – cardiovert with 100-200J if unstable
      o Of stable pt.: anticoag (heparin / enoxaparin, warfarin, dabigatran) if >48hr hx and rate control 3-4 weeks before trying conversion
No thrombus and low risk thrombus formation can be treated with cardioversion once anticoagulation with heparin is established.

- Rate control in presence of HF: digoxin, amiodarone, dronedarone
- No HF: metoprolol / esmolol or diltiazem / verapamil

**Atrial flutter:** usually in pt. with COPD, HF, septal defects, CAD

- Cardioversion with 50J = primary option in pt. with hemodynamic or symptomatic instability
- Stable: anticoagulants + rate control (beta-blocker)
- Sustained / recurrent: refer for catheter ablative surgery after anticoag w/ warfarin
- If antiarrhythmic therapy is chosen for chronic a flutter, dofetilide is primary choice

**Junctional rhythms:** normal hearts, myocarditis, CAD, dig toxicity

- Clinical features: palpitations, angina, fatigue, HF sx, asymptomatic
- Diagnostic studies: ECG
- Tx options:
  - Significant brady / tachy: continuous cardiac monitoring, BP monitoring, pulse ox, IV, oxygen if hypoxic

**Ventricular Rhythms**

- Aka premature ventricular complexes (PVCs) – common and benign; occur with increasing frequency if myocardium is irritated by factors such as ischemia / electrolyte disturbance
  - May be asymptomatic or aware of it
- V tach: 3+ consecutive ventricular premature beats; can be sustained or unsustained (both associated with electrolyte abnormalities); can be stable or unstable and can present without a pulse; frequent complication of acute MI / dilated cardiomyopathy
  - Can be asymptomatic or complain of palpitations, dizziness, syncope, sudden death
  - Tx:
    - With severe hypotension / loss of consciousness – synchronized cardioversion
    - Pulseless = immediate defibrillation + CPR
    - Pharm: amiodarone, lidocaine, procainamide (in that order)

- **Torsades de pointes** (polymorphic V tach): QRS twists around baseline – can occur spontaneously or when pt. has hypokalemia / hypomagnesemia or from drugs that prolong the QT
  - Tx: IV magnesium, correct electrolyte abnormalities, withdraw drugs
  - Isoproterenol infusion and overdrive pacing may be indicated after initial therapy / permanent pacemaker if it’s recurrent
- **Long QT syndrome:** congenital or acquired / associated with reccurrent syncope, QT interval usually .5-.7sec long, ventricular arrhythmias, sudden death
  - Tx: **treat electrolyte abnormalities and discontinue drugs**
- **Brugada syndrome:** genetic – syncope, ventricular fibr, sudden death, often during sleep (more common Asian men)
- **V fib:** no effective pumping action exists, without intervention = death
- **Diagnostic studies:** ECG
- **Treatment:**
  - Ventricular premature beats / unsustained V tach without heart disease / electrolyte abnormalities are usually not treated – may be treated with B-blockers / CCB if pt. is symptomatic
  - Those with identifiable site of arrhythmic origin benefit from radiofrequency ablation
  - ICD may be indicated for recurrent sustained V tach with structural heart disease or without reversible cause for congenital long QT syndrome / brugada

**Conduction Disturbances**

- **Sick sinus syndrome:** physiologically inappropriate sinus brady, sinus pause, sinus arrest or episodes of alternating sinus tach + brady – usually found in elderly / infants who had heart surgery
  - Can be caused by digitalis, CCBs, B-blockers, sympatholytic agents, antiarrhythmic drugs, aerosol propellant abuse
  - Reversible if caused by digitalis, quinidine, B-blockers, aerosol propellants
  - Usually asymptomatic, but may have syncope, dizziness, confusion, HF, palpitations, decreased exercise tolerance
  - Most require permanent pacing if symptomatic
- **AV block:** refractory conduction of impulses from atria to ventricles thorough AV node / bundle of His and divided into first degree, second degree, and complete / third degree
  - First degree: PR interval >.2 sec
    - usually asymptomatic; higher grade may produce weakness, fatigue, decreased exercise tolerance
    - no treatment
  - Second degree: aka weneckebach - not all atrial beats conducted to ventricles
    - **Mobitz 1:** progressive lengthening PR interval with shortening RR interval until atrial impulse eventually doesn’t get conducted to ventricles (long, longer, drop now you have Wenckebach)**
• Permanent cardiac pacing is only treatment
  • Mobitz 2: intermittently nonconducted atrial beats – block within His bundle system – almost always secondary to organic disease involving infranodal system and may progress to complete heart block
  • Permanent cardiac pacing is only treatment
  • Temp transthoracic or transvenous pacing should be followed by permanent pacing
    o Third degree: complete heart block – complete dissociation between atria and ventricles caused by lesion distal to His bundle
  • Temp transthoracic or transvenous pacing should be followed by permanent pacing

• Diagnostic studies: ECG changes

  **Coronary Vascular Disease**
  • CAD is #1 killer in USA and worldwide ➞ Death rates ↓ yearly since 1968 – MC cause of cardiovascular death and disability
    o RF: smoking, diabetes, dyslipidemia (↑ LDL, ↓ HDL), hypertension, family hx, men <55, women <65
    o Dx: high-sensitivity high CRP, lipids, triglyceride yfs, carotid U/S
    o Tx: Smoking cessation, lifestyle (BP, LDL/HDL, obesity)
      o “Primary prevention” = platelet inhibitors (Aspirin, etc.) = cornerstone
      o “Secondary prevention”: aspirin, β-blockers, ACE-I/ARB, statins; nitro if symptomatic
    o MOA:
      o Foam cells are macrophages that gobble up lipids in the wall; it then dies off and stays there and becomes a foam cell; when it dies it releases cytokines that attract more macrophages to the area ➔ plaque clot
      o Fibrous plaque forms over lipid core: Complete clot – ST elevation MI; Incomplete clot – unstable angina / NSTEMI
        ▪ Vulnerable plaque is easy to rupture; thick plaque is stable
        ▪ Adhesion, activation, aggregation, propagation of clot, platelet adherence

  **Cardiac Arrest**
  • NSTEMI: Myocardial necrosis without acute ST segment elevation or Q waves
    • EKG: STD, t wave inversion or both; coronary artery not completely blocked; subendocardial infarct
    • Cardiac markers elevated:
      o troponin = most sensitive; appears at 2-4 hours, peaks 12-24 hours, lasts 7-10 days
      o CK/CK-MB: appears at 4-6 hours, peaks at 12-24, returns in 48-72 hours
      o Myoglobin (Mb): used less; appears at 1-4 hours, peak 12 hours, return to baseline 24 hours
    • Tx: beta blocker + NTH + aspirin + clopidogrel + heparin + ACE-I + statin + reperfusion
      o Reperfusion via percutaneous coronary intervention
      o Less time-sensitive than STEMI
  • STEMI: myocardial necrosis WITH ST changes/ q waves
    • Coronary artery completely blocked; full thickness of myocardial wall involved
    • ECG: ST elevation, possible q waves
      o Anterior wall: q waves / STE in I, AVL, V2-V6
      o Inferior: II, III, AVF
      o Lateral: lateral (I, aVL, V5-V6) + reciprocal STD in inferio leads (III and aVF)
      o Posterior: STD in V1 – V3
    • Tx: BB + NTG + aspirin and clopidogrel + heparin + ACE-I + statin + reperfusion
      o Aspirin and clopidogrel are given at once
      o TIME SENSITIVE!!!! Immediate coronary angiography and primary PCI IN 90 minutes!!!!!!!
      o Thrombolytic therapy within first 3 hours if PCI not available
        ▪ c/I to fibrinolytic use in STEMI: prior intracranial hemorrhage, known structural cerebral vascular lesion, known malignant intracranial neoplasm, ischemic stroke in 3 months, suspected aortic dissection, active bleeding / bleeding diathesis (menses)
    • Reversible causes: H’s and T’s
      o Hypoxemia, hypovolemia, hypothermia, hyperkalemia/hypokalemia, hydrogen ion (acidosis)
      o Tension pneumothorax, tamponade (cardiac), toxins, thrombosis (pulmonary), thrombosis (coronary)

  **Dyspnea on Exertion**
  • Arrhythmia: afib, sinus tach, sick sinus syndrome/bradycardia
    o Hx: palpitations, syncope
    o PE: irregular rhythm, pauses
    o Dx: ECG, event recorder, holter monitor, stress testing
• **Myocardial:** cardiomyopathies, coronary ischemia  
  - Hx: dyspnea on exertion, paroxysmal nocturnal dyspnea, orthopnea, chest pain / tightness, prior CAD or afib  
  - PE: edema, JVD, S3, displaced cardiac apical impulse, hepatojugular reflex, murmur, crackles, wheezing, tachycardia, S4  
  - Dx: ECG, BNP, echo, stress test, coronary angiography

• **Restrictive:** constrictive pericarditis, pericardial effusion / tamponade  
  - Hx: chest pain, dyspnea  
  - PE: paradoxical pulse (exaggerated variation in blood pressure with respiration)  
  - Dx: EKG shows low voltage QRX with electrical alternans; echo with increased pericardial fluid, XR = water bottle heart

• **Valvular:** aortic insufficiency/stenosis, congenital heart disease, mitral valve insufficiency/stenosis  
  - Hx: DOE  
  - PE: murmur, JVD  
  - Dx: echo

**Edema**  
- Swelling caused by collection of fluid in spaces that surround body's tissues / organs  
  - Peripheral = lower legs / hands; ascites (abdomen), chest (pulmonary / pleural effusion)  
- MC causes: chronic venous insufficiency, DVT  
  - Lymphedema: from surgical removal of lymph nodes after cancer tx, can cause swelling of lungs / skin thickening  
  - Angioedema: reaction to meds – fluid leaks out of blood vessels into surrounding tissues  
  - Drugs: oral diabetes meds, hypertensive meds, ibuprofen, estrogens  
  - Infection: peritonitis  
  - Hypertension, kidney disease, heart failure, cirrhosis

- Sx: heavy legs, itching, pain, hyperpigmentation, stasis dermatitis, increased abdomen size, difficulty breathing  
- Dx: low suspicion = D-dimer (wells criteria to r/o DVT), color duplex ultrasound, ABI, urine dipstick to r/o nephrotic syndrome  
- Tx: treat underlying cause, use compression stocking, elevate legs above head for 30 min 3-4x/day, sodium restriction, avoid diuretics (without volume overload), may enhance sodium retention through increased secretion of renin and angiotensin → AKI and oliguria

**Heart Failure**  
- Syndrome of ventricular dysfunction – can be involved together or separately  
  - LV failure → SOB + fatigue  
  - RV failure → peripheral and abdominal fluid accumulation

• **Systolic:**  
  - S3 – rapid ventricular filling during early diastole  
  - sxs: dyspnea, PND, orthopnea, rales, crackles, displaced own and to the left apical impulse  
  - EF <40%  
  - Tx: ACE-I, BB, loop diuretic  
  - Acute worsening: O2 + ACE + stop BB + start nitro and double dose diuretic IV (when stable → BB + PO loop diuretic)

• **Diastolic:**  
  - S4 – hypertrophic thick walled LV with impaired relaxation  
  - Increases age 55, common in pt with HTN (often forget to take meds)  
  - sxs: dyspnea and rales with apical heave / lift  
  - EF = normal  
  - Tx: ACE-I + BB/CCB (do not use diuretics in stable chronic diastolic failure  
  - NEVER USE DIGOXIN FOR DIASTOLIC  
  - Acute = same as systolic (ACE_ + loop IV + NTG + O2)

• **Right heart failure** (right ventricle)  
  - Cause: pulmonary HTN (right heart can’t pump blood to lungs – MC cause right heart failure = left heart failure)  
  - sxs: JVD, leg edema  
  - dx: echo and doppler; gold = right heart cardiac catheterization  
  - treat underlying condition

• high output cardiac failure: caused by increased metabolic demand (higher than heart can pump)  
  - hyperthyroid, severe anemia, beriberi / thiamine deficiency  
  - tachycardia → systolic failure bc heart tires, dilates, weakens  
  - tx: like heart failure and acute CHF, treat underlying condition

**Hypertensive Crisis**

- Systolic >180 or diastolic >100 without target-organ damage
• Immediate BP reduction not required but pt should be started on 2-drug oral combination and close eval

Hypertensive Emergency
• SBP >180 and/or DBP >120 with signs of damage to target organ: encephalopathy, nephropathy, intracranial hemorrhage, aortic dissection, pulmonary edema, unstable angina, MI
• BP must be reduced within 1 hour
• Tx: sodium nitroprusside = drug of choice
  o Potential for developing cyanide toxicity → treat with sodium thiosulfate which combines with cyanide ion to form thiocyanate (nontoxic)
  o Nitro should be avoided in setting of renal failure due to risk of cyanate and thiocyanate toxicity
• Admit to ICU – goal 20-25% reduction in mean arterial pressure in 1-2 hours; decrease 10% in first hour, additional 15% in next 2-3 hours using IV agents

Malignant HTN:
• Diastolic reading >140mmHg with papilledema and either encephalopathy or nephropathy
• If untreated → progressive renal failure
• Can be caused by MAOI + food (cheese, sausage, red wine)
• Hydralazine = drug of choice

For all:
• Dx: BP, ECG, UA, ophthalmic exam, serum BUN and Cr

Cardiogenic shock: common causes – acute MI, heart failure, cardiac tamponade
  o PE: hypotension (SBP <90), cyanosis, cool extremities, AMS, crackles
  o Increased capillary wedge pressure >15mm
  o Tx: fluid resuscitation, pressors (dopamine), treat underlying cause

Orthostatic hypotension: drop of >20mm systolic, 10mm diastolic and 15 bpm increase in pulse 2-5 min after change supine → standing
  o Autonomic dysfunction in DM common cause, medications, tilt table testing if autonomic dysfunction suspected
  o If associated HR >15bpm likely related to low blood volume

Vasovagal: drop in HR and BP → fainting, often reaction to stressful trigger
  o Upright tilt-table study can reproduce sx in susceptible people
  o Tx: avoid triggers, sometimes BB disopyramide, pacemaker

Orthopnea

Palpitations

Peripheral Vascular Disease:
  • atherosclerotic dz of the lower extremities (and vessels outside the heart and brain)
  • sx: intermittent claudication = MC presentation; reproducible pain / discomfort in lower extremity brought on by exercise with exercise + relieved with rest; erectile dysf(n)
• aortic bifurcation / common iliac = buttock, hip ground claudications
  • leriche syndrome: claudication, impotence, decreased femoral pulses
• femoral artery: thigh / upper calf claudication (MC)
• popliteal artery: lower calf claudication
• signs: weak or absent distal pulses, arterial bruits, loss of hair, shiny atrophic skin, pallor with dependent rubor
• 6ps caused by acute arterial embolism: pain, pulselessness, pallor, paresthesias, poikilothermia, paralysis
• Diagnostics: arteriography = gold standard (clinically only done if revascularization is planned); doppler ultrasonography; ankle-brachial index <0.9 (normal = 1-1.2)
  • Falsely high index may indicate severely hardened, non-compressible leg vessels
• Management: risk factor modification: discontinue tobacco, control diabetes, hypertension, hyperlipidemia
• Medications: B-blocker, ACE-I, statins
  • Platelet inhibitors:
    • cilostazol = mainstay of treatment (helpful for intermittent claudication)
    • aspirin
    • clopidogrel (Plavix)
• tx: aspirin, cilostazole, rosuvastatin, smoking cessation, structured exercise

Varicose Veins:
• Sx: asymptomatic; aching and fatigue
• Signs: dilated, tortuous veins; greater saphenous = MC; flat, reticular veins; telangiectasia; spider veins
• Diagnostics: duplex ultrasonography
• Management: weight loss, control risk factors; graduated compression stockings
• Interventions: exercise programs, elevation, radiofrequency or laser ablation, compression, sclerotherapy, surgical stripping

Phlebitis:
• Sx: superficial = dull pain, erythema; deep = swelling, heat, redness
• Signs: superficial = erythema, tenderness, induration; deep = heat, edema, homan’s sign (calf pain w foot dorsiflexion)
• Diagnostics: duplex ultrasonography, venography, D-dimer
• Management: superficial: bed rest, local heat, elevation, NSIADs; deep = anticoagulation (prevention is key!!)
• Interventions: surgery

Chronic Venous Insufficiency:
• Symptoms: progressive edema, itching, dull pain, ulcerations
• Signs: shiny, thin, atrophic skin
• Severe disease: ulceration (stasis ulcer, dermatitis) - PAINLESS
• Diagnostics: clinical; duplex ultrasonography
• Management: prevention, elevation, avoid extended standing or sitting, compression hose
• Interventions: wet compresses, compression boots or stockings, skin grafting

Syncope
• MC causes: vasovagal, idiopathic
• Red flags: syncope during exertion, multiple recurrences in short time, heart murmur / structural heart disease, old age, significant injury during syncope, family hx of unexpected death / exertional / unexplained recurrent syncope
• Usually from insufficient cerebral blood flow / from benign causes
• Less common = cardiac arrhythmia
• Dx: ECG, glucose, pulse ox, echo, tilt table, CNS imaging = rare
• Tx: fix underlying cause

Valvular Heart Disease

Diastolic Murmur: almost always mean heart disease
- Early = regurg flow through incompetent valve (usually aortic)
- Rumbling = mid / late diastole suggests stenosis of AV valve (usually mitral)
  • Aortic regurg: soft, high pitched, blowing diastolic along LSB with pt sitting, leaning forward after exhalung
  • Mitral stenosis: diastolic low pitched decrescendo and rumbling with opening snap at apex
  • Pulmonary regurg: high pitch, decrescendo murmur at LUSB, increases with inspiration
  • Tricuspid stenosis: mid diastolic rumbling at LLSB with opening snap

Midsystolic Murmurs: aka ejection murmurs; MC kind of heart murmur; peak near midsystole and stop before S2; gap between murmur and S2
1. pathologic - secondary to structural cardiovascular abnormalities
2. physiologic – secondary to physiologic alteration in body
3. innocent – not associated with detectible physiologic / structural abnormality
   • Aortic stenosis: systolic ejection crescendo-decrescendo RUSB
   • Pulmonic stenosis: hard midsystolic ejection crescendo-decrescendo murmur with widely split S2 at LSB that radiates to left shoulder and neck
   • HCOM: medium-pitched, mid-systolic murmur that decreases with squatting and increases with straining
     o S4 gallop and apical lift with thick, stiff left ventricle
   • Mitral valve prolapse: midsystolic ejection click at apex

Pansystolic (holosystolic) murmurs – pathologic; heard when blood flows from high to low pressure chamber; begins immediately with S1 and continues up to S2
   • Mitral reguruge: blowing holosystolic murmur at apex with split S2
   • Tricuspid reguruge: high pitched holosystolic murmur at mid LSB
   • Ventricular septal defect: harsh holosystolic murmur heard at LSB with wide radiation and fixed, split S2

Vascular Disease
- Aortic aneurysm: flank pain, hypotension, pulsatile abdominal mass; screen if male >65 and hx of smoking
  • Tx: immediate surgical repair if >5.5cm or expands >0.5cm per year; monitor annual if >3cm, q6mo >4cm; beta blocker
- Aortic dissection: sudden onset tearing chest pain between scapula; diminished pulses; widened mediastinum; unequal bps on arm
  • Tx: ascending aorta = surgical emergency; descending: beta blocker
- Arterial embolism / thrombosis: sudden arterial occlusion
  • Pain, pallor, pulselessness, paresthesia, paralysis, poiklothermia
  • Angiography = gold standard
  • Tx: IV heparin if not limb threatening call vascular surgeon for angioplasty, graft or endarterectomy
- Giant cell arteritis: inflammation of large and medium vessels – jaw claudication and HA, thickened temporal artery scalp pain elicited by touching scalp / hair brush; acute vision disturbances; associated with polymyalgia rheumatica
  • Amaurosis fugax (temporary monocular blindness) secondary to anterior ischemic optic neuritis
  • Dx: ESR >100, temporal artery biopsy
  • Tx: high dose prednisone URGENTLY – don’t wait for biopsy results
- Peripheral artery disease: intermittent claudication, ABI <0.9
  • s/s: lower extremity hair loss, brittle nails, pallor, cyanosis, hypothermia; ulcers pale to black, PAINFUL, lateral / distal
  • arteriography = gold standard
  • tx: definitive = arterial bypass; medical: antiplatelet, antilipid, manage r/f, dilostazol, aspirin, Plavix
- Phlebitis / Thrombophlebitis: spontaneous / after trauma or IV/PICC lines – dull pain, erythema, induration of vein, palpable cord
  • dx: duplex U/S = gold standard
  • tx: symptomatic: NSAIDs, warm compress
- Varicose Veins: dilated tortuous superficial veins, venous stasis ulcers, ankle edema, LE pain after sitting/standing
  • tx: leg elevation, compression stockings, vein stripping
- Venous insufficiency: edema, atrophic shiny skin, brawny induration, stasis dermatitis, brown hyperpigmentation, varicosities, ulcers above medial malleolus
  • dx: ABI, Trendelenburg tests, U/S
  • tx: sclerotherapy, vein stripping, compression hose
- Venous thrombosis: unilateral (asymmetrical) swelling of lower extremity
  • Virchow’s triad: stasis, trauma, hypercoagulability (OCP, cancer, surgery, factor V leiden)
  • Dx: d-dimer, venous duplex U/S = 1st line; venography = gold standard; Homan sign = discomfort behind knee on forced foot dorsiflexion
  • Tx: heparin to coumadin bridge

ORTHOPEDICS / RHEUMATOLOGY
- Back strain / sprain
  • Cervical Sprain (whiplash) – can last 18+ months
    o s/sx: stiffness / pain in the neck; presents with paraspinal muscle tenderness and spasm and +spurling test
    o tx: soft cervical collar (2-3 days), application of ice / heat, analgesics, gentle active ROM soon after injury
  • Back strain (thoracic and lumbar strain) – MC cause of back pain usually d/t lifting or strenuous activity
    o s/sx: stiffness, difficulty bending, axial back pain and no radicular symptoms
Acute and chronic lower back pain

• MC cause lower back pain = prolapsed intervertebral disk and low back strain; usually occurs within 24 hours of injury / overuse

• Features:
  - pain originating in the back and radiating down the leg = nerve irritation
  - MSK usually located to one region / point tenderness
  - Sciatica felt in buttock, posterior thigh, posterolateral aspect of leg around lateral malleolus to lateral dorsum of foot
  - Unilateral low back and butt pain that gets worse with standing → SI joint involvement
  - Pain in elderly increased by walking and relieved by leaning forward = spinal stenosis

• Dx: XR usually not required if h&p is benign / Normal neuro exam
  - Red flags: fever, weight loss, morning stiffness, IVDU / steroid history, trauma, cancer, saddles anesthesia, loss of anal sphincter tone, motor weakness = emergent XR
  - CT helpful in demonstrating bony stenosis and identifying lateral nerve root entrapment
  - MRI helpful for cord pathology, neural tumors, stenosis, herniated disks, and infections
  - Get XR if pain persists

• Tx: short term rest (max 2 days), with support under knees and neck + NSAIDs
  - Progressive walking to normal activities if pain subsides
  - Postural exercises / back rehab
  - No improvement in 6 weeks → imaging to r/o spinal tumor / infection (if normal → rehab)
  - Surgery if conservative tx fails (~5%)

Bursitis

• Inflammation of bursa (thin walled sac lined with synovial tissue); caused by trauma / overuse
• Pain, swelling, tenderness – may persist weeks
• Tx: prevention of precipitating factors, rest, brace/support, NSAIDs, steroid injections

Tendonitis

• Inflammation of the tendon commonly d/t overuse injuries and systemic disease (arthritis)
• Features: pain with movement, swelling, impaired function; resolves over several weeks but recurrence common
• Tx: ice, rest, stretching for inflammation
  - NSAIDs help but don't penetrate tendon circulation; steroid injection + anesthesia may be beneficial
• Surgery for excision of scar tissue / necrotic debris if conservative measures fail

Cauda Equina

• Midline disk herniation that compresses several nerve roots, usually at L4-L5 level
• s/sx: bladder/ bowel incontinence, decreased lower extremity sensation, decreased lower extremity strength, leg pain, numbness, saddle anesthesia, paralysis
• dx: MRI – new onset urinary symptoms with associated back pain / sciatica need and MRI
• tx: surgical emergency → immediate referral

Costochondritis

• Inflammation of cartilage in the rib cage
• s/s: pain to the touch, radiating pain down limbs, unbearable chest pain with/without inspiration
• r/f: age >40, high-impact sports, manual labor, allergies, rheumatoid arthritis, ankylosing spondylitis, reactive arthritis
• dx: physical exam (rule out other things with imaging / blood tests / ECG)
• tx: NSAIDs, lifestyle changes, RICE

Ecchymosis/erythema

Fractures/dislocations

Upper Extremity

• Humerus: MC site of radial nerve injury; posterior fat pad / sail sign, treat with sugar tong splint (distal) and coaptation splint (shaft) with ortho follow up in 24-48 hours
- **Supracondylar:** MC pediatric elbow fracture; usually from fall to outstretched hand; XR shows anterior fat pad (dark area on either side of bone), check neurologic / vascular involvement (median nerve / brachial artery injury), long arm posterior splint followed by long arm casting (ORIF for displaced)
- **Radial head:** pain and tenderness along lateral aspect of elbow, limited elbow / forearm ROM, particularly pronation / supination; MC cause is falling on outstretched arm; treat with sling, long arm splint at 90 degrees, ORIF
- **Radial head subluxation (nursemaid):** lateral elbow pain, hold elbow in slight flexion and forearm pronated; pain and tenderness localized to lateral aspect of elbow; usually from pulling upward motion; supination-flexion technique is classically used
- **Nightstick fracture (of ulna):** usually from blow; functional brace with good interosseous mold for isolated nondisplaced or distal 2/3 ulna shaft fx; ORIF if displaced
- **Monteggia (proximal ulnar shaft fracture with radial head dislocation):** elbow pain and swelling, tenderness to palpation along elbow, decreased elbow ROM, radial head may be palpable if dislocated
  - FOOSH, radial nerve injury, treat with ORIF
- **Galeazzi (distal radial shaft fracture, dislocation of ulna):** wrist pain, swelling, pain with flexion / extension; FOOSH, falling on pronated hand, unstable fracture = ORIF, long arm splint
- **Colles:** dorsally angulated extra-articular distal radius fracture; “fragility fracture”; FOOSH; causes dinner fork deformity; need lateral XR to make diagnosis; treat with sugar tong splint/cast
- **Scaphoid:** FOOSH, snuffbox tenderness = treat as fracture; pain on radial surface of wrist at anatomical snuffbox, fx may not be evident for up to 2 weeks; complication = avascular necrosis; treat with 10-12 weeks casting with thumb spica splint
- **Boxer’s:** fracture of neck of 5th / 4th metacarpa; usually from punch with clenched fist; treat with ulnar gutter splint with joints at 60 degree flexions
- **Bennet / Rolando of hand:** require ORIF

**Shoulder**

- **Shoulder fracture:** common in elderly, complication = adhesive capsulitis / rotator cuff tear; MRI to r/o rotator cuff tear; scapular fractures often missed after MVA; tx = immobilize 2-3 weeks the begin with gentle passive ROM and modalities; progress to light strengthening after 6 weeks
- **Shoulder dislocation:** mode of injury = FOOSH (abduction and extension) → usually sports related / in elderly
  - **Anterior:** MC (arm = anterior) → arm is abducted and externally rotated (FOOSH)
  - **Posterior:** arm is adducted and internally rotated
  - In both: get XR (AP, axillary, and scapular view)
  - Tx: reduce, postreduction films, sling and swath, PT
  - Associated conditions:
    - Bankart – fracture of anterior inferior glenoid following impaction of humeral head against glenoid
    - Hill-sachs lesion (dent in humeral head) – compression chondral injury of posterior superior head following impaction against glenoid
    - Axillary nerve injury (CS-C6 fibers): transient neurapraxia present in 5% shoulder dislocations → numblness / tingling of lateral shoulder
    - Rotator cuff tear / labral tear also possible
- **Clavicular fracture:** usually from direct fall on shoulder – direct blow to lateral aspect of shoulder / birth trauma in newborn
  - Middle third = MC
  - PE: swelling, erythema, tenderness to palpation, tenting of overlying skin, MC injured rotator cuff muscle = supraspinatus
  - XR: anteroposterior and clavicle view
  - Tx: simple arm sling or figure of eight sling; 4-6 weeks adults, ortho consult if proximal 1/3; begin PT after 4 weeks with light strengthening after 6 weeks

**Hip**

- **Hip fracture:** severe hip, groin, thigh pain often wit hx of recent trauma / fall; hip tender with pain on active nad passive ROM
  - Femoral neck = main blood supply to femoral head = medial circumflex femoral artery; log roll maneuver (internal and external rotation of leg elicits hip pain which suggests femoral neck fracture; get AP XR of pelvis; high incidence of avascular necrosis with femoral neck fractures; manage with ORIF; hip arthroplasty, DVT prophylaxis until ambulatory
- **Hip dislocation:** hip pain with leg shortened and internally rotated / adducted after trauma = MC cause (fall from height, MVA);
  - Posterior dislocation in 90% = adducted, flexed, internally rotated; anterior dislocation = abducted, flexed, externally rotated
- r/o sciatic nerve injury, prevent DVT
- XR: posterior – femoral head superior to acetabulum; anterior – femoral head inferior to acetabulum
- Tx: closed reduction under conscious sedation; open reduction if failure of closed reduction; repeat XR and neurovascular exam after reduction

Knee
- Ottawa: age >55, tenderness head of fibula, isolated tenderness to patella, can’t flex to 90, can’t bear weight 4 steps
- Pittsburgh: recent fall or blunt trauma, age <12 or >50, can’t take 4 unaided steps
- Knee dislocation: usually after high impact trauma and pt can’t extend knee; worry about popliteal artery injury - diagnose with CTA, get pre and post reduction XR, MRI required to eval soft tissue injury for surgical planning; orthopedia emergency → early reduction essential (chest distal pulses and peroneal nerve function)
- Tibial plateau fracture: usually in children in MVA, get ap lateral oblique XR, if displaced check peroneal nerve (foot drop) – may need to confirm with CT/MRI, tx: nondisplaced = cast 6-8 weeks; displaced = ORIF
- Patella fracture: patella alta (pulled quad muscles cause fracture displacement; tx = 6-8 eeks immobolization, may bear partial eight; displaced need ORIF
- Knee osteoarthritis: degenerative disease of synovial joints that cause progressive loss of articular cartilage; pain worse with activities, swelling, stiffness, palpable crepitus on exam; XR shows joint space narrowing, osteophytes, subchondral sclerosis; tx = weight reduction, moderate activity, NSAIDs, intra-articular steroid injection, bracing, canes, muscle strengthening, PT; acetaminophen = first line, NSAIDs = second line; total joint replacement indicated in advanced cases

Ankle/Foot
- Need for XR: pain along lateral malleolus, medial malleolus; midfoot pain (5th metatarsal / navicular), unable to walk >4 steps in exam room
- Jones: proximal 5th metatarsal disphysis fracture; pain over lateral border of foot; not benign (poor blood supply to that area); radiographs: AP, lateral, oblique; tx: walking boot/cast, RICE, surgery for displaced, 6 weeks non-weight bearing
- Stress: common in athletes, military (overuse), MC in 3rd metatarsal; dx: XR 50% negative; bone scan / MRI may show, tx: rest, splint, post-op shoe
- Talus: high force impact (falling / snowboarding), radiography with suspicious, non-weight bearing cast for non-displaced, surgery for displaced
- Weber Ankle:
  - A: fibular fracture below mortise, tibiofibular syndesmosis intact, usually unstable
  - B: fibular fx at level of mortise, tibiofibular syndesmosis intact or mild tear, deltoid ligament intact or may be torn, stable or unstable
  - C: fibular fx above Mortise, tibiofibular syndesmosis torn with widening of talofibular joint, deltoid ligament damage or medial malleolar fracture, unstable = ORIF
- Ankle dislocation: usually from fall, MVA, sports injury; can be damage to blood vessels/nerves/skin; tx = reduction +/- ORIF

Gout / Pseudogout
- Altered purine metabolism and sodium urate crystal precipitation into synovial fluid, M>W (9:1) until menopause (1:1)
- Usually young, >30 yo, asymmetric; great toe; tophi
- s/s: MC = podagra (attack of MTP of great toe) (70% of cases); pain, swelling, redness, exquisite tenderness. In chronic gout = tophi
- dx: joint fluid – rod shaped negatively birefringent; serum uric acid level >8 (not diagnostic)
- imaging: small, punched out lesions on XR = high likelihood diagnosis
- tx:
  - lifestyle: elevation, rest, decrease purines (meats, bear, seafood, alcohol), weight loss, increase protein, limit alcohol
  - pharm: NSAIDs = drug of choice (indomethacin tid); colchicine = effective but bad GI s/e; steroid injections for those who can’t take NSAIDs, oral pred if other meds not tolerated
    - thiazide diuretics and aspirin should be avoided
    - management between acute attacks: colchicine, allopurinol
  - don’t start someone on allopurinol in acute attack
- CPPD: pseudogout; usually >60yo; large joints, lower extremity; no tophi
- Similar gout symptoms
- Dx: rhomboid shaped calcium pyrophosphad crystals – positively birefringent
  - XR shows fine, linear calcifications in cartilage
- Tx: NSAIDs, colchicine, intra-articular steroid injections
  - Colchicine = prophylaxis, NSAIDs = acute attacks
Herniated disc (herniated nucleus pulposus)

- **Cervical:** usually posterolateral at C5-C6/C6-C7; pain into arm / shoulder, numbness / tingling into arm with pain at rest vs rotator cuff no pain at rest until there’s movement; confirmed with MRI
  - C4: weakness in shoulder elevation
  - C5: weakness of shoulder abduction and external rotation; bicep reflex may be diminished
  - C5-C6: pain at shoulder tip with radiation to anterior upper arm, radial forearm, thumb; weakness with elbow flexion, or shoulder external rotation
  - C6-C7: affects C7 nerve root – pain at shoulder blade, pectoral area, medial axilla, posterolateral upper arm, dorsal elbow and forearm, index, and medial digits or all of fingers; diminished triceps reflex
  - C7-T1: cause T8 radiculopathy – opponens pollicis and hand intrinsic muscles; weakness of finger abductors and grip strength

- **Lumbar:** pain in dermatomal pattern – increases with coughing, straining, bending, sitting (L5-S1 = MC)
  - Sciatica: back pain radiating through thigh / buttocks (lower leg below knee down L5-S1) – do straight leg raise, crossover test; dx = noncon MRI; tx: NSAIDs, rest, steroids, PT, epidural steroid injection, surgery if warranted
  - Red-flag sx: fecal / urinary incontinence, saddle anesthesia, urinary retention, immunosuppression, IVDU, fevers, chronic steroid use, focal neurologic deficit, fracture / infection, trauma, >50 with mild trauma, neoplasm or fracture, hx of CA, unexplained weight loss, no improvement after 6 weeks of conservative management
  - L1: inguinal region (rare)
  - L2-L4: spinal stenosis; anterior aspect of thigh
  - L5: MC radiculopathy: lateral aspect of leg into foot; reduced strength in foot dorsiflexion, toe extension, foot eversion
  - S1: pain down posterior aspect of leg into foot from back; reduced strength with plantar flexion, ankle reflex loss
  - S2-S4: sacral / buttock pain that radiates down posterior aspect of leg into perineum → urinary / fecal incontinence and sexual dysfunction

**Osteomyelitis**

- Acute or chronic infection and inflammation of bone and bone marrow – can occur as result of hematogenous seeding, contiguous spread of infection or direct inoculation into intact bone (trauma / surgery)
  - Fever, restriction of movement of involved extremity or refusal to bear weight
  - Staph aureus = MC cause; Pasteurella seen in cases caused by cat / dog bites; salmonella in sickle cell; mycobacterium TB seen in vertebral involvement (Potts dz)
  - Dx: XR triad: demineralization, periosteal reaction, bone destruction (lags behind sx 7-10 days); MRI shows changes before XR
  - Labs: CRP elevated - 6 weeks, WBC and ESR high in most cases; definitive diagnosis = blood culture or by needle aspiration / bone biopsy
  - Tx: empiric therapy directed toward most probable organism and tailored once culture results are available – all hardware removed; therapy = 4-6 weeks for acute and >8 for chronic or MRSA
    - If diabetic foot ulcer is >2cmx2cm or bone = palpable → osteomyelitis is likely

**Septic Arthritis**

- Direct bacterial invasion of joint space; MEDICAL EMERGENCY – most dangerous form of arthritis
- Single, swollen, warm, painful joint that is tender to palpation + constitutional sx – fever, sweats, myalgia, malaise, pain; MC = knee and hip
- Caused by: hematogenous spread, direct inoculation, contiguous spread
- Staph aureus = MC; gonorrhea in sexually active young adults; pseudomonas in IVDU
- Dx: arthrocentesis: joint fluid aspirate for definitive diagnosis (WBC >50,000 primarily PMNs); WBC >1000 is positive in pt with prosthetic joints
- Tx = 2-4 weeks abx; choice is guided by gram stain; staph aureus = vanco/nafcillin; gonorrhea = ceftriaxone; IVDU = cipro/Levaquin; + arthroscopy with joint drainage

**Soft Tissue Injuries**

- **Upper Extremity**
  - **Medial epicondylitis** (golfer’s/pitchers elbow): overuse syndrome; pain with resisted wrist flexion and pronation, pain at medial elbow may radiate to wrist; tx: activity modification, PT, steroid injection, surgery for pt who failed PT for 4-6 mo
  - **Lateral epicondylitis** (tennis elbow): overuse syndrome; pain with wrist extension and forearm supination; tx: activity modification, counterforce bracing, PT, steroid injection, surgery for failed PT 4-6mo
  - **Olecranon bursitis** (scholar’s elbow): elbow swelling – nonseptic = acute trauma / repetitive trauma; septic = pain / fever (r/o septic / gout with aspirate); tx: PT, rest, ice, systemic abx based on cx if septic, NSAIDs, injected steroids, operative
• **Cubital/ulnar tunnel syndrome:** caused by ulnar nerve compression at wrist; sx = paresthesias over small finger and unar half of 4th finger and ulnar dorsum of hand; worse with cell phone use, nigh sx caused by sleeping with arm in flexion, tunnel sign positive; tx: NSAIDs, activity medication, nightimng bracing, operative = ulnar nerve decompression

• **Carpal tunnel:** pain / paresthesia in median nerve distribution (first 3 digits and radial half of 4th digit; sx worse at night); +phalen and tinel; clinical dx; confirmed by nerve conduction studies; tx = splint at night, steroid injection / oral, surgical decompression for severe

• **De Quervain’s Tenosynovitis:** pain and swelling at base of thumb that radiates into radial aspect of forearm; + finkelstein; tx = thumb spica splint x 3 weeks, NSAIDs 10-14 days, steroid injections, PT

• **Thick collateral ligament injury** (gamekeeper / skier): ulnar collateral ligament injury from fall on abducted thumb
  - Gamekeeper = chronic; skier = acute
  - Laxity and pain with valgus stretch; XR to evaluate for avulsion injury
  - Tx: thumb spica splint 4-6 weeks

• **Dupuytren Contracture:** AKA claw hand (MC 4th and 5th digit); benign fibroproliferative disorder characterized by contracture of palms and palmar nodules – associated with alcoholic cirrhosis – painless nodules on palms, may limit function; tabletop test positive (lie flat on tabletop); diagnosis = clinical; tx: injected collagenase or steroid, fasciotomy or fasciectomy if pt are refractory to 1st line therapy

• **Mallet finger** (baseball – tear at DIP joint): avulsion of extensor tendon → forced flexion; can’t straighten distal finger, XR = bony avulsion of distal phalanx; tx: splint DIP uninterrupted extension x6 weeks or surgical pinning

• **Boutonniere deformity** (tear at PIP joint – jammed finger): PIP flexion and DIP hyperextension; usually from jammed finger; elson test = bend PIP 90 degrees over edge of table and extend middle phalanx against resistance → weake PIP extension and DIP will be rigid; XR not required; tx: splint PIP in extension x4-6 weeks

• **Infections:**
  - Cellulitis: usually staph / strep
  - Paronychia: infection next to fingernail; acute = bacterial; chornic = fugal
  - Felon: abscess in tip of finger
  - Herpeteic whitlow: HSV around fingernail (thumb sucking)

• **Ganglion cyst:** noncancerous mucin-filled synovial cyst caused by trauma, mucoid degeneration, synovial herniation usually on dorsal aspect of wrist; usually asymptomatic, do allen’s test to ensure radial and unar artery flow; U/S can differentiate cyst from vascular aneurysm; most ganglia don’t require treatment → 1. Observe. 2. Aspirate (avoid on volar aspect of wrist d/t radial artery – effective n only 50% of pt 3. Excision (severe sx or neurovascular manifestations)

• **AC joint separation:** fall directly on shoulder or FOOSH, may have elevation of clavicle (step off deformity) and point tenderness and pain with cross chest testing; XR taken with pt holding weight to assess level of injury to joint; tx: conservative management can be slang / analgesia; more severe = operative repair

• **Biceps tendonitis:** pain at biceps groove, anterior shoulder pain, pain with resisted supination of elbow, dx: XR to r/o fx, U/S can show thickened tendon within bicipital groove; MRI shows increased T2 signal around biceps tendon; “popeye deformity” → rupture; tx: NSAIDs, PT, steroid injection; surgical release for refractor cases
  - **Speeds:** pt attempts to forward elevate shoulder against examiner resistance while elbow extended and forearm supinated; positive with pain (SLAP lesion)
  - **Yergason:** elbow flexed at 90, wrist supination against resistance

• **Rotator cuff tear/tendinopathy:** supraspinatus = MC injury; shoulder pain with overhead activity or at night hwen lying on arm / weakness and immobility after acute pain; shoulder pain with overhead activity or at night when lying on arm / weakness and immobility after acute injury; XR = initial imaging (loss of subacromial space due to upward migration of humeral head), MRI = most accurate; tx = NSAIDs, steroid injection and surgical repair if you fail 3-6mo of conservative
  - **Supraspinatus:** empty can test, full can test, arm drop
  - **Suscapularis:** lift off test (elbow at 90, rotate medially against resistance)
  - **Teres minor / infraspinatus:** elbow at 90, rotate laterally against resistance

• **Adhesive capsulitis:** insidious onset shoulder stiffness and pain at rest, decreased active and passive ROM, post fracture looks like rotator cuff injury, apley scratch test; tx = NSAIDs, PT, steroid injection

• **Subacromial impingement:** pain with reaching / lifting and pain with overhead motion
  - **Neer test:** arm fully pronated with pain during forward flexion while shoulder held
  - **Hawkins:** elbow/shoulder flexed at 90 with sharp anterior should pain with internal rotation
  - **Drop arm:** pain with inability to lift arm above shoulder or hold it
  - **XR may show subacromial spur
  - **Tx:** rest, ice, activity modification, NSAIDs, steroid injection, arthroscopic surgery if refractory to conservative
• **Subacromial bursitis**: inflammation of bursae from trauma / overuse; pain on motion and at rest → fluid accumulation; aspirate if fever, diabetic, immunocompromised; tx: prevention of precipitation factors, rest, NSAIDs, steroid injections sometimes

• **Glenohumeral joint osteoarthritis**: more common in elderly; pain with activities; XR = subchondral sclerosis and osteophytes at inferior aspect of humeral head; MRI indicated to evaluate rotator cuff tendon, tx = NSAIDs, PT, steroid injections, total shoulder arthroplasty if unresponsive to conservative tx

  \[\text{Knee}\]

• **Prepatellar Bursitis**: pain with direct pressure on knee, swelling over patella, concern for septic bursitis in wrestlers; tx: compressive wrap, NSAIDs, +/- aspiration and immobilization for 1 week; steroid use = controversial

• **Patellar tendinitis**: activity related, “jumper’s knee”, swelling over tendon and tenderness at inferior border of patella; XR may show inferior traction spur in chronic cases (enthesisophyte), U/S = thickening tendon and hypoechoic areas; MRI shows tendon thickening; tx = ice, rest, activity modification, PT; surgical excision and suture repair as needed; steroid injection = CI d/t risk of tendon rupture!!!!!!

• **ACL tear**: pop and swelling along with instability or “giving out” the knee after plant and twist injury; quickly stopping movement and changing direction while running / landing jump → rotation or valgus stress → ACL; anterior drawer test, lachman’s = most sensitive, MRI confirms diagnosis; PT and lifestyle modifications for low demand pt; surgery for young / active

• **MCL**: valgus stress injury (hit in football); “pop” along with medial joint line pain, MRI = definitive; conservative tx with bracing and therapy = effective; surgery for chronic instability

• **LCL**: trauma to inside of knee; rare; MRI = definitive study; conservative treatment with bracing and therapy usually effective; surgery for grade III injury

• **PCL**: blow to the knee while flexed or bend like landing hard during sports fall; test = posterior drawer sign, sag sign, MRI = confirms; protected weight bearing and rehab for isolated grade I and II; surgical repair for PCL + ACL or PCL and PCL + grade III MCL or LCL

• **Meniscal tear**: after twist injury with locking, feeling of knee giving away, triad of joint line pain, effusion, locking; effusion usually 6-24 hours after injury; mcmurray test / apley test

  \[\text{Ankle/foot}\]

• **Ankle sprain**: 85% are in collateral ligaments → anterior talofibular ligament during inversion; deltoid affected by eversion
  - Anterior drawer test, talar tilt test
  - XR depends on ottawakankle rules: malleolar zone pain and bone tenderness at lateral or medial malleolus; can’t bear weight / take a few steps
  - Tx: rest, ice, NSAIDs, crutches, bracing, splinting, f/u with ortho based on XR and dx

• **Achilles tendon rupture**: “pop” then weakness, palpable gap + increased resting ankle dorsiflexion in pron position with knees bend, + Thompson test, MRI shows acute rupture with retracted tendon edges; tx: surgical repair for early ROM, splint with ankle in some plantar flexion

• **Plantar fasciitis**: pain on plantar surface usually at calcaneal inserion of plantar fascia upon weight bearing especially in morning / initiation of walking after prolonged rest (dancers, runners); tx: stretching, ice, calf strengthening, shoe inserts, NSAIDs

• **Tarsal tunnel**: posterior tibial nerve compression from overuse, restrictive footwear, +tinel’s sign, dx: nerve conduction test / electromyography; tx: avoid exacerbating activities, NSAIDs, steroid injection if no improvement, surgery

• **Bunion (hallux valgus)**: deformity of bursa over 1st metatarsal; hx of poorly fitted shoes / flat feet (pes planus); or RA; pain over prominence at MTP joint / pain with shoes, dx = XR, tx = comfortable wide toed shoes; surgical when sx present sedespite shoe modification

• **Morton’s neuroma**: painful mass near tarsal heads; MC in women with tight fitting shoes, high heels; sharp pain with ambulation at 3rd metatarsal head; associated with numbness / paresthesia; MRI may be needed for diagnosis; tx = wide shows, steroid injections, surgical resection if conservative management fails

  \[\text{Back strain / sprain}\]

• **Cervical strain**: whiplash and extension injury – pain can last 18 mo – usually as result of rear impact / rapid extension followed by flexion (MVA or fall); stiffness / pain in neck, +spurling test, tx: soft cervical collar 2-3 days, ice/heat, analgesics, gentle active ROM soon after injury

• **Back strain**: MC cause of back pain (lifting, strenuous activity), stiffness and difficulty bending, axial back pain and no radicular sx, resume activity as tolerated, if no improvement in 4 weeks → re-evaluate
  - no red flag sx → treat conservatively with NSAIDs, heat, ice, PT, muscle relaxant, short term benzo

**GASTROINTESTINAL / NUTRITIONAL**

• **Abdominal pain**
- **Renal**
  - CC: colicky right sided flank pain, nausea, vomiting, hematuria, CVA tenderness
  - Workup: UA, BUN/Cr, CT abdomen, renal US, KUB, blood cultures
  - Ddx: nephrolithiasis, renal cell carcinoma, pyelonephritis, GI etiology, glomerulonephritis, splenic rupture

- **Pancreas**
  - CC: dull epigastric pain that radiates to the back
  - Workup: CT abdomen, CBC, electrolytes, amylase, lipase, AST, ALT, bilirubin, alk phos, U/S abdomen
  - Ddx: pancreatitis, pancreatic cancer, peptic ulcer disease, cholecystitis/choledocholithiasis

- **Gallbladder**
  - CC: RUQ pain
  - Workup: RUQU, CBC, CMP, HIDA scan, MRCP/ERCP, amylase, lipase, alk phos, bili
  - Ddx: cholecystitis, choledocholithiasis, hepatitis, ascending cholangitis, fitz-hugh-curtis syndrome, acute subhepatic appendicitis

- **Liver**
  - CC: RUQ pan, fever, anorexia, nausea, vomiting, dark urine, clay stool
  - Workup: CBC, amylase, lipase, liver enzymes, viral hepatitis serologies, UA, U/S abdomen, ERCP, MRCP
  - Ddx: acute hepatitis, acute cholecystitis, ascending cholangitis, choledocholithiasis, pancreatitis, primary sclerosing cholangitis, primary biliary cirrhosis, glomerulonephritis

- **Spleen**
  - CC: severe LUQ pain that radiates to left scapula w hx of infectious mono
  - Workup: CBC, CXR, CT/US of abdomen
  - Ddx: splenic rupture, splenic infarct, kidney stone, rib fracture, pneumonia, perforated peptic ulcer

- **Stomach**
  - CC: burning epigastric pain after meals
  - Workup: rectal exam (occult blood in stool), amylase, lipase, lactate, AST, ALT, bili, alk phos, upper endoscopy (H.pylori biopsies), upper GI series
  - Ddx: peptic ulcer disease, perforated peptic ulcer disease, gastritis, GERD, cholecystitis, mesenteric ischemia, chronic pancreatitis

- **Intestines**
  - CC: crampy abdominal pain, vomiting, abdominal distention, inability to pass flatus
  - Workup: rectal exam, CBC, electrolytes, CT abdomen/pelvis, colonoscopy
  - DDx: intestinal obstruction, small bowel / colon cancer, volvulus, gastroenteritis, food poisoning, ileus, hernia, mesenteric ischemia/infarction, diverticulitis,
  - w/ alternating disrrhea/. Constipation: diverticulitis, Crohn’s disease, ulcerative colitis, abscess, IBS, celiac disease, GI parasitic infection (amebiasis, giardiasis)

- **Pelvis**
  - CC: RLQ pain, nausea, vomiting, dysuria, hematuria
  - Workup: pelvic exam, urine hCG, doppler U/S, rectal exam, UA, CBC, CT abdomen, laparoscopy, chlamydia and gonorrhea testing
  - Ddx: ovarian torsion, appendicitis, ectopic pregnancy, ruptured ovarian cyst, pelvic inflammatory disease, bowel infarction / perforation, endometriosis, vaginitis, cystitis, pyelonephritis

### Acute Appendicitis

- Umbilical ➔ RLQ pain (Mcburney’s) + n/v/f/chills, anorexia
- MC due to inflammation of appendix secondary to fecalith; pediatric and geri pt present atypically and have increased perforation rates
- Signs: mcburney’s, rovsing’s, obturator, iliopsoas
- Dx: ultrasound = initial; contrast CT = more sensitive and confirms; labs: leukocytosis (higher levels suggest perforation / peritonitis); some microscopic hematuria / pyuria may be seen
- Tx: appendectomy; give 3rd generation cephalosporin preop and if perforated continue post op

### Cholecystitis

**Definition:** gall bladder (cystic duct) obstruction by stone ➔ inflammation / infection
- 50-80% = E.coli

**History and Physical Exam:**
- Biliary colic: episodic RUQ / epigastric pain beginning abruptly, continuous in duration, resolves slowly lasting 30m-hours assoc with nausea **precipitated by fatty foods or large meals**
o **Low grade fever, nausea/vomiting**, palpable GB, murphy’s sign; boas sign (referred pain to subscapular area due to phrenic never irritation)

o **Hypoactive bowel sounds** are an indicator that a perforation has occurred. Other symptoms include high fever, systemic signs of toxicity (tachycardia and increased respiratory rate), and increased abdominal pain with rebound tenderness.

**Diagnostics:**

o **US = initial test of choice**: thickened GB <3mm, distended GB, sludge, gallstones, pericholecystic fluid, sonographic murphy’s sign

o Abdominal XR: 10% of stones seen

o Labs: leukocytosis with left shift, increased bilirubin after 24 hours, alk phos and LFTs

o **HIDA scan (heptoiimodinodiaceic acid): gold standard** – positive HIDA = nonvisulization of gallbladder in cholecysitis
  
  o HIDA shows gallbladder ejection fraction and if stone are present in the cystic ducts

o If pt. is fasting, HIDA may show falsely decreased ejection fraction (if this is the case, inject with morphine or CCK)

o **ERCP can identify cause, location and extent of biliary obstruction**

**Therapeutics:**

o Conservative: NPO, IVF, abx (3rd gen cephalosporin + metronidazole)

o Cholecystectomy

o Meperidine preferred (morphine assoc with sphincter of oddi spasm)

o Acute acalculous cholecystitis: MC occur in seriously ill pt.

o Chronic cholecystitis: assoc with gallstones; strawberry GB (interior of GB resembles strawberry secondary to cholesterol submucosal aggregation) → porcelain GB (premalignant condition)

**Acute vs chronic:**

- Acute cholecystitis begins suddenly, resulting in severe, steady pain in the upper abdomen. Inflammation may cause the gallbladder to fill with fluid and its walls to thicken. Rarely, a form of acute cholecystitis without gallstones (acalculous cholecystitis) occurs.

- Chronic cholecystitis is gallbladder inflammation that has lasted a long time. It almost always results from gallstones and from prior attacks of acute cholecystitis. Chronic cholecystitis is characterized by repeated attacks of pain (biliary colic) that occur when gallstones periodically block the cystic duct.

**Cholelithiasis**

**Definition:** gallstones in the gall bladder (NO INFLAMMATION)

o **90% cholesterol**

**History and Physical Exam:**

- Risk factors = 5Fs: fat, fair, female, forty, fertile: OCP’s (increased estrogen), Native Americans, bile stasis, chronic hemolysis, cirrhosis, infection, rapid weight loss, IBD, TPN, fibrates, increased triglycerides

- MC asymptomatic (may be incidental finding)

**Diagnostics:**

- **Ultrasound = test of choice**

- **Biliary colic:** episodic RUQ / epigastric pain beginning abruptly, continuous in duration, resolves slowly lasting 30m-hours associated with nausea precipitated by fatty foods or large meals

**Therapeutics:**

- If asymptomatic may observe or use oral bile dissolution treatment

- **Cholecystectomy** in symptomatic pt (usually laparoscopic)

**Complications:**

- **Choledocholithiasis:** gallstones in biliary tree → +/- biliary colic or jaundice
  
  o **Dx = MRCP**

  o **Tx = stone extraction via ERCP**

**Primary Sclerosing Cholangitis**

- Autoimmune, progressive cholestasis with diffuse fibrosis of intrahepatic and extra hepatic ducts – RARE

- MC associated with inflammatory bowel disease – 90% have ulcerative colitis +/- Crohn’s

- MC men 20-40yo

- Clinical manifestations progressive jaundice, pruritus, RUQ pain, hepatomegaly, splenomegaly

- Diagnosis: increased ALP (3-5x normal), increased GGT (cholestasis), increased ALT, AST, increased Bili, increased IgM; +P-ANCA
  
  o **ERCP = GOLD STANDARD** (increased risk developing cholangiocarcinoma)
Management: liver transplant; meds (steroids, immune meds) = no significant benefit

**Ascending Cholangitis:**
- Definition: biliary tract infection secondary to obstruction by gallstone
  - **Dx:** ERCP
  - **Charcot’s triad:** fever/chills, RUQ pain, jaundice, increased liver enzymes
  - **Reynold’s pentad:** shock + AMS
  - **Tx:** abx (PCN + aminoglycoside), decompression of biliary tree via ERCP stone extraction

**Hepatitis**
- **Hep A:** fecal-oral, recent travel to Asia, hepatomegaly + jaundice, fatigue, malaise, n/v/a, fever, RUQ pain, contagious until 1 week of jaundice, dx: IgM anti-HAV, once exposed = lifelong immunity; for family member give IV-IGg
  - **Tx:** vaccination at 12 mo; post-exposure prophylaxis for close contacts
- **Hep B:** needles, sex, mom to child, close contact; flu-like sx + jaundice; may → cirrhosis / live failure, fi HepB5Ab positive = immunity; HbsAg + = infection; anti-HBc IgM acute, Anti-HBc IgG (resolved or chronic)
  - **Acute tx = supportive; chronic treatment if increased ALT, inflammation of liver biopsy or +HBeAg = alpha-interferon 2b, lamivudine, adefovir; hep B vaccine at 0, 1, 6 mo
- **Hep C:** needles, blood, IVDU = MC, 85% with acute → chronic, flu like sx, RUQ pain, increased risk HCC, screen with testing for anti-HCV ab, dx: HCV RNA quant
  - **Tx:** pegylated interferon alpha-2b and ribavirin
    - s/e: psychosis and depression
- **Hep D:** only occurs with Hep B and cause more severe hepatitis and faster pr ogression to cirrhosis; transmission via clotting factors and drug users
- **Hep E:** fecal oral, waterborne outbreaks, self-limiting; Hep E + mother = high infant mortality; diagnose with IgM anti-HEV

**Pancreatitis**
- Think AB DISCOMFORT: alcohol, biliary, don’t know, iatrogenic, scorpion, Ca (hypercalcemia), obstruction, mom, familial, triglyceride/trauma
- **Definition:**
  - MC cause is cholelithiasis or alcohol abuse
  - Chronic = due to alcohol abuse
  - Hyperlipidemia (hypertriglyceridemia), trauma, drugs, hypercalcemia, penetrating PUD, medications (ARTs) may also cause
  - Chronic: loss of endocrine function
- **History and Physical:**
  - Epigastric pain radiating to back – boring, constant radiating to back / other quadrant; lessens when pt. leans forward, sits, or lies in fetal position
  - N/V, fever, leukocytosis, dehydration / shock, sterile peritonitis, severe hypovolemia, ARDS, tachycardia >130bp → grave prognosis
  - Hemorrhagic pancreatitis: may cause bleeding into flanks (Grey turner) or umbilical (Cullen sign)
  - Chronic = fat malabsorption / steatorrhea
    - Triad of calcifications, steatorrhea, diabetes mellitus
  - Left sided exudative pleural effusion
- **Diagnostics:**
  - Elevated amylase – may be transient / return to normal after 48-72 hrs
  - Lipase = more sensitive but only with elevations 3x or greater – increases 7-14 days
  - **Abdominal CT = diagnostic test of choice**
  - AXR: sentinel loop = localized ileus – dilated small bowel in LUQ – colon cutoff sign
  - WBC count elevated; liver enzymes may increase – mild hyperbilirubinemia / bilirubinuria, hyperglycemia, hypocalcemia
  - Chronic: calcification on US / gallstones; amylase and lipase usually not elevated
- **Therapeutics:**
  - Stop oral intake; fluid resuscitation – 90% recover with supportive measures only
Pain management (analgesics and Demerol) consider abx but not used prophylactically – when necessary, broad spectrum imipenem (necrotizing pancreatitis)
- ERCP if biliary sepsis suspected; only effective in obstructive jaundice
- Monitor for complications
- Chronic: oral pancreatic enzyme replacement; low fat diet; surgical removal of damaged part for pain control / pain control; STOP DRINKING

Health Maintenance:
- STOP DRINKING

**Anal Fissure**

**Definition:**
- Painful, linear lesions in the distal anal canal most commonly found on posterior midline
- May involve full thickness of mucosa if untreated

**History and Physical Exam:**
- Severe tearing pain on defecation, often accompanied by hematochezia
- Bright red blood often noted on stool or toilet paper
- Skin tags seen in chronic
- MC = posterior midline

**Diagnostics:**
- Severe painful BM causing pt to refrain from having BM → constipation, bright red blood per rectum, rectal pain

**Therapeutics:**
- >80% resolve spontaneously
- 1st line: analgesics, sitz bath, bulking agents and increased fluids to avoid straining
- 2nd line: topical nitroglycerin .4% ointment or topical styptic, such as silver nitrate 1% or 2% may help with healing; gentian violet solution 1% may help with healing; nifedipine ointment, botox

Health Maintenance:
- High fiber diet

**Anorectal Abscess / Fistula**

**Definition:**
- Often results from bacterial infection of anal ducts / glands. MC staph aureus, e.coli
- MC posterior midline

**History and Physical:** throbbing rectal pain worse with sitting, coughing, defecation

**Treatment** of perirectal abscess: incision and drainage – no antibiotics

**Anorexia**
- Appendicitis, gastric ulcers, duodenal ulcers, gastric cancer ("weapon" = weight loss, emesis, anorexia, pain/epigastric, discomfort, obstruction nausea), lower GI bleed, carcinoma of gallbladder, pancreatic carcinoma
- Dx: depends → history, PE, EGD +/- biopsies, UGI series, endoscopic U/S, CT abd/pelvis; anoscopy / proctoscopic exam, ERCP, MRCP

**Change in Bowel Habits**

**Obstipation** = severe or complete constipation

1. Bowel obstruction: post-op adhesions or internal ischemia → cramping, abdominal distention, tenderness, hyperactive high pitched bowel sounds, visible peristalsis; XR: air-fluid levels; dilated bowel loops
   - SBO: colicky abd pain, bilious vomiting, hyperactive bowel sounds (early) or hypoactive (late) – prior ABD surgery
   - LBO: gradually increasing ain with longer intervals between episodes of pain, less vomiting, more common elderly
   - Tx: bowel rest, NG tube placement, hemodynamic monitoring, if no resolution in 24-48 hr → laparotomy; abx for surgery
2. Small bowel intussusception: sudden onset significant, colicky abdominal pain that recurs every 15-20 min, often after vomiting; affects children after viral infections / adults after cancer
   - Usually first 2 weeks of post-op; currant jelly stools; sausage-like mass in abdomen
   - Dx: abdominal XR/US = crescent sign / bull’s eye/target sign / coiled spring lesion
   - Tx: barium enema = diagnostic and therapeutic in children → NPO, IVF, NG, ABX
     - Manual reduction or resection with primary anastomosis
3. Ileus: persists for 3+ days → following surgery = post op adynamic ileus or paralytic ileus
   - Hypomotility of GI tract in absence of mechanical bowel obstruction
   - Dx: absent bowel sounds; CT scan with gastrograffin to exclude mechanical obstruction
   - Tx: spontaneously resovles within 2-3d; d/c opiates
4. Gastroparesis: prevents proper stomach emptying; MCC = diabetes (other = anorexia, bulimia, scleroderma, ehlers-danlos, abd surgery)
   a. Sx: nausea, early satiety, palpitations, heartburn, bloating, decreased appetite, GERD
   b. Dx: KUB, manometry, gastric emptying scan
   c. Tx: low fiber, low-residue diet, restrict fat intake, smaller meals spaced 2-3 hr apart; reglan (metoclopramide) to increase contractility and resting tone in GI tract

Diarrhea:
1. Pseudomembranous colitis: inflammation of colon caused by C. diff usually secondary to tx with abx (broad spectrum), usually elderly hospitalized, disruption of normal colonic flora
   a. s/sx: mild watery foul-smelling diarrhea (>3 but <20x/day); fever, abd pain, constitutional sx
   b. dx: PCR identification of C.diff toxin (toxin B = important); culture from stool stample or rectal swab for pt with ileus; XR shows severe inflammation, CBC = leukocytosis
   c. tx: IV metronidazole or PO vanco; strict hand washing, minimize abx
d. complications: bowel perforation, toxic megacolon

Cirrhosis
• cirrhosis = late stage hepatic fibrosis from widespread distortion of normal hepatic architecture → regenerative nodules and dense fibrotic tissue; liver can’t regenerate due to large amounts scar tissue
• chronic hepatitis = MC cause, alcohol = second
• Wilson’s: increased copper, decreased ceruloplasmin, + family history
• PE: may be normal until end-stage disease: hepatomegaly, terry’s nails, splenomegaly, central obesity, ascities, gynecomastia, esophageal varices, pulmonary edema/effusion
• Hepatic encephalopathy: asterixis, dysarthria, delirium, coma
• Progressive cirrhosis: elevated ammonia, BUN, sodium, potassium, alpha fetoprotein level at diagnosis to screen for HCC; abd US q6-12 mo for HCC screen; doppler ultrasound of hepatic/portal veins, MRI best for follow up for HCC if AFP is elevated / liver mass found
  o Fever + abd pain in pt with cirrhosis = think spontaneous bacterial peritonitis!!!!
  o HCC: monitor AFP
  o Budd chiari = hepatic vein thrombosis: abd pain, ascites, hepatomegaly
• Dx:
  o USUALLY AST > ALT, increased risk HCC = monitor AFP, elevated ALP, GGT, total/direct bilirubin = cholestasis
  o Anemia from hemolysis, folate deficiency, splenomegaly
  o Decreased platelets, impaired synthetic liver function, low albumin / cholesterol, prolonged PT, INR, PTT
  o U/S to determine liver size / evaluate for HCC
  o Liver biopsy = definitive
• Tx: avoid alcohol, restric salt, liver transplant
  o Encephalopathy: lactulose + neomycin
  o Ascites: sodium restriction, paracentesis
  o Pruritis: cholestyramine
  o SBP: ABX!

Diarrhea
• DDX = VAST:
  o IBS, infectious (gastroenteritis – salmonella, shigella, cholera, dysentery), IBD, peptic ulcer disease, diverticular dz, carcinoid syndrome, Celiac
• Salmonella:
  • typhoid and enteric fever: salmonella typhi – flu-like bacterial infection → fever, GI sx, HA, transmitted via fecal-oral
  o pea soup diarrhea, rose spots, MC in developing world
  • gastroenteritis: improperly handled food that ‘s contaminated by animal or human fecal material; can also be acquired via fecal-oral – usually egg yolk
  • dx: blood, stool, urine cultures
    o increased WBC, low platelets
  • tx: ceftriaxone and sometimes fluoroquinolone or azithromycin
• Shigella: gram negative bacteria → watery diarrhea / dysentery (frequent and painful passage) → usually with blood, pus, mucus
  • s/sx: abrupt diarrhea, lower abdominal cramps, tenesmus, fever, chills, anorexia, HA, malaise
- stool mixed with blood / mucus; tender abdomen
- HLA-B27 may get reactive arthritis
- Often spread in crowded areas (daycare) – transmission via person-to-person contact and contaminated foods / water

- Dx: stool positive for leukocytes and RBCs; culture yields shigella spp; sigmoidoscopy: inflamed engorged mucosa, punctate lesions, ulcers
- Tx: fluid replacement + Bactrim (amoxicillin not effective); do not use anti-diarrheals (prolong illness)

- **Cholera:**
  - from Vibrio cholera (gram negative, oxidase positive, comma-shaped bacteria) → life threatening, rice water diarrhea
  - from water / seafood, usually in endemic areas; usually free of cholerae within 2 weeks of cessation diarrhea; chronic biliary tract carriers
  - dx: confirmed by stool culture; rapid dipstick testing can be used in public health setting without access to labs
  - tx: fluid replacement (mild); doxy, azithro, Bactrim, cirpo; adequate hydration

- **Carcinoid syndrome/ tumor:**
  - Neuroendocrine tumor that secretes vasoactive material (serotonin, histamine, catecholamine, prostaglandin, peptide)
  - MC caused by carcinoid tumor – GI tract cancer that has metastasized to lung (cancer of appendix = MC); adenoma = MC
  - Presentation: usually hemoptysis, cough, focal wheezing, recurrent pneumonia
    - Syndromes: Cutaneous flushing, diarrhea, wheezing, low blood pressure (hallmark sign) → RARE
  - Dx: CXR – pedunculated sessile growth in central bronchi; elevated 5-HIAA in 24 hr urine excretion (main metabolite of serotonin)
  - Tx: surgical excision; lesions resistant to XRT and chemo; octreotide decreases secretion of serotonin by tumor

### Diverticular Disease

- **Diverticula:** small mucosal herniations protruding through intestinal and smooth muscle layer along natural openings of the vasa recta of the colon; sigmoid colon MC area due to highest intraluminal pressure; onset usually >40y
- **Diverticulosis:** uninflamed diverticula (assoc w low fiber diet***, constipation and obesity); usually asymptomatic but MC causes of acute lower GI bleeding
  - MC area = sigmoid
- **Diverticulitis:** inflamed diverticula secondary to obstruction/infection (fecaliths) → distention
  - s/s: fever, LLQ pain, nausea, vomiting, diarrhea, constipation, flatulence, bloating
  - dx: CT = test of choice; increased WBCs, +guaiac
  - management:
    - diverticulitis: clear liquid diet, broad spectrum abx (cipro / Bactrim) + metronidazole
    - diverticulosis: high fiber diet, fiber supplements; bleeding stops in 90% (+/- vasopressin if not)

### Esophagitis

- GERD = MC cause
- Infections in immunocompromised = 2nd MC (candida, CMV, HSV)
- Also caused by: radiation therapy, medication or corrosive ingestion, eosinophilic (assoc with food allergies, atopic disease)
- r/f: pregnancy, smoking, obesity, ETOH, chocolate, spicy foods, meds (NSAIDS, beta blockers, CCB)
- odynophagia (painful swallowing), dysphagia (difficulty swallowing)
- symptoms resemble GERD

### Gastritis

- gastritis = superficial inflammation/irritation of stomach mucosa with mucosal injury
- gastropathy = mucosal injury without evidence of inflammation
- protective factors: mucus, bicarb, mucosal blood flow, prostaglandins, alkaline state, hydrophobic layer, epithelial renewal
- imbalance protective factors → inflammation

### History and Physical:

- imbalance between increased aggressive and decreased protective mechanisms
  - h. pylori = MC cause gastritis (gram negative spiral shaped bacillus)
- causes type B gastritis – antrum and body of stomach
- tolerates acidity of normal stomach and associated with peptic ulcer, gastric adenocarcinoma, gastric lymphoma
  - NSAIDs / aspirin: 2nd MC cause – disrupts mucosal protective barrier by prostaglandin inhibition (prostaglandins responsible for protecting gastric mucosa)
  - Acute stress: in critically ill patients
  - alcohol
- MC = asymptomatic
  - If symptomatic → upper GI bleed, epigastric pain, nausea, vomiting, anorexia, dyspepsia, abdominal pain

**Diagnostics:**
- Endoscopy with biopsy = gold standard
  - Reveals severity / presence of H. pylori
  - Urea breath test also used for H. pylori
  - thick, edematous erosions <0.5cm; H pylori testing
- Specific testing for underlying conditions (vitamin B12, CBC for pernicious anemia)

**Therapeutics:**
- remove causative factor / treat underlying cause
- H. pylori positive: clarithromycin + amoxicillin + PPI (CAP); metronidazole if allergic to PCN
- H. pylori negative: PPI, antacids/H2RA, sucralfate
- Pharmacologic prophylaxis for pt high risk for stress related gastritis (IV proton pump inhibitors)

**Health Maintenance:**

**Scientific Concepts:**
- Causes: autoimmune disorders / other noninfectious factors
- H. pylori

**Definition:**
- MC form of salmonella infection
- Incubation period 8-48 hrs after ingestion of contaminated food / drink

**History / Physical Exam:**
- n/v/fever, abdominal cramping, bloody diarrhea 3-5 days

**Diagnostics:**
- stool culture

**Therapeutics:**
- self-limited
- treat symptomatically
- specific tx with Bactrim, ampicillin, cipro required for severely ill / malnourished pt. with sickle cell or pt who develop bacteremia

**Gastroenteritis**

**Gastrointestinal Bleeding**

- **Gastric Carcinoma: adenocarcinoma = MC worldwide 99%**: MC males >40 and usually present in late disease
  - r/f: H.PYLOREI = MOST IMPORTANT R/F – salted, cured, smoked, pickled foods containing nitrites; pernicious anemia, chronic atrophic gastritis, achlorhydria, smoking, ETOH, blood type A
  - s/s: indigestion, weight loss, early satiety, abdominal pain / fulness, nausea, post-prandial vomiting, dysphagia, melena; hematemeses; iron deficiency anemia
    - signs of metastasis: virchow’s node, sister mary joseph’s node, ovarian METS, palpable nodule on rectal exam (blumer’s shelf); left axillary lymph node involvement (irish sign)
  - dx: upper endoscopy with biopsy; linitis plastica – diffuse thickening of stomach wall d/t cancer infiltration (worst type)
  - tx: gastrectomy, XRT, chemo; poor prognosis
- **Hematemesis**: upper GI bleed → first thing’s first = assess hemodynamic stability!!!
  - Causes: peptic ulcer, esophageal ulcer, Mallory-weiss tear, variceal hemorrhage /; portal hypertensive gastropathy, malignany
  - s/sx: orthostatic dizziness (if blood volume loss >15%), confusion, angina, severe palpitations, cold/clammy extremities
  - labs: CBC, CMP, liver tests, coags
  - 2 large bore IVs, type and screen (transfuse if <7 normal or <9 in high risk)
- **Melena**: black tarry stool, from upper GI bleed usually (peptic ulcer, esophageal, mallory-weiss, variceal hemorrhage, malignancy)
  - Dx: EGD, blood, stool, breath test for H.pylori
**Hematochezia: BRBPR**
- Causes = lower GI bleed, hemorrhoids, anal fissures, polyps, proctitis, rectal ulcers, and colorectal cancer
- Dx: colonoscopy, enteroscopy, barium XR, radionuclide scanning, angiography, laparotomy

**Labs:** CBC, CMP, coags, liver enzymes
- Acute = normocytic, chronic = microcytic anemia

**Tx for both melena / hematochezia:** endoscopic thermal probe, endoscopic clips, endoscopic injection, angiographic embolization, band ligation

### Giardiasis / Parasitic Infections

- **Types:**
  - Traveler’s: e. coli $\rightarrow$ azithromycin / supportive
  - Picnic / egg salad: staph aureus $\rightarrow$ supportive
  - Shellfish: vibrio cholerae $\rightarrow$ supportive / doxy
  - Poultry / pork: salmonella $\rightarrow$ supportive
  - Post antibiotics: c. difficile $\rightarrow$ oral vanc, IV flagyl
  - Poorly canned home foods: clostridium perfringens $\rightarrow$ supportive
  - Breakout in daycare: rotavirus $\rightarrow$ Supportive
  - Cruise ship: norovirus $\rightarrow$ Supportive
  - Mountain stream water: giardia lamblia (incubates for 1-3 weeks, foul smelling bulky stool may wax and wane over weeks before resolving) – treat with metronidazole

- **Dx:** white blood cells in stool; culture for bacterial agents, microscopy for parasites / toxin identification
  - acute <4days – no testing except for dehydration, bloody stool, fever, severe pain, hypotensions, toxic features exp in young / old $\rightarrow$ CBC, electrolytes, BUN, creatinine

- **tx:** fluid / electrolyte replacement to correct dehydration, electrolyte imbalance, acidosis
  - oral loperamide to decrease diarrhea
  - anti-diarrheal may exacerbate c. diff or increase likelihood of HUS in shiga toxin producing E. coli so don’t use in bloody diarrhea in unknown cause

### GERD

**Definition:**
- transient relaxation of LES $\rightarrow$ gastric acid reflux $\rightarrow$ esophageal mucosal injury

**History / Physical Exam:**
- **typical symptoms:** heartburn (pyrosis) hallmark often retrosternal and post prandial (MC 30-60min post eating, increased in supine position and often relieved with antacids); regurge (water brash or sour taste in mouth), dysphagia, cough at night (acid aspiration into the lung causes lung irritation
- halitosis, cough, hiccupping, sore throat, laryngitis, atypical chest pain
- **atypical symptoms:** hoarseness, aspiration pneumonia, “asthma” (bronchospasm from lung contact with acid), noncardiac chest pain, weight loss
- **ALARM SYMPTOMS:** dysphagia, odynophagia, weight loss, bleeding

**Complications:**
- esophagitis, esophagus stricture, barrett's esophagus, esophageal adenocarcinoma
- barrett's: esophageal squamous epithelium replaced by precancerous metaplastic columnar cells from the cardia of the stomach

**Diagnostics:**
- clinical diagnosis based on history especially if present with classic, simple symptoms
- **endoscopy:** often 1st used: useful to evaluate persistent symptoms, GERD with culture, malignancy, new sx >50y etc
  - use with: pt older than 45 with new onset sx, long standing or frequently recurring symptoms, failure to respond to therapy or symptoms indicating more severe conditions like anemia, dysphagia, or recurrent vomiting
- make sure to eval / rule out MI
- **esophageal manometry:** decreased LES pressure – often done if normal upper endoscopy
- **24th ambulatory pH monitoring:** gold standard (not usually done)

**Therapeutics:**
1. As needed pharm therapy: antacids and OTC H2 receptor blockers: if alarm of atypical sx upper endoscopy is next appropriate step
2. Initiation of scheduled pharmacologic therapy: PPIs are drug of choice in severe disease
3. H2 blocker at bedtime and PPI in the daytime may be helpful in pt with significant nighttime symptoms
4. Avoid: beta agonist, alpha adrenergic antagonist, nitrates, calcium channel blockers, anticholinergics, theophylline, morphine, meperidine, diazepam, barbiturate agents (decrease LES pressure)

5. Nissen fundoplication if refractory

Health Maintenance:

6. Lifestyle modifications: elevate head of bed by six inches, avoid recumbency for 3 hours after eating, eating small meals, avoid fatty/spicy, citrus, chocolate, caffeinated products, peppermint; decrease fat and alcohol intake, weight loss, smoking cessation

7. Predisposing factors: obesity, pregnancy, diabetes, hiatal hernia, connective tissue disorders

Scientific Concepts:

- multifactorial: increased gastric acid, incompetent lower esophageal sphincter (LES), esophageal motility disorders and delayed gastric emptying +/- hiatal hernia
- reflux esophagitis is result of recurrent reflux of gastric contents into distal esophagus bc of mechanical or functional abnormality
- present in ~10% of the population
- infants: 50%
- protective factors: gravity, lower esophageal sphincter tone, esophageal motility, salivary flow, gastric emptying, tissue resistance
- can → barrett’s which can predispose to malignancy

Hemorrhoids

Definition: enlarged venous plexus that increases with increased venous pressure: worse with pregnancy, defecation (especially if constipated), prolonged sitting, obesity

History and Physical:

- **internal: intermittent rectal bleeding** = MC, hematochezia BRBPR (toilet paper / toilet water), vague anal discomfort, rectal pain with internal suggest complication; purple nodules if prolapses; uncomplicated internal are neither palpable or tender
  - stage I internal: confined to anal canal and may bleed with defecation
  - stage II: protrude from anal opening but reduce spontaneously; bleeding and mucoid discharge may occur
  - stage III: require manual reduction after bowel movement; may develop pain and discomfort
  - stage IV: chronically protrude and risk strangulation
- **external: MC perianal pain**, aggravated with defecation, tender palpable mass; thrombosis may be precipitated by cough / heavy lifting
  - visible peri-anally

Diagnostics:

- visual inspection, digital rectal exam, fecal occult blood testing
- proctosigmoidoscopy, colonoscopy in pts with hematochezia to r/o proximal sigmoid dz

Therapeutics:

- conservative (stage I and II): high fiber diet, increased fluids, warm sitz baths, bulk laxatives
  - higher stage = suppositories and anesthetic and astringent properties
  - topical rectal hydrocortisone for pruritus and discomfort +/- analgesics
- surgical (stage IV): if failed conservative management, debilitating pain, strangulation
  - injection, rubber band ligation, sclerotherapy if failed above tx

Hernia

- obstructed: irreducible containing intestine that’s obstructed from without / within but no interference to blood supply to bowel
- incarcerated: hernia so occulted can’t be returned by manipulation, may → strangulated
- strangulated: blood supply seriously impaired
- dx: history and physical
- tx: manual reduction, referral to surgery; urgent for incarceration / strangulation

Hiatal Hernia aka paraoesophageal hiatus hernia

Definition: Involves protrusion of the stomach through the diaphragm via the esophageal hiatus

History and Physical:

- Type 1: sliding hernia → GE junction and stomach slide into mediastinum (MC)
  - Increase reflux, treat like GERD
- Type 2: rolling hernia → fundus of stomach protrudes through diaphragm with GE junction, remaining in its anatomic location
  - Surgical repair to avoid complications
### Inflammatory Bowel Disease

<table>
<thead>
<tr>
<th></th>
<th>UC</th>
<th>Crohn’s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>• Onset sudden or gradual</td>
<td>• Some genetic predisposition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cause = unknown; M = F; 15-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Onset gradual; waxes and wanes</td>
</tr>
<tr>
<td><strong>History / Physical</strong></td>
<td></td>
<td>Abdominal cramps, diarrhea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Low grade fever, polyarthalgia, anemia, fatigue</td>
</tr>
<tr>
<td></td>
<td>• Abdominal cramps, bloody diarrhea, anemia, fatigue</td>
<td>Any segment of GI tract; mouth → anus</td>
</tr>
<tr>
<td></td>
<td>• Rectum always involved</td>
<td>MC in terminal ileum / right colon (RLQ pain)</td>
</tr>
<tr>
<td><strong>Area affected</strong></td>
<td>• Limited to colon (begins in rectum with contiguous spread proximally to colon)</td>
<td>• Any segment of GI tract; mouth → anus</td>
</tr>
<tr>
<td></td>
<td>• Rectum always involved</td>
<td>Abdominal cramps, diarrhea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Low grade fever, polyarthalgia, anemia, fatigue</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>• Mucosa and sub mucosa only</td>
<td>• transmural</td>
</tr>
<tr>
<td><strong>Clinical manifestations</strong></td>
<td></td>
<td>Abdominal pain: RLQ pain (crampy); weight loss more common in Crohn’s</td>
</tr>
<tr>
<td></td>
<td>• abdominal pain; LLQ MC, colicky</td>
<td>• diarrhea with no visible blood usually</td>
</tr>
<tr>
<td></td>
<td>• tenesmus, urgency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• blood diarrhea hallmark (stools with mucous/pus), hematochezia MC in UC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• smoking decreases risk for UC</td>
<td></td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td>• primary sclerosing cholangitis; colon CA; toxic megacolon (more common in UC)</td>
<td>• perianal dz; fistulas, stricture, abscesses, granulomas</td>
</tr>
<tr>
<td></td>
<td>• smoking decreases risk for UC</td>
<td>• malabsorption: B12 and iron deficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• smoking makes worse</td>
</tr>
<tr>
<td><strong>Colonoscopy</strong></td>
<td>• uniform inflammation +/- ulceration in rectum / colon = “sandpaper” appearance</td>
<td>skip lesions (normal areas between inflamed areas) with cobblestone appearance</td>
</tr>
<tr>
<td></td>
<td>• pseudo polyps</td>
<td></td>
</tr>
<tr>
<td><strong>Barium studies</strong></td>
<td>• stovepipe sign (loss of haustral marking)</td>
<td>string sign (Ba flow through narrowed inflamed / scarred area due to transmural strictures)</td>
</tr>
<tr>
<td><strong>Labs</strong></td>
<td>• P-ANCA (more common in UC)</td>
<td>• ASCA</td>
</tr>
<tr>
<td><strong>Surgery</strong></td>
<td>curative</td>
<td>noncurative</td>
</tr>
</tbody>
</table>

**Both UC and CD:** arthritis (seronegative spondyloarthropathies, ankylosing spondylitis), episcleritis  
**Systemic:** fevers, sweats, weight loss, malaise, fatigue, erythema nodosum, pyoderma gangreosum

### Diagnostics:
- Crohn’s: upper GI series with small bowel follow through is test of choice in acute disease  
  - Colonoscopy is most valuable tool for establishing diagnosis / determining extent / guiding treatment  
  - Avoid contrast studies  
  - Biopsy will show involvement of entire bowel wall; granulomas are frequent  
  - Blood test: increased ESR, anemia, nutritional and electrolyte imbalance during exacerbation  
  - Anti-saccharomyces cerevisiae antibody and perinuclear antineutrophil cytoplasmic antibody may distinguish crohn and UC  
- UC: flex sigmoidoscopy test of choice in acute disease  
  - Radiograph may show colonic dilation  
  - Colonoscopy = contraindicated!!! → perforation  
  - Barium enema = CI → may cause toxic megacolon  
  - Anemia, increased sed rate, decreased albumin  
  - Perinuclear antineutrophil cytoplasmic antibody and anti-saccharomyces cerevisiae antibody may be used to distinguish UC from crohn’s

### Therapeutics:
- Elemental diet  
  - Crohn’s: supplement with vitamin B12, folic acid, vitamin D  
  - Smoking cessation  
  - Surgery not curative in Crohn’s; curative in UC
Aminosalicylates (sulfasalazine, mesalamine) → corticosteroids → immune modifying agents

1. 5-aminosalicylates: anti-inflammatory agents; good for flares and remission
   a. Oral mesalamine: especially active in terminal small bowel and colon; long acting works throughout entire small intestine and colon; **best for maintenance**
   b. Topical mesalamine: rectal suppositories and enemas: topical are effective in distal colon
   c. Sulfasaline: works primarily in the colon; s/e: **higher side effect profile** with sulfasalazine (hepatitis, pancreatitis, allergic reaction, fever, rash); give folic acid with sulfasalazine

2. Corticosteroids: rapid acting anti-inflammatory drugs used for acute flares only → oral and topical; long term risk = osteoporosis, increased infections, weight gain, edema, cataracts

3. Immune modifying drugs: 6-mercaptopurine, azathioprine and methotrexare = steroid sparing

4. Anti-tnf drugs: inhibits proinflammatory cytokines (-mab)

5. Initial treatment for uncomplicated Crohn’s disease is immunosuppressant therapy. If this is not effective, surgery may be required, especially for complications of perforation, hemorrhage, and toxic colitis. The distinction between Crohn’s disease and ulcerative colitis is important as chronic treatment approaches vary. Resection is strongly recommended for ulcerative colitis patients who are young, have frequent recurrence, or are steroid-dependent. Avoidance of surgery is desired in patients with Crohn’s disease due to the natural history of recurrence. Indications for surgery in both Crohn’s disease and ulcerative colitis include intractable or fulminant disease, massive hemorrhage, colonic obstruction, cancer prophylaxis, colon dysplasia, or cancer. Indications for surgery specific to ulcerative colitis include toxic megacolon, colonic perforation, or extracolonic disease. Indications for surgery specific to Crohn’s disease include stricture and obstruction, refractory fistula, abscess, or perianal disease unresponsive to medical therapy.

Scientific Concepts:

- Etiology = idiopathic (most likely immune reaction to GI tract flora); MC in Caucasians 15-35y

**Toxic Megacolon**
- Complication of IBD (UC, more rarely crohn’s) and some infections like c. diff
- Life threatening form of colon distention, pt presents with fever markedly distended abdomen with peritonitis and shock,
- Dx: KUB shows dilated colon >6cm + at least 3 of the following: fever >101.5, HR >120, neutrophilic leudocytosis >10.5, anemia
- Tx: decompression of colon – in some cases complete colonic resection required

**Ischemic Bowel Disease**
- Acute mesenteric: SMA = MC; sudden onset actue, severe abdominal pain out of proportion to exam usually with afib, MI, CHF
- Chronic: postprandial epigastric pain within first hour of eating; usually resolves in 2-3 hours; mesenteric angina; usually presnts with recurrent cramping with postprandial pain in pt with history of PVD, smoker, DM
- Dx: CT or colonoscopy; mesenteric angiography = gold; abd XR = thumb printing
- Tx: revascularization

**Jaundice**
- Definition:
  - Yellowing of skin, nail beds, sclera by bilirubin deposition as consequence of hyperbilirubinemia; not a disease but sign of disease
  - Occurs with increased bilirubin overproduction (hemolysis), decreased hepatic bilirubin uptake, impaired conjugation, biliary obstruction, hepatitis

**History and Physical:**
- Hemolytic = prehepatic
  - Increased indirect / unconjugated bilirubin, mild hyperbilirubinemia
  - Dark urine due to hemoglobinuria; dark stool
- Obstructive = post hepatic
  - Cholestasis = bile duct blockage → increased conjugated bili
  - Ex. Cholestasis / pancreatic CA
  - Increased direct/ conjugated hyperbilirubinemia
  - GGT and ALP elevated
  - Dark urine = increase direct bilirubin
  - Acholic stools = biliary obstruction (white)
- Hepatocellular (intra hepatic)
  - Increased indirect and direct bilirubin; ALT and AST markedly elevated
  - Dark urine = increased direct bilirubin
  - ETOH hepatitis: AST > ALT 2:1
  - Acute hepatitis: increased ALT and AST >1000; ALT >AST usually
Chronic hepatitis: increased ALT:AST but <500

**Causes:** extravascular hemolysis / ineffective erythropoiesis, physiologic jaundice of newborn, gilbert syndrome, dubin-johnson, biliary tract obstruction, viral hepatitis

**Diagnostics:**
- Bilirubin >2.5mg/dL
- Increased bilirubin without increased LFTs = suspected familial bilirubin disorders (gilbert’s, dubin-johnsons) and hemolysis

**Mallory Weiss Tear**
- Mucosal tear in esophagus at GE junction; hx of alcohol intake and episode of vomiting with blood
- Dx: upper endoscopy shows longitudinal mucosal erosions
- Tx: self limiting / no need for treatment

**Nausea / Vomiting**
- Tx: anti-emetics – scopolamine patch, dexamethasone (4mg), ondansetron (4mg)
- Rescue antiemetics: prochlorperazine, droperidol
- GI cocktail: Maalox, viscous lidocaine, droperidol
- PO challenge in ED – eat something before going home → can do with GI cocktail

**Peptic Ulcer Disease**

**Definition:** secondary to imbalance of 1. Decreased mucosal protective factors 2. Increased damaging factors (acid); gastric ulcers more common in elderly

**History and Physical:**
- **Etiology:** h. pylori, NSAIDs, Zollinger Ellison syndrome (suspect GI malignancy in nonhealing GU-ZES and gastric cancer)
- **Asymptomatic,** dyspepsia, worse at night
  - Ulcer-like or acid dyspepsia: relief with food, antacids, anti-secretory agents; worse before meals or 2-5h after meals; nocturnal symptoms
  - Food provoked: pain 1-2 hours p meals and weight loss
  - GI bleed: PUD = MC cause of upper GI bleed

**Diagnostics:**
- **Endoscopy = gold standard / most accurate diagnostic test**
- **Bx to r/o malignancy – alarm sx:** >50yo, dyspepsia, history of UG, anorexia, wt loss, anemia, dysphagia
- **Upper GI series:** all GU seen on UGI serious should be followed with endoscopy to r/o malignancy
- **H. pylori testing:**
  - Endoscopy with biopsy = gold standard + rapid urease test
  - Urea breath test to confirm eradication after therapy
  - H. pylori stool antigen = >90% specific – confirm eradication after therapy
  - Serologic antibodies: confirm infection not eradication
- **Complications:** bleeding (melena, hematemesis, dizziness), perforation (sudden onset severe, diffuse abdominal pain, rigid abdomen, rebound tenderness), penetration (pain radiating to back), obstruction (vomiting)

**Therapeutics:**
- **H.pylori:** clarithromycin + amoxicillin + PPI (CAP)
- **H. pylori negative:** PPI, H2RA, misoprostol, antacids, bismuth compounds, sucralfate
  - PPI: drug of choice / most effective drug to treat PUD – 30m before meals; s/e = B12 deficiency
  - H2 blocker: cimetidine = lots of drug interactions + anti-androgen effects
  - **Misoprostol:** good for preventing NSAID related ulcers but not for healing already existing ulcers; CI in premenopausal women bc abortifacient
  - Antacid: milk of magnesia → diarrhea; amphogel → constipation; Maalox, Mylanta
  - Bismuth compounds: antibacterial and cytoprotective; s/e = darkening tongue / stool, constipation
  - Sucralfate: forms viscous adhesive ulcer coating; promotes healing / protects mucosa; may reduce bioavailability of H2RA, PPI
- **Parietal cell vagotomy if refractory**
- **Weight loss** is experienced by up to 30% of patients post-surgically. Patients may limit food intake due to early satiety. Distention or discomfort may occur shortly after even a moderate-sized meal as the residual gastric pouch is smaller. Patients should be counseled to eat smaller and more frequent meals. Additionally, weight loss can be a result of other postsurgical complications such as maldigestion or dumping syndrome.

**PULMONOLOGY**

**Acute Bronchiolitis**
- **RSV = MC cause; commonly in fall / winter**
- **Dx:** CXR = normal; nasal washing for RSV culture and antigen assay
- **Tx:** hospitalization and administration of ribavirin if O2 < 96%, age < 3 mo, RR > 70 or atelectasis on CXR
  - Supportive → humidified O2, antipyretics, B agonist, nebulized racemic epinephrine, steroids, ribavirin if severe

  **Acute / Chronic Bronchitis**

- **Acute:** cough > 5 days; can last 1-3 weeks
  - **s/s:** fever = unusual; 95% viral (common bacterial = m. catarrhalis)
  - **dx:** CXR – if dx uncertain / sx persist despite conservative tx
  - **tx:** symptomatic / supportive!!!! Hydration, expectorant, analgesic, B2 agonist, cough suppressant
    - abx indication: elderly, underlying cardiopulm dz, cough > 7-10 days; immunocompromised

- **Chronic:** results from enlargement of mucous glands and goblet cell hypertrophy in large airway; **3 months!!!!**
  - **dx:** CXR show interstitial markings; diaphragms not flattened
    - labs: increased HGB and Hct (chronic hypoxic state); lung biopsy = gold standard
    - PFTs: FEV1/FVC ratio < .7; airflow limitation is reversible or only partially reversible
      - decreased FEV1/FVC, normal / decreased FVC, normal or increased TLC, roughly normal DLCO
  - **tx:**
    - acute exacerbations: O2, beta-agonist, anticholinergic, inhaled/IV steroids, abx (mild = amox/doxy/bactrim; severe = augmentin, levoquin/cipro)
    - chronic disease: smoking cessation (BEST); ambulatory O2, bronchodilator, steroids, vaccines

- **Acute epiglottitis**
  - supraglottic inflammation/obstruction of airway d/t infection with Haemophilus influenzae type B
  - MEDICAL EMERGENCY!!!! Caused by Hib; usually unvaccinated children (Hib vaccine at 2, 4, 6, 12-15 mo)
  - **s/sx:** tripod positioning / 3Ds → dysphagia, drooling, respiratory distress
  - **dx:** thumbprint sign on XR lateral neck film, secure airway then culture for H.flu
  - **tx:** intubate if necessary, supportive care, ceftriaxone (may treat as outpatient if stable)

- **Acute Respiratory Distress Syndrome**
  - permeability of alveolar capillary membranes → development of protein – rich pulmonary edema
  - 3 settings account for 75%; sepsis (MC), severe multiple trauma, aspiration of gastric contents (alcoholics), toxic inhalation, near drowning
  - Dx: CXR shows air bronchograms
  - Tx: identify and manage underlying conditions
    - Tracheal intubation with lowest level PEEP to maintain PaO2 > 60mmHg or SaO2 > 90 with ARDS

- **Asthma**
  - chronic, reversible inflammatory airway disease → recurrent attacks of breathlessness and wheezing; FEV1:FVC < 80
    - lack of wheezing = EMERGENCY!!!!

- **Classification of Severity of Chronic Stable Asthma**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Symptoms</th>
<th>Nighttime Symptoms</th>
<th>Use of Rescue Medication</th>
<th>Lung Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent</td>
<td>Symptoms &lt; 2 days/week</td>
<td>&lt;2 times/month</td>
<td>&lt;2 days/week</td>
<td>FEV1 &gt; 80% predicted</td>
</tr>
<tr>
<td></td>
<td>No interference with daily activities</td>
<td></td>
<td></td>
<td>FEV1/FVC normal</td>
</tr>
<tr>
<td>Mild persistent</td>
<td>&gt;2 days/week but not daily</td>
<td>3-4 times/month</td>
<td>&gt;2 days/week but not daily and not more than once on any day</td>
<td>FEV1 &gt; 80% predicted</td>
</tr>
<tr>
<td></td>
<td>Minor limitation</td>
<td></td>
<td></td>
<td>FEV1/FVC normal</td>
</tr>
<tr>
<td>Moderate persistent</td>
<td>Daily symptoms</td>
<td>&gt;1 time/week but not nightly</td>
<td>Daily</td>
<td>FEV1 &gt; 60% but &lt; 80% predicted</td>
</tr>
<tr>
<td></td>
<td>Some limitation in daily activity</td>
<td></td>
<td></td>
<td>FEV1/FVC reduced 5%</td>
</tr>
<tr>
<td>Severe persistent</td>
<td>Continual symptoms</td>
<td>Often 7 times/week</td>
<td>Several times/day</td>
<td>FEV1 &lt; 60% predicted</td>
</tr>
<tr>
<td></td>
<td>Extremely limited physical activities</td>
<td></td>
<td></td>
<td>FEV1/FVC reduced &gt; 5%</td>
</tr>
</tbody>
</table>

  - **Tx:**
    - Intermittent (<2x/week or <2 night/month) – SABA prn
    - Mild persistent (>2x per week or 3-4 night/month) – low dose ICS dialy
- Moderate persistent (daily sx or >1 night/week) –
  - Low dose ICS + LABA daily
  - Medium dose ICS + LABA daily
- Severe persistent (sx several times / day + nightly) –
  - High dose ICS + LABA Daily
  - High dose ICS + LABA + oral steroids
- acute treatment: oxygen, nebulized SABA, ipratropium bromide, oral steroid, magnesium

**Croup**
- caused by parainfluenza virus
- common children 6mo-3yrs; fall and early winter months
- s/sx: barking cough and stridor
- dx: steeple sign on PA XR (narrowing trachea in subglottic region)
- tx: antipyretics, hydration, nebulized racemic epi, steroids

**Foreign Body Aspiration**
- aspirated solid or semi-solid object; most often food, can be life threatening; 80% in mainstem or lobar bronchus right > left
- r/f: institutionalization, advanced age, poor dentition, alcohol, sedative use
- s/sx: inspiratory stridor (if high in airway), wheezing, decreased breath sounds (if low in airway)
- dx: CXR shows expiratory radiography, ABG may be appropriate to evaluate ventilation
- tx: endoscopic to establish diagnosis: rigid bronchoscopy preferred in children (flexible is diagnostic and therapeutic in adults); culture if pneumonia suspected; surgical removal may be necessary

**Hemoptysis**
- MC causes:
  - Bronchitis (50%): hemoptysis, dry cough, cough with phlegm
  - Tumor mass (20%): hemoptysis, chest pain, rib pain, tobacco history, weight loss, clubbing
  - TB (8%): hemoptysis, chest pain, sweating
  - Other: bronchiectasis, pulmonary catheters, trauma, pulmonary hemorrhage

**Influenza**
- Caused by orthomyxovirus → fever, coryza, cough, HA, malaise – strains A,B,C; complications in young, old, immunocompromised
- Everyone >6mo should receive annual influenza vaccine
  - Avoid vaccination: severe egg allergy, previous reaction, guilain barre within 6 week of previous vaccination, GBS in the past 6 weeks, <6 mo old, avoid FluMis in pt with asthma
- Dx: rapid antigen test in clinic, rapid serology test more accurate
  - CXR: primary flu pneumonia will show bilateral diffuse infiltrates
- Tx: Antiretroviral tx in <48 hours – Tamiflu (oseltamivir)
  - Indications for tx: hospitalized, outpatient with severe/progressive illness, outpt at high risk for complications (immunocompromised, pt with chronic medical conditions, >65 yo, pregnant women / 2 weeks post partum)

**Pulmonary Neoplasm**
1. **Carcinoid tumors**: GI tract cancer metastasized to lung (CA of appendix = MC; appendix → liver → lung)
   a. Presentation: hemoptysis, cough, focal wheezing, recurrent pneumonia
      i. Carcinoid syndrome = cutaneous flushing, diarrhea, wheezing, hypotension (telltale sign)
   b. **Adenoma = MC type (slow growing, rare)**
   c. Dx: bronchoscopy – pink/purple central lesion, well vascularized; elevated 5-HIAA
   d. Tx: surgery
2. **Lung cancer**
   a. Small cell = 15% cases – 99% smokers; doesn’t respond to surgery; mets at presentation
      i. Central location, very aggressive
      ii. Tx = combination chemo
      iii. Paraneoplastic syndromes; cushing’s, SIADH
      iv. Tx: can’t have surgery; needs chemo
         1. Associated manifestations: SVC syndrome, Pancoast tumor, horner’s syndrome, carcinoid syndrome
   b. **Non small cell (85%)**
      i. Squamous cell (central mass): presents with hemoptysis, central location, hypercalcemia, elevated PTHrp
ii. Large cell: rarely responds to surgery; periphery location, gynecomastia
iii. Adenocarcinoma: MC peripheral mass; smoking / asbestos exposure; thrombophlebitis
iv. Tx: stage 1-2 = surgery; 3 = chemo then surgery; 4 = palliative

3. **Pulmonary nodules:** <3cm = nodule; >3cm = mass
   a. Found on CXR → get CT
      i. If suspicious → biopsy (ill-defined lobular or spiculated suggests cancer)
      ii. Not suspicious → <1cm monitor at 3mo, 6mo, then yearly for 2 yr (calcification, smooth well defined edges = benign)

   - Pertussis (whooping cough)
     * Gram negative bacteria Bordetella pertussis – high contagious
     * Consider in adults with cough >2 weeks
     * Dx: nasopharyngeal secretions – culture
     * Tx: macrolide (clarithro / azithro); supportive care with steroids / beta2 agonists
       - Vaccination: 5 doses – 2, 4, 6, 15-18mo, 4-6yrs (DTap)
       - 11-18 yo = 1 dose Tdap
       - Expectant mothers should get Tdap during each pregnancy, usually at 27-36 weeks

   - Pleural effusion
     * Pathologic accumulation of fluid in pleural space
     * Transudate = transient → from changes in hydrostatic pressure: cirrhosis, CHG, nephrotic syndrome, heart failure, ascities, hypoalbuminemia
     * Exudative: infection, malignancy, immune; MC cause = pneumonia, cancer, PE, TB
       - Light’s criteria: increased protein, increased LDH
     * Dx: lateral decubitus XR, chest CT, U/S; PE shows decreased tactile fremitus and dullness to percussion in pleural effusion
       - Isolated left sided pleural effusion likely exudative
       - Right sided = transudative
     * Tx: thoracocentesis if chronic / recurrent – pleurodesis / intermittent drainage with indwelling catheter

   - Pleuritic Chest Pain
     * Pneumonia, pericarditis, pericardial effusion, pancreatitis

1. **Viral:** adults → flu = MC cause; kids → RSV; comes on fast
   - Dx: CXR = bilateral interstitial infiltrates; rapid antigen testing for flu, RSV nasal swab, cold agglutinin titer negative
   - Tx: flu with Tamiflu (A and B) if sx began <48 hrs; symptomatic tx = beta 2 agonist, fluids, rest
2. **Bacterial:** fever, dyspnea, tachycardia, tachypnea, cough, +/- sputum
   - Dx: patchy, segmental lobar, multilobar consolidation; blood cultures x2, sputum gram stain
   - Tx: outpatient = doxy, macrolides; inpatient = ceftriaxone + azithromycin/respiratory FQs
3. **Fungal:** common in immunocompromised pt (AIDs, steroid use, organ transplant)
   - Coccidioides (valley fever); non-remitting cough/bronchitis non-responsive to conventional tx
     - Fungal inhalation in western states; test with EIA for IgM and IgG
     - Tx: fluconazole / itraconazole
   - Pulmonary aspergilllosis: usually those with healthy immune systems
     - Tx: fluconazole / itraconazole
   - Cryptococcus: found in soil; can disseminate and → meningitis
     - Lumbar puncture for meningitis
     - Tx: amphotericin B
   - Histoplasma capsulatum: pulmonary lesions that are apical and resemble cavitary TB; worsening cough and dyspnea, progression to disabling respiratory dysfunction; no dissemination
     - Bird or bat droppings (caves, zoo, bird); Mississippi ohio river valley
     - Signs: mediastinal or hilar LAD (looks like sarcoid)
     - Tx: amp B
4. **HIV:**
   - PJP (pneumocystis jirovci)
     - Common in HIV patients with CD4 count <200
     - XR: diffuse interstitial or bilateral perihilar infiltrates
• Dx: bronchoalveolar lavage PCR, labs, HIV test; low O2 sat despite supplemental oxygen
  • Tx: Bactrim and steroids; pentamidine for allergy
    o Prophylaxis for high risk pt with CD4 <200 = daily bacctrim
  o CURB65: confusion, urea >7, RR >30, SBP <90 OR DBP <60, age >65
    ▪ 0-1 = low risk, consider home tx
    ▪ 2 = probable admission vs close outpt management
    ▪ 3-5 admission, manage as severe

Pneumothorax

• Accumulation of air in pleural space
• s/sx: acute onset ipsilateral chest pain and dyspnea with decreased tactile fremitus, deviated trachea, hyperresonance, diminished breath sounds
• can be spontaneous or traumatic
  o primary: occurs in absence of underlying disease (tall, thin males age 10-30 at greatest risk)
  o secondary: in presence of underlying disease (COPD, asthma, cystic fibrosis, interstitial lung disease)
• dx: tension pneumothorax = mediastinal shift to contralateral side and impaired ventilation
  o XR = pleural air; ABG shows hypoxemia
• Tx:
  o small - <15% diameter of hemithorax will resolve spontaneously without need for chest tube placement
  o large - >15% diameter and symptomatic pneumothoraces, chest tube placement performed
  o serial XR every 24 hours until resolved
• tension = medical emergency!!! – large bore needles to allow air out of chest; chest tube for decompression

Pulmonary Embolism

• arises from thrombi in systemic venous circulation or right side of heart, from tumors that invade venous circulation or other
• >90% from clots in deep veins of lower extremities (homan’s sign – dorsiflexion foot = calf pain)
• r/f: virchow’s triad – hypercoaguable state, trauma, venostasis (surgery, cancer, oral contraceptives, pregnancy, smoking)
• dx: spiral CT = initial method of identifying
  o ABG = respiratory alkalosis secondary to hyperventilation
  o EKG: S1Q3T3 (rare); non-specific ST wave changes
  o CXR: Westermark sign or Hampton hump (triangular or rounded pleural base infiltrate adjacent to hilum)
  o VQ scan: perfusion defects with normal ventilation (normal VQ rules out PE; abnormal – non-specific)
  o D-dimer
  o Pulmonary angiography = gold standard definitive
• Tx: heparin = anticoagulant of choice or warfarin (INR 2-3)
  o Duration: minimum of warfarin 3 months with reversible risk factor
  o Unprovoked: warfarin recommended for at least 6 months then reevaluate
  o 2 episodes unprovoked, long term with warfarin

Respiratory Syncytial virus

• MC cause of lower respiratory tract infection in children worldwide – virtually all get it by age 3; leading cause of pneumonia and bronchiolitis
• s/sx: rhinorrhea, wheezing / coughing that persist for months, low-grade fever, nasal flaring / retraction, nail bed cyanosis
• dx: nasopharyngeal secrerations RSV antigen test; CXR can show diffuse infiltrates
• tx: indications for hospitalization → tachypnea with feeding difficulties, visible retractions, oxygen desaturation
  o supportive: albuterol, humidified oxygen, antipyretics, steroids (controversial), sx resolve 5-7 days
  o vaccine for children with lung issues or born premature / immunocompromised at birth should get synagis prophylaxis (palivizumab)

Shortness of Breath

• asthma, COPD, pneumonia, CHF, acid reflux, pneumothorax, PE, foreign body aspiration, interstitial lung disease, obesity, pulmonary hypertension, sarcoidosis, TB, anemia, cardiomyopathy, pericarditis, epiglottitis, GAD, myasthenia gravis fractured rib, sudden blood loss

Tuberculosis

• mycobacterium tuberculosis – transmitted through respiratory droplets
• s/sx: fever, night sweats, anorexia, weight loss
  • dx: tuberculin skin test (TST) or interferon – gamma release assays IGRAs
    o PPD rules: >5: at high risk, CXR with evident, immunocompromised HIV / drugs, steroids daily, or close contact with pt with infectious TB
    o >10: some risk factors, IVDU, recent immigrants from high prevalence area, renal insufficiency, prison, homeless shelter, diabetes, head/neck cancer, gastrectomy / jejunooideal bypass surgery
    o >15 = no risk factors
  • Diagnosis with sputum for AFB smears and cultures – have to be 3 afb negative
    o NAAT helps diagnosis etter and sooner
    o XR: cavitary lesions, ghon complexes in apex of lungs, caseating granulomas
    o Military TB = spread outside lungs → potts dz (TB in spine); scrofula (TB to cervical lymph nodes)
  • Tx: start mepipic tx in those who likely have it
    o PPD positive + CXR negative: latent TB → isoniazid x9mo (+ B6 to prevent neuropathy)
    o PPD + CXR positive = active: quad therapy (RIPE): rifampin, isoniazid, pyrazinamide, ethambutol – all = hepatotoxic
      • Four drugs x8 weeks (RIPE) then two drugs x16 weeks (RI)
        o Rifampin: orange body fluids, hepatitis
        o Isoniazid: peripheral neuropathy (B6 = pyridoxine 25-50mg/day)
        o Pyrazinamide: hyperuricemia (gout)
        o Ethambutol: optic neuritis, re-green blindness
    o Monitor serum creatinine; take meds on empty stomach since food can reduce absorption, watch for hepatotoxicity, aware of drug interactions especially with HIV meds

Wheezing

• Asthma, chronic bronchitis, COPD, carcinoid tumors, RSV, acute bronchiolitis, foreign body aspiration, transfusion reaction, heartburn / dyspepsia, ingestion of toxic substances / foreign bodies, pulmonary neoplasm, cor pulmonale, photosensitivity reaction, food allergies, influenza, pneumonia, emphysema, anaphylaxis

NEUROLOGY

Altered Level of Consciousness / Coma

### Glasgow Coma Scale

<table>
<thead>
<tr>
<th>Best Eye Response (E)</th>
<th>Best Verbal Response (V)</th>
<th>Best Motor Response (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Spontaneous - open with blinking at baseline</td>
<td>5 Oriented</td>
<td>6 Obey commands for movement</td>
</tr>
<tr>
<td>3 Opens to verbal command, speech, or shout</td>
<td>4 Confused conversation, but able to answer questions</td>
<td>5 Purposeful movement to painful stimulus (crosses midline)</td>
</tr>
<tr>
<td>2 Open to pain, not applied to face</td>
<td>3 Inappropriate responses, words discernible</td>
<td>4 Withdraws from pain</td>
</tr>
<tr>
<td>1 None</td>
<td>2 Incomprehensible speech</td>
<td>3 Abnormal (spastic) flexion, decorticate posture</td>
</tr>
<tr>
<td></td>
<td>1 None</td>
<td>2 Extensor (rigid) response, decerebrate posture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 None</td>
</tr>
</tbody>
</table>

- LOC evaluated by attempting first with verbal commands the non-noxious stimuli then noxious (sternal rub)
- All pt have >3; eye response, verbal response, motor response (motor correlates best to outcome)
- Asymmetrical motor responses to pain or deep tendon reflexes may indicated focal hemispheric lesion
- Confusion: reduced mental clarity, coherence, comprehension, reasoning
- Drowsiness: pt can’t be easily aroused by touch or noise and can’t maintain alertness for some time
- Lethargy: depressed mental status in which pt may appear wakeful but has depressed awareness of self and environment globally; can’t be aroused to full function
- Stupor: can be awakened only by vigorous stimuli and an effort to avoid uncomfortable or aggravating stimulation Is displayed
- Coma: pt can’t be aroused by stimulation and no purposeful attempt made to avoid painful stimuli
- Delirium: acute onset fluctuating cognition with impaired attention / consciousness, ranging from confusion to stupor
- Ddx: substance use disorder, arrythmias, seizures, aneurysms, encephalitis, delirium, alzheimer’s
• AEIOU TIPS: alcohol / AAA, electrolytes / endocrine, insulin, opiates, uremia, trauma / temperature / toxemia, infections (sepsis / meningitis), psychogenic / pulmonary embolus, space occupying lesions / strokes / shock / seizure

• dx: consider reversible causes:
  o hypoglycemia (check glucose, give dextrose)
  o opiate overdose (trial naloxone)
  o thiamine deficiency (trial thiamine)
  o consider head CT for unclear etiology / neurologic abnormality
  o consider empiric abx in pt with fever or unclear etiology

• treat underlying cause

  Bell Palsy

  s/s: sudden onset unilateral facial nerve paralysis with no other focal neurologic or systemic findings.
  o Sx peak in 48 hours
  o 60% have viral prodrome
  o Incomplete closure of eyelids → corneal exposure keratitis (lubricating eye drops needed / patch at bed time)

• Differential diagnosis: infectious, traumatic, and neoplastic etiologies, the most common diagnosis is idiopathic Bell's palsy.

• Tx:
  o PE will show CN VII nerve palsy that does not spare the forehead
  o Most commonly caused by HSV
  o Treatment is prednisone, artificial tears, tape eyelid shut
  o Comments: Bilateral: Lyme disease, infectious mononucleosis

  Encephalitis

  Presents similar to meningitis: AMS, seizures, personality changes, exanthema → different bc of altered brain function!
  Encephalitis: usually viral (HSV = MC, CMV in immunocompromised)
  Reye's: rapidly progressive encephalopathy with hepatic dysfunction, usually post-flu / URI; Babinski positive and hyperreflexia noted; salicylate use (aspirin, pepto); vomiting, confusion → seizure / coma; dx: elevated liver enzymes, PTT, hyperammonemia, hypoglycemia, metabolic acidosis; tx = supportive

  s/sx: Begins with flu-like illness
  Dx: Kernig's and Brudzinski's usually absent; MRI / LP
  Tx: supportive care and acyclovir 10mg/kg IV q8hr started promptly; empiric abx until bacterial meningitis excluded

  Epidural Hematoma

  Transient LOC from injury → LUCID → drowsiness. HA, unilateral contralateral weakness
  Cause: traumatic intracranial hemorrhage after skull fracture → middle meningeal artery is MC involved → blood fills space between dura and skull
  Dx: non con head CT (lenticular, unilateral convexity – lens shape) usually in temporal region → ”lemon”
  Tx: surgical craniotomy / medical management of increased intracerebral pressure (mannitol, hyperventilate, steroids/ventricular shunt)

  Subdural Hematoma

  head injury from fall, MVA, assault → sudden blow tears blood vessels; usually elderly pt with multiple falls presenting with neurological sx (AMS / neurologic signs) → usually in alcoholics or elderly
  Injuries to bridging veins – acute = 48 hours; subacute: 3-14 days; chronic: >2 weeks (elderly)
  Blood collects between dura and arachnoid matter
  Dx: non-con head CCT (crescent shaped, concave hyperdensity)
  Tx: depends on severity
  o small: observation
  o severe: surgery → burr hole trephination, craniotomy, craniectomy

  Subarachnoid Hemorrhage

  sudden, severe HA “worse HA of life”, sudden LOC in 50% pt, BP rises, may develop fever
  herald bleed occurs in 40% - less severe but atypical HA
  Ruptured berry (saccular) aneurysm accounts for 75% nontraumatic – r/f: smoking, HTN, hypercholesterolemia, heavy alcohol
  Dx: non-con head CT, LP (elevated opening pressure / grossly blood fluid in all 4 tubes
  o Cerebral angiography may be done, EEG may show site of hemorrhage / diffuse changes
- tx: prevention of elevated arterial / intracranial pressure – manage HTN
  - surgical clipping / wrapping of aneurysm

**Intracerebral Hemorrhage**
- Associated with high mortality; usually from HTN (sudden increase BP)  →  rupture small vessels deep in brain parenchyma
- Usually older pt, risk increases with age
- Ischemic stroke may  →  hemorrhagic stroke
- s/sx: abrupt onset focal neurologic deficits that worsens steadily over 30-90 min, altered LOC, stupor, coma, HA, vomiting and signs of increased ICP
- dx: CT / MRI
- tx: neurosurgery

**Guillan Barre Syndrome**
- ascending paralysis beginning in distal limbs: leg weakness → total paralysis of all 4 limbs, facial muscles, eyes, loss of reflexes
- often present after immunization
- post-infectious cause: campylobacter jejuni = MC, CMV, Epstein-barr, HIV
- dx: based on LP → elevated CSF protein with normal CSF WBC
- tx: plasma exchange (remove circulating antibodies) and IVIG
  - monitor PFTs for paralysis of chest muscle/diaphragm (respiratory failure)

**Concussion**
- Brief LOC, amnesia → no structural abnormalities / focal neurologic deficits
- Negative CT scan
- Grade 1: “mild” – GCS 13-15, no LOC, post traumatic amnesia and other sx resolve <30 min – can return to sports if asymptomatic for 1 week
- Grade 2: +LOC, 1 minute or post-traumatic amnesia that lasts >30 min but <1 week; may return to sports if asymptomatic at rest and exertion for at least 7 days
- Grade 3: +LOC >1 min or post-traumatic amnesia and other sx last >1 week; may return in 1 month if asymptomatic at rest and exertion 7 days
- Neuroimaging: LOC, GCS <15, focal neurologic deficits, persistently AMS, clinical deterioration
- Get a CT: suspected open skull / basilar skull fx, >2 episodes vomiting, >65 yo, amnesia >30 min prior to impact, MVA with ejection, pedestrian struck by car, fall >3 feet, underlying bleeding disorder / anticoagulant use, seizure activity, focal neurological deficit, ETOH involvement
- Dx: usually clinical, sometimes head imaging
- Tx: athletic activities resumed gradually
  - Single concussion: LOC lasting <15 min – return to sports when asymptomatic for at least 1 week
  - Repeat: LOC / sx >15 min → NOT to return to sports that season

**Cluster Headaches**
- always unilaterial, but can change sides with new attack; pt. is usually a man
- s/s: pain (excruciating unilateral pain, periorbital and temporal)
  - autonomic sx: ptosis, miosis, lacrimation, conjunctival injection, rhinorrhea, nasal congestion
  - circadian periodicity: short-lived (15-180 min) cluster attacks; attacks occur daily in clusters followed by remission
- tx: 100% oxygen, sumatriptan (prophylaxis: CCBs)

**Tension Headache**
- **MC type of headache**
- bilateral, non-pulsating, bandlike pain occurring in frontal and occipital regions ;with neck muscle tenderness
- MC caused by stress, or fatigue, glare, noise
- Tx: NSAIDs, smoking cessation
Migraine Headache:

- F>M
- triggers: menstruation, pregnancy, contraceptives, food (chocolate, cheese, MSG, nitrites), alcohol
- Gradual onset unilateral > bilateral, throbbing, pulsating headache,
  - Without aura = most common, N/V, photophobia, phonophobia
  - Aura: scotoma, flashing lights, sound
    - HA follows aura w/in 30 min; visual = MC
- Dx: clinical
- Tx:
  - Abortive – triptans, DHE, antiemetics, NSAIDs
  - Prophylaxis – beta blockers, CCBs, TCAs
  - Triptans / DHE CI in HTN or CV disease

Loss of Coordination / Ataxia

ddx: hyper/hypovitaminosis (B12), inner ear issues, hallucinogen-related psych disorders, encephalopathies, neoplasms, huntington / MS / 36oncom3636k’s, stroke, fibromyalgia, cerebral palsy, metabolic disorders (hepatic encephalopathy)

Loss of Memory

Delirium
- Acute syndrome caused by medical condition, substance, intoxication or withdrawal or medication side effect → AMS
  - Ex: sepsis, sundowning, ETOH withdrawal, opiate withdrawal, sunstroke
- Rapid onset, short-term, reversible!!!
- Criteria:
  - Disturbed level of consciousness (decreased attention span / lack of environmental awareness)
  - Cognitive change – memory deficit, disorientation, language disturbance, visual / auditory hallucinations
  - Rapid onset within hours / days with fluctuating course
  - Evidence of causal physical condition
- Dx: history, CT/MRI, CBC, blood cultures, CXR, UA, BUN, electrolytes, glucose, utox to r/o infection
- Tx: treat underlying cause / supportive care; sedation when necessary

Alzheimer’s Disease
- Age related progressive cognitive decline, affects 5% of those aged 71-80 years, and near 40% of those aged over 90 years.
- s/s: gradual, progressive memory loss, difficulty word-finding, concentration problems, emotional lability, personality changes, social withdrawal, difficulties with dressing, cooking, balancing the checkbook, and maintaining hygiene. There are multiple types of dementia: Alzheimer disease, vascular dementia, and other less common dementias
- dx: Folstein Mini-Mental State Examination (MMSE) or the Memory Impairment Screen. The MMSE may be useful to provide a baseline for future comparison. Controversy exists over the use of memantine and anticholinergic medications in the treatment of dementia.
  - Alzheimer disease = MC: 2/3 dementia cases; irreversible; early language / visuospatial defects
    - Severe memory deficits; clues don’t help memory retrieval
    - r/f: advanced age, family hx
  - vascular: ¼ cases; r/f: HTN, dyslipidemia, DM, smoking, adv age
  - lewy body: cognitive fluctuations, visual hallucinations, Parkinsonism
  - frontotemporal dementia: personality, and social behavior changes, non-fluent speech
  - neurodegenerative conditions: Huntington disease, metabolic abnormalities
- irreversible causes: 36oncom3636k’s, vascular dementia, Creutzfeldt-jakob
- reversible: depression, B12 deficiency, syphilis, hypothyroidism, NPH, drug use, intracranial mass
- tx: cholinesterase inhibitors (donepezil); NMDA antagonists (memantine) → don’t cure, just slow progression

Meningitis

- Classic triad: fever >38C, nuchal rigidity, headache
• P/e: kernig’s sign (neck pain with knee extension), 37oncom3737ki’s sign (leg raise with bent neck)
• Aseptic: usually viral; negative blood cultures
• Bacterial: community acquired, usually s. pneumo / n. meningitidis (both gram positive diploccoci) – likely if pt has a rash
  o Neonates = e. coli / s. agalactiae
  o >50-60 = listeria / cryptococcus neoformans
  o Hospital acquired: staph / aerobic gram negative
• Dx: lumbar puncture → must first check for increased intracranial pressure (check for papilledema!!) get a CT if unsure
  o Bacterial: increased protein, decreased glucose (bacteria eat glucose); markedly increased opening pressure
  o Viral: normal pressure, increased WBC (lymphocytes)
• Tx:
  o Aseptic: symptomatic or IV acyclovir for HSV
  o Bacterial: dexamethasone + empiric IV abx (cephalosporin, vanco, penicillins)
  o Household contacts: treat with rifampin, cipro, Levaquin, azithromycin, ceftriaxone

Numbness / Paresthesias

• Distal sensory: stocking-glove → sensory loss affecting distal lower and upper extremities
• Axonal neuropathies: DM, alcohol, vitamin B12 deficiency, syphilis, HIV, lyme, uremia, chemotherapy, vasculitis, paraneoplastic neuropathy, amyloidosis
• Sensory neuropathy: 37oncom37’s syndrome, Guillain-barre, chemotherapy induced (especially platinum drugs), vitamin B6 toxicity

Seizures

• Status Epileptics:
  o s/s: > or equal to 5 min continuous seizure activity or more than one seizure without recovery from postictal state in between episodes
  o always check finger stick blood glucose!!! Consider pyridoxine (B6) for INH toxicity!!!
  o MC caused by change in med regimen of someone with seizure disorder
  o Tx:
    ▪ Place in left lateral decubitus position (suppressed gag reflex → prone to aspiration of gastric contents)
      • IV route is preferred
      ▪ Watchful waiting for auto-correction of acidosis once seizure activity is controlled
• Focal seizures
  o With retained awareness (simple partial): no alteration in consciousness
  o With loss of awareness (complex partial): automatisms (lip smacking) – postictal state = confusion / memory loss
  o Tx: phenytoin, carbamazepine
• Generalized seizure: widespread seizure activity in left and right brain hemispheres
  o Absence Seizure (petit mal)
    o Brief mental status change; without motor activity – blank stare
    o No aura, no post-ictal state, no loss of postural tone
    o MC in 5-10 yo
    o EEG → brief 3-Hz, spike and wave discharged
    o Tx: ethosuximide
  o Tonic clonic: convulsive (grand mal) – bilaterally symmetric and without focal onset, begins with LOC
    ▪ Tonic = rigic phase, clonic = convulsions, post-ictal = confused state
  o Atonic = drop attack → like syncope; loss of muscle tone
  o Clonic: los control of bodily function, jerking, may temporarily lose consciousness
  o Tonic: extreme rigidity then LOC
  o Myoclonic: muscle jerking, no tonic phase, occurs in morning
  o Febrile: temp >38C, >6mo, <5 years, absence of CNS infection / inflammation
  o Infantile spasm: type of epilepsy seizure
  o Psychogenic non-epileptic seizure: not due to epilepsy but look similar to epileptic seizure
• Diagnostic approach: check electrolylates, glucose, pregnancy test, ECG, EEG, neuroimaging for adults with first seizure (CT / MRI)
• Tx: treat underlying cause → electrolytes, infection, toxic ingestion, trauma, azotemia, hypoxia, hypoglycemia, stroke /bleed
  o Meds for focal seizures: phenytoin, phenobarb, valproate, lamotrigine, gabapentin
**Spinal Cord Injuries**

- **Anterior cord syndrome**: loss of pain / temperature below level of preserved joint position / vibration
- **Central cord syndrome**: loss of pain and temperature sensation at level of the lesion, where spinothalamic fibers cross the cord with other modalities preserved (dissociated sensory loss)
- **Complete cord transection**: rostral zone of spared sensory levels (reduced sensation caudally, no sensation in levels below injury); urinary retention and bladder distension
- **Brown-sequard syndrome (hemisection of cord)**: loss of joint position and vibration sense on same side as lesion and pain / temperature on opposite side a few levels below lesion

**Stroke**

- Ischemia / hemorrhage \(\rightarrow\) infarction
- \(r/f\): HTN, hypercholesterolemia, diabetes, afib, carotid artery disease, cigarette smoking, age, family history, amel sex
- HTN = most significant treatable
- **Ischemic**: 85% - 2/3 thrombotic, 1/3 embolic
  - Thrombotic usually preceded by TIA, embolic caused. By blood clot that develops somewhere else in body usually from hert, aortic arch, large cerebral arteries \(\rightarrow\) occur abruptly without warning
- **Hemorrhagic**: usually secondary to HTN \(\rightarrow\) intracerebral / subarachnoid
  - Weakened vessel that ruptures and bleeds into surrounding brain compressing surrounding brain tissue \(\rightarrow\) either aneurysms or AVMs; less predictable
- \(s/sx\): hemiparesis, hemisensory deficit; must present on one side only and will be side of body opposite stroke
  - Right-sided \(sx\) = left side stroke; left-sided \(sx\) = right side stroke
  - Anterior circulation (anterior cerebral / middle cerebral arteries) associated with hemispheric \(s/s\) (aphasia, apraxia, hemiparesis, hemisensory loss, visual field defect)
  - Posterior circulation (vertebral / basilar arteries): coma, drop attack, vertigo, n/v, ataxia
  - Carotid/ophthalmic: amaurosis fugax
  - MCA: aphasia, neglect, hemiparesis, gaze preference, homonymous hemianopsia
  - ACA: leg paresis, hemiplegia, urinary incontinence
  - PCA: homonymous hemianopsia
  - Basilar: coma, cranial nerve palsies, apnea, drop attack, vertigo
  - Lacunar: silent, pure motor or sensory
- **Dx**: emergent brain imaging essential for ischemic stroke \(\rightarrow\) noncon CT
  - Transcranial doppler US, echo for ischemic stroke
- **Tx**: thrombolysis, IV admin for rtPA for occlusive disease treat with IV tPA within 3-4.5 hours onset
  - Admit to ICU or stroke unit with neuro exams every 15 minutes during infusion, every 60 minutes for next 6 hours then hours 24 hours after tx / get serial blood pressures
  - Exclusions criteria for thrombolysis within 3 hours: SAH, head trauma / prior stroke within 3 mo, MI within 3 mo, GI / gastric ulcer within 3 weeks, major surgery in 14 days, hx of intracranial hemorrhage, elevated BP >185 systolic / 110 diastolic, active bleeding / acute trauma, INR >1.7 with anticoagulation, glucose <50, seizure with postictal state, multilobar infarction on CT
  - BP closely monitored in first 24 hours; hold antihypertensives until systolic >220 or diastolic >120 with goal to lower BP by 15% in first 24 hours if tx is indicated
    - BP has to be <185/110 for thrombolytics \(\rightarrow\) give labetolol 10-20mg IV over 1-2 min

**Transient Ischemic Attack**

- Transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia without acute infarction
- Atherosclerotic plaque reduces blood flow in the internal carotid artery
- 10% of TIA patients will have a stroke within 90 days
- **Tx**: Aspirin + dipyridamole or clopidogrel monotherapy (antiplatelet therapy!!!!)
- ABCD² score: predicts likelihood of subsequent stroke within 2 days
• 30% of those with CVA had TIA; **risk is highest 24 hours after initial event**

**Syncope**

• Syncope = Brief LOC with loss of postural tone followed by spontaneous revival – motionless / limp and usually has cool extremities, weak pulse, shallow breathing
  - Near syncope = light-headedness / sense of impending faint without LOC
  - Seizures can cause sudden LOC but not considered syncope

• Most result from insufficient cerebral blood flow → usually from decreased cardiac output or decreased venous return

• MC causes: vasovagal (apparent trigger / warning symptoms), idiopathic

• Red flags: syncope during exertion, multiple recurrences in short time, heart murmur, old age, significant injury during syncope, family history sudden unexpected death

• Dx: ECG, pulse ox, echo, tilt table testing, blood test only if clinically indicated, CNS rarely indicated

**Vertigo**

• Sensation of movement in absence of movement
  - Peripheral = inner ear → labrynthitis, BPPV, meniere, vestibular neuritis, head injury → sudden onset, n/v, tinnitus, hearing loss, nystagmus (horizontal)
  - Central: brainstem vascular disease, AVM, tumor, MS, veterbrobasilar migraine → mor gradual onset / vertical nystagmus, no auditory symptoms
    - Vertigo + syncope = vertebrovascular insufficiency

• BPPV: positional, no hearing loss, tinnitus, ataxia, dx: dix-hallpike; tx: epley maneuvers, meclizine

• Vestibular neuritis: not positional, no hearing loss / tinnitus, tx: meclizine

• Labrynthitis: acute, self-resolving episode; vertigo, hearing loss tinnitus, tx: meclizine + steroids

• Meniere’s disease: chronic, relapsing, remitting; vertigo + hearing loss + tinnitus; tx: diuretics, salt restriction, CN VIII ablation for severe cases

• Perilymph fistula: history of trauma; vertigo from trauma; tx: fix damage surgically

• Acoustic neuroma: ataxia, neurofibromatosis type II, MRI findings: vertigo, hearing loss, tinnitus and ataxia; tx = surgery

**ENT / OPHTHALMOLOGY**

**Acute Laryngitis**

• Inflammation of larynx, **usually from virus** / overuse → change in voice (decreased volume / hoarse);
  - Consider squamous cell carcinoma if hoarseness persists >2weeks, hx of ETOH / smoking
  - Consider GERD if no associated viral etiology

• Dx: clinical; laryngoscopy required for sx persisting >3 weeks
  - Deviation of soft palate → abscess

• Tx: symptomatic (cough suppressant, voice rest, steam inhalant)
  - Viral = self-limited; oral and IM steroids for vocal performers to hasten recovery

**Acute Otitis Media**

• Bugs: strep pneumo = 25%, h. flu 20%, Moraxella catarrhalis 10%

• Acute: <3 weeks, chronic: >3mo, recurrent: 3 episodes in 6 mo or 4 in 12 with clearing between

• Chronic >3 mo: clear serous fluid in middle ear without s/sx of ear infection (may have hearing loss / asymptomatic) – no abx

• Dx: otoscopic → bulging, loss of landmarks, redness, TM injection, pus, limited TM mobility

• Tx: amox x10-14 days; augmentin = 2nd line (PCN allergy = azithro, erythron, Bactrim)
  - Chronic: myringotomy with ventilation tube insertion of fluid

**Acute Pharyngitis**

• Bacterial: usually GAS; Centor: fever >38, anterior LAD, lack of cough, pharyngotonsillar exudate
  - s/sx: fever, sore throat, no cough, exudates, cervical LAD
  - dx: throat culture = gold standard; think: rheumatic fever / glomerulonephritis
  - tx: penicillin tdo prevent acute rheumatic fever (erithrymycin with allergy)

• Viral: less likely exudative (CMV, EBV, adenovirus)
  - mono (caused by Epstein barr virus) – rash with penicillins, dx by atypical lymphotcytes and monospot
  - splenic rupture possible with contact sports
  - tx: supportive

• Fungal: common to pt with inhaled steroids
  - s/sx: sore throat, dysphagia, white patches in oropharynx, seen in HIV pt
  - dx: clinical / endoscopy
Acute / chronic sinusitis

- **Definition:** often follows URI – can be viral or bacterial (bacterial = s. pneumo, h. flu)
- **r/f:** cigarette smoke / exposure, history of trauma, presence of foreign body
- **symptoms:** purulent nasal discharge, facial pain and pressure, nasal obstruction, fever
- **p/e:** tenderness to palpation over affected sinus, decreased light transmission with transillumination
- **dx:** clinical, XR not recommended, MRI indicated if malignancy or intracranial spread of infection is suspected
- **tx:** NSAIDs for pain, saline washes, steam, oral/nasal decongestents – improvement in 2 weeks
  - abx recommended with extended duration (10-14 days) or more severe symptoms → amoxicillin (or doxy with allergy) is first line 7-10 days; augmentin if no improvement after 3 days of amox x10days; quinolones use with tx failures or recent abx use

Allergic Rhinitis

- **symptoms:** allergic shiners (bluish discoloration below the eyes), rhinorrhea, itchy or atery eyes, sneezing, nasal congestion, dry cough, pale, boggy, bluish mucosa, children = allergic salute
- **tx:** avoid known allergens and use antihistamines, cromolyn sodium, nasal or systemic corticosteroids, nasal saline drops or washes, and immunotherapy

Barotrauma

- tissue injury caused by pressure related change in body compartment gas volume – affects air-containing areas (lungs, ear, sinuses, GI tract, air spaces in teeth, space in diving face mask)
- **sx:** ear pain, vertigo, hearing loss, sinus pain, epistaxis, abdominal pain / dyspnea and LOC are life threatening and may result from alveolar rupture and pneumothorax
- **dx:** clinical but sometimes needs imaging tests; exam: signs of trauma without signs of infection (redness without building pus, or effusion)
- **tx:** supportive (anti-inflammatories) then consider prophylaxis
  - pseudoephedrine / afrin can be good for prophylaxis (not be used for >3 days)

Blepharitis

- chronic inflammation of lid margins caused by seborrhea, staph, or strep / dysfunction of Meibomian glands
- anterior blepharitis: eyelid skin, eyelashes; may be ulcerative (s.aureus) or seborrheic
- posterior: inflammation of Meibomian; may be infectious (s. aureus) or caused by glandular dysfunction
- **features:** red rims, scales, adherent eyelashes, hyperemic lid margins, dandruff like deposits (scurf) and fibrous scales (collarettes); clear or slightly injected conjunctiva; thick cloudy discharge visible when Meibomian glands obstructed
- **tx:** lid scrubs with diluted baby shampoo on cotton tipped swabs; massage to express the gland; topical abx used if infection suspected

Blowout Fracture

- **s/sx:** hx trauma, pain with EOM, double vision, swelling, numbness of cheek / gum, epistaxis, erythema / ecchymosis, “raccoon eyes”
- **dx:** CT scan
- **tx:** usually surgery / abx to prevent infection / follow up ophtho

Conjunctivitis

**Viral**
- MC caused by adenovirus; highly contagious, transmission via direct contact / swimming pools
- **Features:** acute onset unilateral or bilateral erythema of conjunctiva, copious watery discharge, tender preauricular lymphadenopathy
- **Tx:** eye lavage with normal saline bid 7-14 days; antihistamine drops, warm to cool compresses,

**Bacterial**
- Pathogens: s.pneumo, s. aureus = common, chlamydia / gonorrhoeae = rare
- Transmission via direct contact or fomites / swimming pools / autoinoculation
- **Features:** acute onset purulent discharge from both eyes; “glued” shut in the morning;
- **Tx:** hand washing, avoid contamination
- Topical abx: sulfonamids, FQs, aminoglycosides = drops > ointment
  - Add systemic abx for rare pathogens
**Corneal Abrasion**
- Usually caused by minor trauma (fingernail, contact lens, eyelash, small foreign body)
- **Features**: pain and sensation of foreign body + photophobia, tearing, injection, blepharospasm, blurred vision
- **Dx**: slit lamp with fluorescein \(\rightarrow\) epithelial defect but clear cornea
- **Tx**: topical anesthetic but ONLY to assist in confirming dx (don’t prescribe!!! Delayed healing!!!), saline irrigation, antibiotic ointment (gentamicin or sulfacetamide), Tylenol for pain
  - Patching for **no longer than 24 hours** recommended for large abrasions (>5-10mm); refer if not healing

**Dacroadenitis**
- Inflammation of lacrimal glands (tear producing) usually caused by either infection
- **s/sx**: unilateral severe pain, swelling, redness, tearing, drainage
- **dx**: usually clinical; CT orbits of chronic
- **tx**: usually viral = symptomatic; can be caused by mumps

**Dacrocystitis**
- Inflammation of the lacrimal sac caused by obstruction (s. aureus, B-hemolytic strep, s. epidermidis, candida)
- **Sx**: pain, swelling, tenderness, redness, tearing, +/- purulent discharge
- **Tx**: warm compresses and systemic abx
  - If abscess forms \(\rightarrow\) I&D

**Ear Pain**
- **Ddx**: otitis externa, malignant (necrotizing) otitis externa, otitis media, mastoiditis, cerumen impaction, acoustic neuroma, barotrauma, eustachian tube dysfunction, labyrinthitis, cholesteatoma, otitis media, tympanic membrane perforation, mastoiditis, tinnitus

**Entropion / Ectropion**
- **Entropion**: lid and lashes are turned in secondary to scar tissue or spasm of orbicularis oculi muscles
- **Ectropion**: edge of eyelid everts secondary to advanced age, trauma, infection, facial nerve palsy
- **Tx**: surgical repair if the condition causes trauma, excessive tearing, exposure keratitis, cosmetic distress

**Epiglottitis**
- supraglottic inflammation / obstruction of airway from H.flu \(\rightarrow\) medical emergency!!!! Usually occurs in unvaccinated (2,4,6mo /12-15mo) or underserved areas
- **s/sx**: stridor, restlessness, cough, dyspnea, fever, drooling \(\rightarrow\) dysphagia, drooling, respiratory distress (tripod / “sniffing dog” posture – neck extended)
- **dx**: secure airway!!!! Culture for h.flu, thumbprint sign on lateral neck film from swelling
- **tx**: intubate if necessary + supportive care + cephalosporins

**Epistaxis**
- **Features**: MC occurs anteirior from kiesselbach plexus / usually anterior, posterior bleed = less frequent (woodruff plexus)
- **r/f**: nasal trauma, dryness, HTN, nasal cocaine, alcohol
- **tx**:
  - anterior: direct pressure; sitting position while leaning forward for 15 minutes; topical decongestant and topical anesthetics can be used as vasoconstrictor or topical cocaine; cauterize if visualize bleeding source or anterior packing
  - posterior: high risk complications – specialist eval and inpatient monitoring; nasal arterial supply ligation via surgery in some cases

**Foreign Body**
- **Ocular**: metallic foreign bodies \(\rightarrow\) rust ring – if can’t remove easily refer to ophtalmologist
  - **Dx**: slit lamp / XR or CT
  - **Tx**: irrigation after instillation of topical anesthetic \(\rightarrow\) attempt to visualize and extract
    - Intraocular: surgical removal by opthalmologist with systemic / topical antimicrobials (esp for bacillus cereus if injury involved soil / vegetation)
- **Ear**: dx = visualization; tx = removal with either warm irrigation with syringe or alligator forceps
  - **Insects**: drown with mineral oil or viscous lidocaine before trying to remove
- **Nose**: s/sx: persistent foul smelling unilateral nasal discharge; dx = clinical; tx = oxymetazoline drops to shrink mucous membrane then remove
  - Refer to otolaryngology with non-visualized posterior FBs, impacted FBs, or unsuccessful initial attempts at FB removal

- **Glaucoma**
  - increased IOP with optic nerve damage; impediment to the flow of aqueous humor through trabecular meshwork; canal of schlemm with increased pressure in anterior chamber
  - open-angle = more common - >40yo, African americans + family history = more common
  - **angle-closure glaucoma**: OPHTHALMIC EMERGENCY – COMPLETE CLOSURE OF ANGLE
    - sx: painful eye / loss of vision, nausea, vomiting, diaphoresis
    - p/e: circumlimbal injection, steamy cornea, fixed mid-dilated pupil, decreased visual acuity, tearing; anterior chamber narrowed; IOP acutely elevated
    - tx: immediately refer to ophthalmology – start IV carbonic anhydrase inhibitor, topical b-blocker, osmotic diuresis; mydriatics should NOT BE ADMINISTERED; lasar / surgical iridotomy
  - open angle: chronic, asymptomatic, potentially blinding disease
    - sx: increased IOP, defects in peripheral visual field, increased cupo to disc ratio
    - sx: asymptomatic until late in disease, loss of peripheral vision = main symptoms
    - dx: can have elevated IOP without optic disc damage or optic nerve damage without increased IOP
    - tx: pt. should be referred to ophthalmologist for close monitoring
      - topical and systemic meds to decrease. IOP by decreasing aqueous production – BB, carbonic anhydrase inhibitors – or increasing outflow – prostaglandin like meds, cholinergic, epinephirines, alpha agonists

- **Hyphema**
  - trauma causes blood in anterior chamber of eye and may cover iris; usually from blunt / penetrating trauma – ensure no other type of injury (skull fracture, orbital fracture)
  - dx: orbital CT if indicated + ophthalmology consult
  - tx: usually blood is reabsorbed over days / weeks → rest with HOB at 30 degrees at all times
    - may use beta-adrenergic blockers or carbonic anhydrase inhibitors; NSAIDs contraindicated (may increase bleeding); surgery if high pressure/ persistent bleeding

- **Labyrinthitis**
  - features: acute severe vertigo, hearing loss (several days to a week), tinnitus; vertigo progressively improves, hearing loss may not resolve; usually preceded by viral respiratory illness
  - dx: clinical – absence of neurological deficits
  - tx:
    - abx indicated with fever or signs of bacterial infection
    - vestibular suppressants – meclizine, (lorazepam, clonazepam) are helpful during initial acute symptoms

- **Macular Degeneration**
  - painless loss of central vision
  - wet = advanced or of dry age-related macular degeneration; new blood vessels growing beneat retina (neovascularization) leak blood and fluid, damaging retinal cells; small hemorrhages → rapid and severe vision loss
  - dx: dilated fundusocpic findings: hemorrhage or fluid in subretina; macular graish-green discoloration; amlser grid = disrotion on grid
  - tx: VEGF inhibitors, photodynamic therapy, zinc / antioxidant vitamins

- **Mastoiditis**
  - suppurative infection of mastoid air cell → usually complication from acute otitis media; usually from s. pneumo, h.fu, m. catarrhalis, s. aureus, s. pyogenes
  - s/sx: fever, otalgia, pain, erythema posterior to ear and forward displacement of external ear
  - dx: clinical; CT scan temporal bone with contrast for complicated / toxic appearing
  - tx: simple = oral abx; consider IV abx / ENT referral in more serious cases or pt with unreliable follow up ; consider drainage

- **Optic Neuritis**
  - acute inflammation / demyelination of optic nerve → acute monocular vision loss / blurriness and pain
    - MS = MC cause and initial presenting symptoms
    - Can also be from ethambutol
• s/sx: acute monocular vision loss and pain in affected eye
• dx: fundoscopy = inflammation of optic disc; confirmed by MRI
• tx: methylprednisone IV with referral for neuro exam

**Orbital Cellulitis**

• infection of orbital muscles and fat behind the eye (peri orbital = infection only of skin); often associated with untreated sinusitis; more common in children age 7-12
• s/sx: decreased EOM, pain without movement of eye and proptosis; decreased vision = rare
• dx: focused assessment on extraocular muscles; CT with contrast = test of choice, CBC and blood cultures in some settings
• tx: hospitalization and IV broad spectrum abx (vanco)

**Otitis Externa**

• aka “swimmer’s ear” – water exposure, trauma, exfoliative skin conditions – pseudomonas, proteus, fungi
• s/s: ear pain, redness / swelling of ear canal, purulent exudate
• tx: abx otic drops (aminoglycoside or fluoroquinolone +/- corticosteroids) + avoid moisture
  o diabetic / immunocompromised: malignany otis externa → nectrotizing infection → hospitalization with IV abx (caused by aspergillus)

**Papilledema**

• d/t: increase in intracranial pressure from malignany hypertension, hemorrhagic strokes, acute subdural hematoma, pseudotumor cerebri
• p/e: swollen disc, blurred margins, oliteration of vessels
• s/s: may be asymptomatic or complain of transient visual alteration that last for seconds
• tx: treat underlying cause

**Peritonsillar abscess**

• results from penetration of infection through tonsillar capsule and involvement of neighboring tissue
• sx: hot potato voice, sore throat, pain with swallowing, trismus, deviation of soft palate / uvula
• tx: aspiration, I&D, abx; tonsillectomy in 1-3% of patients
  o Amox, clindamycin IV OR in less severe cases oral for 7-10 days

**Pharyngitis / Tonsillitis**

• Sore throat; viral > bacterial
  o sx:
    o GABHS = fever, tender anterior cervical adenopathy, no cough, pharyngotonsillar exudate
    o Presence of all four (centor) = likely GABHS; ¾, rapid strep test >90% positive; only one – GABHS not likely
    o coryza, hoarseness, cough = not suggestive of strep
  o dx: rapid strep has 90-99% sensitivity; if negative and still suspected, throat culture is confirmatory
  o tx: IM penicillin if doubt pt. compliance; oral penicillin / cefuroxime; erythromycin with allergy
    o inadequate tx → scarlet fever, glomerulonephritis, acute rheumatic fever, abscess formation

**Retinal Detachment**

• general: separation of retina from pigmented epithelial layer; commonly begins at superior temporal retinal area; tear can happen spontaneously or be secondary to trauma, extreme myopia, or inflammatory changes in the vitreous, retina, or choroid
• features: acute onset painless blurred or blackened vision that occurs over several minutes to hours and progresses to complete or partial monocular blindness; curtain drawn over th eye from top to bottom; floaters or flashing lights at initiation of symptoms; IOP is normal or reduced; RAPD will be present
• tx: emergency consult with ophthalmologist re: laser surgery or crysurgery
  o remain supine; with head turned to the side of the retinal detachment; 80% recover without recurrence

**Central Retinal Artery Occlusion**

• OPHTHALMIC EMERGENCY – poor prognosis; caused by: emboli, thrombotic phenomenon, vasculitides
  o Differentiate from giant cell arteritis (fever, he/a, scalp tenderness, jaw claudication, visual loss)
• s/s: sudden, painless, marked unilateral vision loss
• exam: fundoscopy sws pallor of retina, arteriolar narrowing, separation of arterial flow, perifoveal atrophy (cherry red spot)
  o ganglionic death → optic atrophy and a pale retina = blindness
Central Retinal Vein Occlusion
- usually occurs secondary to thrombotic event
- r/f: diabetes, hyperlipidemia, glaucoma, hyperviscosity states (polycythemia, leukemia)
- s/s: sudden, unilateral painless blurred vision or complete visual loss
- exam: optic disc swelling; blood and thunder retina (dilated veins, hemorrhages, edema, exudates)
- vision resolved with time (partially); workup for thrombosis
- tx: neovascularization treated with intravitreal injection of VEGF inhibitors

External Ear Trauma
- hematoma, laceration, avulsion, fracture
- subperichondrial hematoma (cauliflower ear)
  - blunt trauma to pinna may → subperichondrial hematoma and accumulation of blood between perichondrium and cartilage; can interrupt blood supply to cartilage and render all or part of pinna shapeless, reddish purple mass → avascular necrosis of cartilage → cauliflower ear
- laceration: can be partial or all the way through ear
- avulsion: ear may be torn away from head
- fracture: forceful blow to jaw may fracture bones around ear canal and distort canal’s shape, narrowing it
- dx of auricular hematoma made by characteristic clinical appearance in pt with history of blunt trauma to auricle
  - temporal bone CT without contrast for pt with history of blunt trauma to auricle
  - hearing tests
- tx:
  - cauliflower: refer immediately for I&D by ENT specialist – can result in permanent damage; prone to infection /abscess formation → oral antibiotic effect against staph (kephlex x5days)
  - laceration: meticulous debridement of devitalized tissue and prophylactic abx; wounds <12hrs can be closed but older wounds should heal secondarily with cosmetic deformities treated later
    - laceration of pinna = skin margins sutured whenever possible
    - cartilage penetration: externally splinted with benzoin-impregnated cotton with protective dressing; oral abx given
    - human bite: high risk infection; potentially severe complications
  - avulsion: repaired by otolaryngologist, facial plastic surgeon, plastic surgeon
  - fracture: surgical correction of shape

Vertigo
- Sensation of movement in absence of movement
  - Peripheral = inner ear → labyrinthitis, BPPV, meniere, vestibular neuritis, head injury → sudden onset, n/v, tinnitus, hearing loss, nystagmus (horizontal)
  - Central: brainstem vascular disease, AVM, tumor, MS, veterbrobasilar migraine → mor gradual onset / vertical nystagmus, no auditory symptoms
    - Vertigo + syncope = vertebrovasilar insufficiency
- BPPV: positional, no hearing loss, tinnitus, ataxia, dx: dix-hallpike; tx: epley maneuvers, meclizine
- Vestibular neuritis: not positional, no hearing loss / tinnitus, tx: meclizine
- Labyrinthitis: acute, self-resolving episode; vertigo, hearing loss tinnitus, tx: meclizine + steroids
- Meniere’s disease: chronic, relapsing, remitting; vertigo + hearing loss + tinnitus; tx: diuretics, salt restriction, CN VIII ablation for severe cases
- Perilymph fistula: history of trauma; vertigo from trauma; tx: fix damage surgically
- Acoustic neuroma: ataxia, neurofibromatosis type II, MRI findings: vertigo, hearing loss, tinnitus and ataxia; tx = surgery

Vision Loss
Approach: compete eye exam (visual acuity, visual fields, external inspection, periorbital soft tissue / bone, EOM, pupils, slit lamp, fundoscopy, full neuro exam

Painful: trauma, glaucoma, uveitis, corneal ulcer, temporal arteritis, optic neuritis

Painless: amaurosis fugax/TIA, central retinal artery/vein occlusion, vitreous hemorrhage, retinal detachment, lens dislocation, hypertensive encephalopathy, pituitary tumors, macular disorders, toxic ingestions

UROLOGY / RENAL

Acid/base disorders

Acid base disturbances

Average values "24/7 40/40"

- 24 (HCO3, base) / 7.40 (pH) / 40 (CO2, acid)

Three Step Approach to Acid Base Disorders

- Look at your PH (7.35-7.45 is normal)
  - < 7.35 = acidosis
  - > 7.45 = alkalosis
- Next look at your PCO2 is it normal low or high (35-45 normal)
  - ↑ CO2 and ↓ PH = respiratory acidosis
  - ↓ CO2 and ↑ PH = respiratory alkalosis
- If you don’t see a change in the CO2 in relation to the PH then take a look at the HCO3
- Finally, look at the HCO3 is it normal low or high (20-26 normal)
  - ↓ HCO3 and ↓ PH = metabolic acidosis
  - ↑ HCO3 and ↑ PH = metabolic alkalosis

Table comparing types of acid base disorders:

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Acidosis</td>
<td>PH 7.30, high PCO2 60, Normal Bicarb 22</td>
<td>Lungs fail to excrete CO2 (Breathing too slow (holding onto CO2), pulmonary disease, neuromuscular disease, drug-induced hypoventilation - opiates, barbiturates)</td>
</tr>
<tr>
<td>Respiratory Alkalosis</td>
<td>PH 7.52, low PCO2 25, Normal Bicarb 22</td>
<td>Excessive elimination of CO2 (Breathing too fast (blowing of CO2), pulmonary embolism, fever, hyperthyroid, anxiety, salicylate intoxication, septicemia ) Alkalosis can result in hypokalemia and an intracellular acidosis from the shift of potassium from the serum into the intracellular space. In acidic states, potassium is exchanged from the intracellular space for hydrogen ions causing an increase in serum potassium. In alkalotic states, the opposite occurs as potassium leaves the extracellular space in exchange for hydrogen ions. The same occurs with ionized calcium, causing decreased levels in the serum in alkalotic states. Hypokalemia and hypocalcemia can cause paresthesias, carpopedal spasm, and tetany.</td>
</tr>
<tr>
<td>Metabolic Acidosis</td>
<td>PH 7.30, Normal PCO2 40, Low Bicarb 16</td>
<td>Need to calculate anion gap: Anion Gap = Na – (Cl + HCO3-) = 10-16 Increase ion gap (&gt;16): Addition of hydrogen ions (lactic acidosis (think metformin), diabetic ketoacidosis, aspirin overdose) MUDPILES: Methanol, Uremia, Diabetic Ketoacidosis, Paraldehyde, Infection</td>
</tr>
<tr>
<td>Metabolic Alkalosis</td>
<td>PH 7.52, Normal PCO2 40, High Bicarb</td>
<td>Loss of hydrogen (vomiting), bulimia, overdose of antacids, addition of bicarbonate (hyperalimentation therapy)</td>
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</tbody>
</table>

### Acute renal failure

- Rapid but usually reversible reduction in renal excretory function sufficient to cause azotemia
- **Causes:** ATN, interstitial nephritis, glomerulonephritis
  - **Azotemia:** retention of nitrogenous waste
  - **Uremia:** symptomatic azotemia, with n/v/lethargy
  - **Acute:** sudden, hours/days and is reversible
  - **Chronic:** progressive, irreversible
  - **Oliguria:** urine output <400ml/day
- **Dx:** CBC, BUN, Cr, electrolytes (Ca, phosphate), UA, postvoid residual bladder volume
- **Tx:** depends on cause
- **3 mechanisms:**
  - **Prerenal:** perfusion (50%) – kidney working fine but things that perfuse it aren’t
    - **Ex:** volume loss, heart failure, loss of peripheral vascular resistance (sepsis / anesthesia)
    - Pt. weak, decreased urine output, dizziness, sunken eyes, tachy, orthostatic
    - Fractional excretion of sodium is normal
    - Urine specific gravity >1.030, Bun/Cr >20, urine osm >500
    - Tx: fluids, cardiac support, treat shock
  - **Renal:** glomerular, tubular, interstitial
    - **RC case = glomerulonephritis**
    - **WBC cast = pyelonephritis**
    - **Muddy casts = ATN**
    - **Hyaline casts = normal**
    - **Waxy = chronic renal disease**
    - Urine specific gravity <1.010, BUN/Cr <10, urine osm <300
  - **Post-renal:** obstructive – most likely prostate
    - Usually low / no urine output
    - Place foley cath to find source of obstruction; renal US to look for tumor / hydronephrosis
- **ATN:** from kidney ischemia / toxins; UA shows muddy brown casts
  - **Damaged tubules means can’t concentrate urine = high FENa**
  - **Prerenal failure is MC cause**
  - **Drugs:** amp B, cisplatin, aminoglycosides, NSAIDs, ACE
  - **Ischemic:** dehydration, shock, sepsis
  - **Fraction excretion of sodium >2% + muddy, pigmented granular casts + high urine osm**
- **Interstitial nephritis**
  - **Immune-mediated response**
    - **Drugs:** PCN, sulfa, NMSAIDs, phenytoin
    - **US: WBC casts + eos + hematuria**
    - **Dx:** renal biopsy, discontinue offending drug, steroids, dialysis if needed, usually self-limiting
- **Glomerulonephritis:** IGA nephropathy, postinfectious, membranoproliferative
  - **UA:** oliguria, hematuria, RBC casts
  - **Causes:** group A strep, IGA, anti-GBM, aNCA
  - **Post-strep glomerulonephritis = MC infectious cause of acute glomerulonephritis:** either from strep pharyngitis or strep skin infection (impetigo) → hematuria, HTN, periorbital edema
- **Dx:** proteinuria + RBC in urine; usually caused by group A beta-hemolytic strep

**Benign Prostatic Hyperplasia**
- proliferation of fibrostromal tissue of prostate → urethral compression → obstruction of urinary outlet
- features: decreased force of urinary stream, hesitancy and straining, postvoid dribbling, incomplete emptying, frequency, nocturia, urgency, recurrent UTIs
- exam: DRE = enlarged, RUBBERY prostate
- dx: PSA slightly elevated
- tx: watchful waiting / frequent monitoring
  - meds: alpha antagonist (prazosin) / phosphodiesterase-5 inhibitors (tadalafil, vardenafil), anticholinergic agents
  - behavioral: limit fluids before bed
  - procedures: balloon dilation, microwave irradiation, stent placement
  - surgery: transurethral resection of prostate or transurethral incision of prostate

**Cystitis**
- infection of normal bladder MC caused by bacteria (E.coli) = 80-85% of cases; infection usually ascends from urethra
- features: frequency, urgency, dysuria, suprapubic tenderness
  - often appear following sexual intercourse in women
- exam usually unremarkable – sometimes suprapubic tenderness
- dx: UA = pyuria, bacteriuria, +/- hematuria
  - urine culture positive for offending organism
  - imaging only warranted in pyelo, recurrent infection, anatomic abnormalities
- tx:
  - uncomplicated: short-term abx: Bactrim or nitrofurantoin 3-5 days, FQs reserved only for people with no alternative options
    - resistant to E.coli = use bactrim
    - rare in men
  - increase fluids, prevention (proper hygiene, void after intercourse)
  - hot sitz baths / urinary analgesics (phenazopyridine / Azo) may provide sx relief (turns pee orange)

**Dysuria**
- cystitis: dysuria, urgency, frequency, hematuria with no fever, chills, flank pain (nitrite / leuk esterase on urine); urine cx = gold
- pyelonephritis: dysuria + fever + flank pain – bacteria + white casts on UA – treat with FQ
- recurrent UTI: 2 uncomplicated in 6 mo / 3+ complicated in 1 year; relapse = UTI w/in 2 weeks tx; reinfection: different bacteria
- urethritis: inflammation of urethra caused by infectious / noninfectious causes (trauma / foreign body); usually G/C, dx = NAAT
- epididymitis: dysuria, unilateral scrotal pain; G/C or e.coli depending on age; treat with FQ / doxy + ceftriaxone
- prostatitis: fever, chills, low back pain, urinary frequency, urgency, dysuria; G/C or E.coli (age) – don’t massage prostate!

**Epididymitis**
- acquired by retrograde spread of organisms through vas deferens
  - <35 = chlamydia and gonocci = MC organism
  - >35 = E.coli
- Features: heaviness / dull, aching discomfort in scrotum that can radiate up ipsilateral flank
  - Swollen epididymis / tender; fever / chills
  - Positive prehn sign (pain relief with elevation)
- Dx: UA = pyuria and bacteriuria; cultures are positive for suspected organisms
- Tx:
  - <35: ceftriaxone 250mgIM + doxy 100mg bid x10 days
  - >35: cipro 500 mg bid 10-14 days
  - Supportive care: bed rest, scrotal elevation, analgesics

**Fluid and Electrolyte Disorders**
- **Hyponatremia / hypervolemia** → water excess = increased free water = decreased serum sodium = hyponatremia
  - Na <135
  - Causes: peripheral / presacral edema, pulmonary edema, JVD, HTN, decreased hematocrit, decreased protein, decreased BUN:Cr
  - s/sx: muscle cramps / seizures
- hypervolemic: CHF, nephrotic syndrome, renal failure, cirrhosis
- euvoletic: SIADH, steroids, hypothyroid
  - tx:
    - asymptomatic: free water restriction
    - moderate: IV saline / loop diuretics
    - severe: hypertonic saline
    - *** correct slowly to avoid osmotic demyelination syndrome

- **Hypernatremia / hypovolemia** ➔ disorders of water deficiency = decreased free water = increased serum Na = hypernatremia
  - Na >145
  - Causes: diarrhea, burns, diuretics, hyperglycemia, diabetes insipidus, deficit of thirst
  - s/sx: poor skin turgor, dry mucous membranes, flat neck veins, hypotension, BUN/Cr >20:1
  - decrease circulating volume = decrease flow to kidneys = more bound urea in blood = increased BUN
  - tx: IV D5W (**rapid overcorrection ➔ cerebral edema / pontine herniated**)
  - DI: low urine sodium (high serum) + polyuria (urine osm <250)
  - Neurogenic = central ➔ deficient secretion of vasopressin (ADH) from posterior pituitary
  - Nephrogenic: kidneys not responsive to vasopressin

- **Hyperkalemia:** K >5-5.5; peaked T waves, prolonged QRS, muscle fatigue
  - tx: insulin, sodium bicarb and glucose (drive K back into cell); calcium gluconate (antagonize effect of K on heart)

- **Hypokalemia:** K <3.5; muscle cramps, constipation, flat / inverted T waves, u waves
  - tx: potassium repletion (DON’T USE DEXTROSE ➔ stimulate insulin and shift potassium back into crrl); replace magnesium

- **Hypocalcemia:** Ca <8.4; QT prolongation, Trousseau / Chvostek sign; decreased Ca decreased PTH, increased phosphate
  - tx: IV calcium gluconate / calcium chloride

- **Hypercalcemia:** Ca >10.5, “stones, bones, abdominal groans, psychiatric moans”; shortened QT; increased PTH, increased Ca, decreased phosphorus; think malignancy / hyperparathyroidism
  - tx: IV normal saline / furosemide

- **Hypomagnesemia:** serum Mg <1.8; muscle weakness, hyperreflexia, prolonged QT, PR wide QRS
  - tx: IV mag sulfate (acute) or oral mag (chronic)

- **Hypomagnesemia:** Mag >2.6, muscle weakness, prolonged QT, PR, wide QRS
  - tx: isotonic saline, loop diuretic

- **Hyperphosphatemia:** phosphate >4.5; chronic kidney dz, usually asymptomatic
  - Tx: calcium carbonate, restrict potassium

- **Hypophosphatemia:** phosphate <2.5, weakness, muscle / bone pain, osteomalacia, rickets
  - Tx: IV phosphate

**Glomerulonephritis**

- Damage of renal glomeruli by deposition of inflammatory proteins in glomerular membranes as result of immunologic response
- 60% in kids; excellent prognosis in kids and worse in adults esp with preexisting renal disease
- Cause: hematuria, Henoch-schonlein purpura, postinfectious GN, IgA nephropathy, hereditary nephritis and others
- Features: hematuria, urine = tea / cola colored, oliguria / anuria, edema of ace and eyes in the morning and of the feet/ ankles at night; HTN is common
- Dx: antistreptolysin-O titer is increased in 60-80% of cases; common cause of GN is streptococcal infection
  - UA reveals hematuria (>3RBCs/high power field) and mishapen RBCs, RBC casts, proteinuria (1-2g/24 hours)
  - Serum complement often decreased
  - Renal biopsy may be done to determine exact diagnosis or severity
- Tx: steroids and immunosuppressive drugs to control inflammatory response; dietary management (salt and fluid intake decreased); dialysis if symptomatic azotemia present
  - Medical: ACE-I = renoprotective (reduce urinary protein loss) in chronic GN
  - Use meds as appropriate for hyperkalemia, pulmonary edema, peripheral edema, acidosis and HTN
- **hematuria, RBC casts, proteinuria, HTN, decreased GFR**

**Hematuria**

- key history: amount, duration, presence of clots; associated sx (fevers, weight loss, night sweats, renal colic, dysuria, irritative voiding sx), timing along the stream where blood appears( initial vs terminal vs throughout); meds (blood thinners, NSAIDs); hx vigorous / prolonged exercise, trauma, smoking, stones, cancer, sex, easy bleeding / bruising
- key physical exam: vital signs, lymph nodes (pelvic); abd exam, genitourinary /rectal exam; extremities
• ddx: bladder CA, renal cell carcinoma, nephrolithiasis, prostate CA, acute glomerulonephritis, coagulation disorder, polycystic kidney disease, nephrolithiasis, UTI, acute glomerulonephritis, pyelonephritis
• dx: cystoscopy, US renal/bladder, CT abdomen/pelvis, UA, prostate biopsy, CBC, CMP, PT/PTT, PSA

Hernias

• protrusion of organ or structure through wall that normally contains it; various types can entrap intestines and cause obstruction
• types:
  o umbilical: congenital and appears at birth; many resolve on own; sometimes need surgery
  o diaphragmatic / hiatal: protrusion of stomach through diaphragm via esophageal hiatus → can cause GERD – tx with acid reduction possibly need surgery
  o incisional hernias: associated with vertical incisions, esp with obesity
  o inguinal:
    ▪ indirect (MC) → passage of intestine through external inguinal ring at inguinal canal, may pass into scrotum
    ▪ direct – passage of intestine through external inguinal ring at Hesselback triangle – rarely enters scrotum
    ▪ femoral – least common – passage through femoral ring
  o ventral: occurs when there is weakening in the anterior abdominal wall and may be either incisional or umbilical
• tx = surgical

Incontinence

• TYPES:
  o Urge incontinence (detrusor overactivity): MC elderly / nursing home
    ▪ s/sx: sudden urge to urinate, loss of large volumes urine with small postvoid residual, nocturnal wetting
    ▪ dx: urodynamic study
    ▪ tx: 1. bladder training exercises 2. Anticholinergics / TCAs
  o Stress incontinence (weak pelvic floor) – multiple vaginal deliveries
    ▪ Etiology: weakness of pelvic diaphragm → loss of bladder support → proximal urethra descends below pelvic floor → increase intra abdominal pressure transmitted to bladder
    ▪ s/sx: involuntary urine loss in spurts during activities that increase abdominal pressure; small post void volume
    ▪ tx: Kegel exercises, vaginal estrogens, pessary, surgery (mid-urethral sling)
  o Overflow incontinence (impaired detrusor contractility): can’t empty bladder – high postvoid volume – diabetic / neurologic disorders
    ▪ Etiology: inadequate bladder contraction or bladder outlet obstruction → urinary retention and subsequent overdistention of bladder
    ▪ Causes: neurogenic bladder (diabetic, lower motor neuron lesions), medications (anticholinergics, alpha agonists, epidural/spinal anesthetics), obstruction to urine flow (BPH, prostate cancer, uretral stricture, severe constipation with fecal impaction)
    ▪ Nocturnal wetting: frequent loss of small amount of urine + large postvoid residual
    ▪ Tx: intermittent self-catheterization = best, conlinergic agent to increase bladder contraction and alpha blocker to decrease sphincter resistance
  o Functional incontinence: occurs in pt who have normal voiding systems but difficulty reaching toile 2/2 physical / mental disability
    ▪ Increased urinary volume and inability to timely urinate
    ▪ Tx: scheduled voiding times
  o Mixed incontinence: combo of stress / urge = MC
    ▪ Tx: lifestyle modificaitons and pelvic floor exercises = first line
  o Nocturnal enuresis: involuntary urination in sleep without urologic or neurologic causes after age 5, wat which time bladder control would normally be expected
• Dx: UA to rule out UTI, postvoid residual volume, urodynamic studies to identify bladder contractions, ultrasonography / cystoscopy

Nephrolithiasis

• renal calculi – occur throughout urinary tract and are common causes of pain, infection and obstruction
• stones: caused by increased saturation of urine with stone-forming salts (calcium, oxalate, and other solutes) or possible lack of inhibitors (citrate) in urine to prevent crystal formation
• calcium stones = most common;
  o calcium > uric acid>cystine>struvite
• features: asx until inflammation / complete or partial ureteral obstruction develops
  o unilateral back pain, renal colic that waxes and wanes
• sx: hematuria, dysuria, urinary frequency, fever, chills, nausea, vomiting
• signs: diaphoresis, tachycardia, tachypnea, restlessness, CVA tenderness, abdominal distention
• dx: normal serum chemistries (possible leukocytosis)
  o UA = microscopic / gross hematuria – leukocytes / crystals
  o CT without contrast can detect stones as small as 1mm
  o Plain film can identify radiopaque stones
  o Renal U/s: can identify stones in kidney, proximal ureter, or UVJ
• Tx: size indicates management:
  o <5mm: likely to pass on own; lots of fluid; strain urine; adequate analgesics
  o 5-10mm: not likely to pass spontaneously; increased fluid and analgesics; elective lithotripsy / ureteroscopy with stone basket extraction
    ▪ Refer to urology with a 9 mm mid-ureteral stone
  o >10mm: not likely to pass spontaneously and increased likelihood complications
    ▪ Treated as inpatient if can maintain adequate oral intake; vigorous hydration; ureteral stent / percutaneous nephrostomy = gold standard – use if renal function jeopardized
      ▪ Ample analgesia (toridol / morphine / meperidine)
      ▪ Extracorporeal shock wave lithotripsy (ESWL)
• commonly caused by ascending bacterial infection from urinary tract; occurs in 25% of postpubertal males with mumps
• features: testicular swelling / tenderness, usually unilateral; fever / tachycardia
• dx: UA reveals pyuria and bacteriuria with bacterial infection
• tx: if mumps is cause, treat mumps (+ ice / analgesia)
  o if bacteria is cause, treat like epididymitis (ceftriaxone 250mgIM + doxy 100mg bid x10 days if <35 // cipro 500 mg bid 10-14 days if >35)
• ascending infection of gram-negative rods into prostatic ducts
• features:
  o acute: sudden onset high fever, chills, low back / perineal pain
  o chronic: variable – asymptomatic → acute symptomatology
  o all forms present with irritative bladder sx (frequency, urgency, dysuria) and some obstruction
  o prostate = swollen / tender
  o avoid vigorous prostate exam in case of septicemia
• dx: UA = pyuria; possible hematuria / bacteriuria
  o prostatic fluid = leukocytosis, culture typically positive for E.coli in acute infections
    ▪ chronic usually has enterococcus
• tx:
  o hospitalization in acute- may need parenteral fluroquinolones
  o uncomplicated: cipro 500mg bid or levo 500mg qd 2-6 eweks or Bactrim 6 weeks – culture urine 1 week after conclusion of therapy
  o if fever doesn’t resolve in 36 hours, suspect abscess and consult urology
  o in chronic, FQ for 1-3 weeks is more effective than Bactrim for 1-3 months
  o abx not effective for nonbacterial
  o NSAIDs = effective for analgesia; alpha 1 blocker may be helpful if lower UTI sx present
  o Chronic, recurrent, resistant prostatitis with / without prostatic calculi may require transurethral resection of prostate (TURP) for resolution
• Involves kidney parenchyma and renal pelvis; more common in diabetics and elderly women
  o E.coli = MC / gram negative most common
  o Chronic is the result of progressive inflammation of the renal interstitium caused by bacterial infection – occurs in pt. with anatomic urinary tract abnormalities such as vesicoureteral reflux
• Features: fever, flank pain, shaking chills, irritative voiding symptoms, n/v/d
  o Young children: fever + abdominal discomfort
  o Fever, tachy, pronounced CVA tenderness
• Dx:
CBC shows leukocytosis and left shift
UA shows pyuria, bacteriuria, varying degrees of hematuria, WBC casts
Complicated: US shows hydronephrosis secondary to obstruction

Tx:
Outpatient: FQ / Bactrim for 1-2 weeks (longer if immunocompromised)
Inpatient: IV FQ, 3rd/4th gen cephalosporins, extended spectrum penicillins, gentamycin
Failure to respond → U/S / imagine
f/u urine cultures not mandatory following tx in uncomplicated cases

Suprapubic / flank pain

ddx flank pain: urolithiasis / nephrolithiasis, renal cell carcinoma, pyelonephritis

ddx: suprapubic: acute / chronic urinary retention, UTI, prostatitis,

Testicular Torsion

twisting of spermatic cord → compromised blood flow + ischemia (SURGICAL EMERGENCY!)
s/sx: often after vigorous activity, minor trauma; usually postpubertal boys (age 10-20), asymmetric high riding testicle “bell clapper deformity”, negative phren’s sign, loss of cremasteric reflex, more common in pt with hx of cryptorchidism
dx: testicular doppler = best initial test; radionuclide scan demonstrates decreased uptake in affected testes = gold standard
tx: surgical emergency → 6 hour time frame for repair with best outcomes
  followed by elective surgery on contralateral testes which is also at risk for torsion

Urethritis
infection of urethra with bacteria; STI (chlamydia, gonorrhoeae, trichomonas, HSV = MC causes)
s/sx: dysuria and urethral discharge (purulent, whitish, mucoid)
dx: UA / urine culture
tx: sexually active pt with sx treated presumptively for STDs (ceftriaxone 250mg + azithromycin 1g po once or doxy 100mg po bid x7days)

DERMATOLOGY
Bullous Pemphigoid
MC autoimmune blistering disease; rare, chronic acquired autoimmune blistering skin disorder; IgG produced against basement membrane, increases in likelihood with age (usually 60-80yo)
s/sx: pruritic, tense, symmetric, localized widespread bullae / uricarial plaques; 80-90% appear in lower trunk, axilla, groin)
dx: skin biopsy with direct immunofluorescence exam → shows deposition of IgG and C3 basement membrane

tx: steroids

Burns

rule of 9s: head 9%, each arm 9%, abdomen 9&, chest 9%, each anterior leg 9%, each posterior leg 9%, upper back 9%, lower back 9%, genitals 1%
palmar method: pt palm = 1%
degree involvement:
  1st (sunburn): erythema of involved tissue, skin blanches with pressure, skin may be tender
  2nd (partial thickness): skin red, blistered, very tender
  3rd (full thickness): burned skin tough and leathery, non-tender
  4th: into bone and skin
Minor: <10 TBSA adults, <5 TBSA young/old, <2% full thickness, must not involve face, hands, perineum, feet, cross major joints or be circumferential
Major: >25% TBSA adults, >20% TBSA young / old, >10% full thickness burn, burns involving face, hands, perineum, feet, cross major joints / circumferential
Tx: monitor ABCs, fluid repletion, topical antibiotic
  Cleans with mild soap and water, don’t apply ice directly; irrigate chemical burns with running water x20 min, topical antibiotic cream to superficial burns, fingers and toes wrapped individually to prevent maceration and gauze placed between them
  Children >10% TBSA and adults >15% need fluid resuscitation → LR IVx24 hrs (1/2 in first 8 hrs; ½ in remaining 16)

Cellulitis
• Acute bacterial skin infection of dermis / subcutaneous tissue
  • s/sx: pain, erythema, warmth, swelling; flat margins that aren’t well demarcated; f/c/LAD, +/- lymphangitis, myalgias, hemorrhage, necrosis
  • adults: s. aureus / group A strep; kid: h. flu / strep pneumo
  • dx: culture taken of all purulent wounds and follow up in 48 hours
  • tx: mild with cephalaxin or dicloxacillin
    o MRSA with Bactrim, clindamycin, doxycycline
    o Cat bine with augmentin or doxy if PCN allergic
    o puncture wound with cipro (cover pseudomonas)

  **Dermatitis**

  • acute eczema: rapidly evolving red rash → may be blistered / swollen
  • chronic (dermatitis): longstanding irritable area; often darker than surrounding skin, thickened (lichenified) and scratched
  • contact:
    o allergic: nicel, poison ivy – type 4 hypersensitivity
    o irritant: cleaners, solvents, detergents, urine, feces
    o dx: clinical - well-demarcated erythema, erosions, vesicles
    o tx: avoid offending agent; burrow’s solution (aluminum acetate), topical steroids, zinc oxide (diaper rash)
  • atopic: pruritis, eczematus lesions, xerosis (dry skin), lichenification; MC on flexor creases – IgE type 1 hypersensitivity; infant = face / scalp; adolescent = flexor surfaces
    o tx: topical steroid / emollients; may require phototherapy for severe
  • nummular: coin-shaped
    o high or ultra high potency topical steroid, phototherapy, systemic steroid, methotrexate, cyclosporine
  • seborrheic (cradle cap): erythematous, yellowing greasy scales, crusted lesions
    o tx: ketoconazole shampoo for scalp, low potency steroid / topical antifungal for face
  • perioral: young women, papulopustular, plaques, scales around mouth
    o topical metronidazole / erythromycin; topical steroid contraindicated as they may flare lesions

  **Drug Eruptions**

  • adverse cutaneous reaction in response to administration of drug; usually within the past 6 weeks
  • dx: clinical – consider bacterial, viral, underlying skin disease like cutaneous lymphoma
  • tx: monitor for signs of impending cardiovascular collapse (anaphylactic, DRESS, SJS/TEN, extensive bullous reactions, generalized erythroderma)
    o don’t rechallenge with drugs causing urticaria, bullae, angioedema, DRESS , anaphylaxis
    o withdraw offending agent
    o anaphylaxis or widespread urticaria = epinephrine 0.2-0.5mg – prednisone to prevent recurrence
    o anti-histamines

  **Erysipelas**

  • acute, well-demarcated raised superficial skin infection with lymphatic involvement almost always caused by Group A strep (strept pyogenes); fever and chills; must r/o MRSA
  • dx: culture and sensitivity
  • tx: mild = penicillin G (erythromycin / clindamycin for PCN allergy); moderate : Bactrim and penicillin / cephalaxins; severe IMP or MER or ERTA IV and linezolid BID or vanco IV / dapto IV

  **Herpes Zoster**

  • varicella transmitted by respiratory droplets and has 10-20 day incubation period
  • Varicella (chicken pox): clusters of vesicles on erythematous base, “dew drops on rose petal”; starts on face and spreads down; appears in successive crops over several days
    o Tx: symptomatic; may use acyclovir in special populations
  • Herpes Simplex (shingles); tx = acyclovir, valacyclovir given within 72 hours to prevent post herpetic neuralgia
    o Zoster opthalmicus: shingles involving CN V, dendritic lesions on slit lamp
      ▪ Oral antivirals, may add acyclovir ophthalmic
    o Zoster oticus (ramsay-hunt syndrome): facial nerve (CN VIII) otalgia, lesions on ear, auditory canal and TM, facial palsy auditory symptoms
      ▪ Oral acyclovir and steroids
    o Postherpetic neuralgia: pain >3 mo, paresthesias or decreased sensation
- Gabapentin or TCA, topical lidocaine gel, capsaicin
  - Dx: clinical; zoster can be identified via tzanck smear with visualization of multinucleated giant cells
  - Zoster vaccine given in adults >60 yo

**Impetigo**

- common pediatric bacterial skin infection that is highly contagious and auto-inoculable usually caused by *Staphylococcus aureus* and *Group A beta-hemolytic Streptococci*.
- MC seen in children ages 2-5 years.
- Risk factors for impetigo include warm, humid conditions, poverty, crowding, and poor hygiene.
  - Secondary impetigo can occur at sites of minor abrasion or scratches.
- s/s: Impetigo typically begins as papules that progress to vesicles and surrounding erythema. Over about one week, the vesicles eventually rupture and form a thick, adherent, golden crust. Regional lymphadenopathy is a common finding.
- dx: Gram stain and culture is recommended to determine bacterial etiology.
- Tx:
  - Topical mupirocin
  - Widespread / outbreaks = treated with kephlex
  - Beta-lactamase resistant antibiotics with *staphylococcal and streptococcal coverage* are typically used.
  - Patients with suspected or confirmed methicillin-resistant *S. aureus* should be treated with doxycycline, clindamycin, or trimethoprim-sulamethoxazole. Antibiotic treatment is usually for seven days. Children may return to school 24 hours after starting antibiotics.

**Lice (pediculosis)**

- Can affect scalp (capitus), body (corporis), pubic area (pubis), and eyelashes; transmission is from person to person
- Dx: observation of lice nad nits; nits = ovoid, grayish white eggs
- Tx: topical permethrin
  - Lindane = older topical treatment that can’t be used on infants, children, elderly due to neurotoxicity
  - Children OK to return to school next day
  - Treat all family members
  - Launder potential fomites in hot water >131F (55C)

**Pilonidal Disease**

- Results from abscess, sinus tract, upper part of natal (gluteal) cleft
- 3 clinical presentations: asymptomatic, acute abscess, chronic abscess
- Dx: clinical
- Tx: surgical I&D – remove hair, curette granulation tissue
  - Cefazolin + metronizadole or augmentin used empirically with cellulitis

**Pressure Ulcer**

- Stage 1: erythema of localized area, usually non-blanching over bony surface (if blanches – not a stage 1); if stays red, stage 1
  - Tx: aggressive preventive measures, thin film dressings for protections
- Stage 2: partial loss of dermal layer → pink ulceration
  - Tx: occlusive dressing to maintain healing, transparent film, hydrocolloids
- Stage III: full dermal loss often exposing subcutaneous tissue and fat
  - Tx: debride necrotic tissue; exudative ulcers will benefit from dressings like calcium alginates, foams, hydrofibers, dry ulcers need occlusive dressing to maintain moisture, hydrocolloids, hydrogels
- Stage IV: full thickness ulceration exposing bone, tendon, muscle – osteomyelitis may be present
  - Tx: Tx: debride necrotic tissue; exudative ulcers will benefit from dressings like calcium alginates, foams, hydrofibers, dry ulcers need occlusive dressing to maintain moisture, hydrocolloids, hydrogels
- r/f: age >65, impaired circulation, immobilization, undernutrition, incontinence
- dx: based on observation and staged according to classification
- debridement: depends on extent of necrosis; surgical closure may be necessary; vaccum-assisted closure uses negative pressure to reduce wound edema and remove debris / reduce bacterial load

**Scabies**

- severe pruritus, worse at night
- s/sx: small papules, vesicles and burrows in webbed spaces of fingers / toes; can’t survive off human >4 days
- dx: clinical – microscopic observation of mite, egg, feces after skin scrape
• tx: topical permethrin to entire body for 8-10 hours then repeat in one week; oral ivermectin if extensive involvement; pruritus may persist 2-4 weeks after treatment

Spider Bites

• brown recluse: brown violin on abdomen; necrotic wound – local tissue reaction → central necrosis
  o pain, erythema, bleb formation, ulceration / necrosis
  o tx: wound care, local symptomatic measures, delayed excision
• black widow: red hourglass on abdomen; neurologic manifestations: toxic reaction, nausea, vomiting, HA, fever, syncope, convulsions
  o generalized muscle pain, spasm, rigidity
  o wound care, local symptomatic measures, sometimes opioids, benzos; treat with anti-venom in elderly and kids

Stevens-Johnson syndrome

• drug reaction commonly caused by anticonvulsants and sulfa drugs
• milder form of TEN with <10% body surface area detachment; blisters cover between 3-10% body
• s/sx: layers of skin peel away in sheets; + Nikolsky sign; red papules and plaques with dusky, blistered, eroded center and mucosal pain with blistering and erosions – PAIN AND SKIN SLOUGHING
• dx: skin biopsy shows necrotic epithelium
• ddx: erythema multiforme, viral exanthems, drug rash
• tx: stop all offending medications, early admission to burn unit, manage fluid/electrolytes/nutrition, airway stability, eye care
  o IVIG
  o Steroids used to be tx of choice but now thought to increase risk of sepsis

Toxic Epidermal Necrosis

• >30% body surface area; + nikolsky’s sign: skin peels away in sheets when pressure applied / rubbed
• Dx: biopsy (necrotic epithelium)
• Tx: in burn unit with supportive care; consult ophthalmology if eyes affected; cyclosporin and possibly plasma exchange for severe cases

Urticaria

• Blanchable, edematous pink papules, wheals, plaques; usually disappear within 24 hours
• Darier’s sign: localized urticaria appearing where skin is rubbed (histamine release)
• May have angioedema (painless deeper form affecting lips, tongue, eyelids hands, genital); anaphylaxis may occur
• Type I: mast cell degranulation with release of inflammatory reactants
• Triggers: food, meds, infections, environmental, insect bites, drugs
• Dx: extensive lab testing not indicated; skin or IgE testing limited to specific history of provoking allergen
• Tx:
  o Anaphylaxis: epinephrine 0.3-0.5mg 1:1,000 IM and 1:10,000 IV; avoid eliciting stimulus; calamine lotion
  o Second generation antihistamine blockers (H1) are first line treatment – allegra, Claritin, clarinex, zyrtec
  o First generation for sleep disturbances: hydroxyzine / diphenhydramine
  o H2 antihistamines as adjuvants: cimetidine, ranitidine
  o Steroids for exacerbations, avoid chronic use

Viral exanthems

• Erythema infectiosum (fifth disease): parvovirus B12 – “slapped cheek” rash on face, lacy ash on extremities, spares palm and soles; resolves 2-3 weeks; supportive care / anti-inflammatories
• Hand-foot-mouth disease: children <10 caused by coxsackivirus type A → sores in mouth, rash on hands, feet, mouth, buttocks; usually clears 10 days; tx = supportive / anti-inflammatories
• Measles (rubeola): 4 C’s – cough, coryza, conjunctivitis, cephalocaudal spread, kolkp spots; morbilliform rash beginning at hairlines then progressive to palms and soles = lasts 7 days; tx = supportive: anti-inflammatories, isolate 1 week after onset of rash
• Rubella: 3 day rash; first appears on face spreads caudally to trunk and extremities and becomes generalized in 24 hours; cephalocaudal spread; teratogenic in 1st trimester (deafness, cataracts, TTP, mental retardation)
• Roseola: HSV 6/7, only childhood exanthem that starts on trunk and spreads to face; high fever 3-5 days then rose pink maculopapular blanchable rash on trunk / back and face

ENDOCRINOLOGY
Adrenal Insufficiency

- Primary (Addison’s disease): autoimmune, infections, disease of adrenal gland → decrease in cortisol secretion
  - Adrenal gland destruction causing lack of cortisol and aldosterone secretion (usually autoimmune)
    - Autoimmune (70%), infectious (tuberculosis), vascular (thrombosis / hemorrhage), metastatic, medications (rifampin, barbiturates, phenytoin, ketoconazole)
  - Dx: increased ACTH, decreased cortisol, decreased aldosterone
- Secondary: pituitary adenoma or discontinuation of steroid – pituitary failure!
  - Exogenous steroid use = MC; Hypopituitarism
  - Dx: decreased ACTH, decreased cortisol, normal aldosterone
- Adrenal crisis = acute adrenal insufficiency
- Dx:
  - 8AM serum cortisol and plasma ACTH alone with ACTH stimulation test
    - High ACTH, low cortisol = primary
    - Low ACTH, low cortisol = secondary
  - CRH stimulation test: differentiates between causes of adrenal insufficiency
    - Primary/addison’s (adrenal): high ACTH, low cortisol
    - Secondary (pituitary): low ACTH, low cortisol
  - Adrenal autoantibodies can be assessed; CXR for TB (CT of adrenals)
    - Autoimmune: atrophied adrenals
    - TB / granulomas: enlarged adrenals + calcification
    - Bilateral adrenal hyperplasia = genetic enzyme defect
- Tx:
  - Addison’s: cortisol replacement therapy + androgen replacement
    - Glucocorticoid + mineralocorticoid → hydrocortisone = 1st line, fludrocortisone for primary addison’s disease only
  - Secondary: cause = focus of treatment (pituitary adenoma resection, wean steroid therapy slowly)

Cushing Disease

- Cushing syndrome = cortisol excess from excessive autonomous adrenal cortical secretion
- Cushing disease = ACTH secreting pituitary microadenoma usually very small on anterior pituitary; F3x>M
- Features:
  - Hypercortisolism → obesity (centripedal, buffalo hump, moon facies, supravacular pads), HTN, thirst, polyuria
  - Proximal muscle weakness, pigmented striae; backache, headache, oligomenorrhea / amenorrhea / ED; emotional lability / psychosis
- Dx: overnight dexamethasone suppression test
  - Suppression <5ug/dL excludes cushing with some certainty; plasma or serum ACTH <20pg/mL suggests adrenal tumor
  - MRI preferred for pituitary tumors, CT may show adrenocortical or other tumors
- tx: transphenoidal selective resection of pituitary tumor cures 75-90%; irradiation provides remission in 50-60%
  - 95% 5 year survival

Diabetes Insipidus

- Caused by deficiency / resistance to vasopressing (ADH) → decrease kidney’s ability to reabsorb water, resulting in massive polyuria
  - Central: no ADH production = MC type – idiopathic, autoimmune destruction of posterior pituitary from head trauma, brain tumor, infection, sarcoid
  - Nephrogenic: partial / complete insensitivity to ADH: drugs (lithium), hypercalcemia, hypokalemia affting kidney ability to concentrate urine, acute tubular necrosis
- Dx: serum osm high, urine osm low
  - Water deprivation test – simplest / most reliable method - continued production of dilute urine despite water deprivation
  - Desmopressin stimulation test:
    - central: reduction in urine output indicating response to ADH
    - nephrogenic: continued production of dilute urine (no response to ADH) because kidneys can’t respond
- tx: central = desmopressin / DDAVP; nephrogenic = sodium and protein restriction, HCTZ, indomethacin

Diabetes Mellitus

- Type 1: MC in young people
The image contains a document with the following content:

- Little to no endogenous insulin secretion; elevated plasma glucagon. Pancreatic B cells don't respond to stimuli.
- Most are autoimmune (90%) with antibodies to insulin, islet cells, and glutamic acid decarboxulase.
- Sx: polyuria, polydipsia, polyphagia, nocturia, rapid weight loss despite normal / increased appetite, blurred vision, glucosuria.
  - Random plasma glucose >200mg/dL, blurred vision, pruritus, weakness, paresthesias, vulvovaginitis.
- Dx: random plasma glucose >200mg/dL with classic symptoms or fasting >126 or > on more than one occasion.
  - HbA1c >6.5% or higher.
- Tx:
  - Diet (Mediterranean).
  - Insulin: regular insulin absorbed most rapidly in abdomen.
  - Daily aspirin to decrease DV risk; careful foot care, regular ophthalmology exams, moderate exercise, meticulous personal hygiene, prompt treatment of infection.

- Type 2: younger persons who are overweight / obese; central obesity.
- Features: polydipsia, polyuria, fatigue, candida vaginitis, skin infections, blurred vision, poor wound healing.
- Dx:
  - Random glucose >200 with symptoms, fasting glucose >126 on more than one occasion, or A1c >6.5%.
  - OGTT for pt. with fasting glucose levels between 100-125.
- Tx: weight loss!!, diet, exercise 150 min/week, monitor feet/eyes, control blood pressure, urine albumin / creatinine screenings.

- Oral agents.

- Diabetic Ketoacidosis:
  - Results from insulin deficiency (can’t meet insulin requirement in response to hyperglycemia) and/or response to stress: infection, infarction, noncompliance with insulin, undiagnosed.
  - Usually younger patients with type I DM.
  - Insulin deficiency → hyperglycemia → dehydration → ketonemia (anion gap metabolic acidosis) → potassium deficit.
  - s/sx: thirst, polyuria, polydipsia, nocturia, weakness, fatigue, confusion, n/v, fatigue, chest pain, abdominal pain.
  - p/e: tachycardia, tachypnea, hypotension, decreased skin turgor, fruity breath / kussmaul’s respiration.
  - dx:

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<th>Moderate</th>
<th>Severe</th>
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- Tx: IV fluids = critical 1st step!!, regular insulin (lowers serum glucose and switches body from catabolic to anabolic state); potassium, bicarb in severe acidosis.

- Heat / Cold Intolerance:
  - Heat: hyperthyroidism.
  - Cold intolerance: myxedema, pituitary tumor.

- Hyperthyroidism:
  - Serum TSH suppressed; Graves = autoimmune.
  - Features: weight loss, anxiety, warm, moist skin, onycholysis, insomnia, fine tremor, fatigue, muscle cramps, weakness, amenorrhea, tachycardia, palpitations, systolic HTN, PVCs, afib, brittle hair, heat intolerance, hyperreflexia.
• Dx: Elevated T3 and free T4, low TSH
  o RAIU study shows increased uptake in graves disease and toxic multinodular goiter
• Tx: beta blocker (propranolol) to control sx; propylthiouracil and methimazole, PTU for breastfeeding, iodine ablation, thyroidectomy

**Hypothyroid**

• 95% are autoimmune; many associated with other autoimmune issues
• Features: weakness, dry/coarse hair, lethargy, slow speech, cold intolerance, eyelid edema, forgetfulness, facial edema, constipation, coarse hair, weight gain, facial dullness, depression, anemia, Bradycardia, hyporeflexia, enlarged thyroid
• Dx: best test is TSH; normal/low normal free T4 and TSH = euthyroid
  o Low free T4 and elevated TSH = primary hypothyroid
  o Low free T4 and low/normal TSH = secondary hypothyroid
  o Normal free T4 and elevated TSH = subclinical hypothyroid
• Tx: levothyroxine; check levels of thyroid frequently

**Hyperparathyroid**

• 1+ parathyroid glands secretes excessive PTH → increased Ca >12 (<12 = asx)
• low blood Ca → increased PTH → 1. Bone breakdown releases Ca 2. Kidney honds onto Ca and increased Vitamin D 3. Intestine absorbs more Ca → increased Ca in blood levels
• primary: increased PTH caused by PTH secreting parathyroid adenoma
• secondary: increased PTH by response to hypocalcemia or vitamin D deficiency
  o CKD = MC cause
• s/sx: n/v, weakness, fatigue, constipation → bones, stones, groans, psychic moans
  o bone loss from increased PTH and Ca absorption from bones = pain in bones
  o renal loss of Ca and phosphage = kidney stone
  o increase GI absorption of Ca and abdominal cramps = groans
  o irritability, psychosis, depression = moans
• dx:
  o blood = increased Ca, increased PTH, decreased phosphorus
  o urine = hyperphosphaturia, hypercalciuria (all Ca and Phosphorus go out through kidneys to urine)
• tx: remove parathyroid adenoma (subtotal or total)
  o secondary = replace cause (vitamin D / Ca supplementation)
  o if Ca very high: IV fluids, Lasix, calcitonin; treat osteoporosis with bisphosphonates

**Hypoparathyroid**

• decreased parathyroid hormone → decreased blood levels of Ca
• MC causes = post surgical (neck/thyroid) or autoimmune
• s/s: carpopedial spasm, laryngeal spasm, tingling, tetany, facial grimacing
  o Chvostek = cheek with tapping; Trousseau = hand with blood pressure cuff
• Dx: prolonged QT, low pTH, low Ca, high phosphate
• Tx: vitamin D and Ca (tetany = secure airway, IV calcium gluconate)

**HHS (hyperglycemic hyperosmolar syndrome)**

• Results from insulin deficiency (can’t meet insulin requirement in response to hyperglycemia) and/or response to stress: infection, infarction, noncompliance with insulin, undiagnosed
• HHS usually older pt with type 2 DM (higher mortality)
• s/sx: thirst, polyuria, polydipsia, nocturia, weakness, fatigue, confusion, n/v, fatigue, chest pain, AMS
• Dx:

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tx: IV fluids = critical 1st step!!, regular insulin (lowers serum glucose and switches body from catabolic to anabolic state); potassium, bicarb in severe acidosis

**Palpitations**

ddx: anxiety, electrolyte abnormalities (hypokalemia, hypomagnesemia), exercise, hyperthyroidism, ischemic heart disease, ingestion of stimulant drugs (cocaine, amphetamines, caffeine), medications, pheochromocytoma, hypoglycemia in type 1DM, mitral valve prolapse, atrial fibrillation, WPW, sick sinus syndrome

dx: history, ECG, echo, exercise testing, CMP, CBC, TSH, urine toxicology, glucose

**Thyroiditis**

MC cause of thyroid pain – greater incidence women

**Subacute**: usually post-infectious / viral (fever, myalgia, pharyngitis); early in course may be hyperthyroid followed by period of hypothyroidism; increased ESR (de quervain’s thyroiditis)

**Hashimoto’s**: presence of neck tenderness and recent viral illness

**Postpartum**: 1-2 months hyperthyroidism after delivery

**Infectious**: hematogenous spread of staph / strep – fever, pain, redness, fluctuant mass, increased WBC

Dx: increased ESR / WBC, TFTs usually hyperthyroid at presentation; US / radioactive iodine scanning have little value
  - With pain think: painful subacute (de quervain’s post viral), infectious, radiation, trauma
  - No pain: postpartum, drug induced (lithium / amiodarone), chronic lymphocytic, fibrous

Tx: no anti-thyroid meds necessary; stop offending drugs, aspirin for pain / inflammation in subacute, abx if bacterial etiology, give propranolol for cardiac sx in post partum

**Tremors**

Rest: parkinson’s, wilson’s, essential if severe

Postural / action (terminal): physiological, exaggerated physiologic
  - Stress, fatigue, anxiety, emotion
  - Endocrine: hypoglycemia, thyrotoxicosis, pheochromocytoma, adrenocorticosteroids
  - Drugs / toxins: b-agonist, dopamine agonist, amphetamines, lithium, TCAs, neuroleptics, theophylline, caffeine, claporic acid, alcohol withdrawal, mercury, lead, arsenic
  - Essential
  - Primary writing tremor
  - Other CNS disorders: parkinson’s, idiopathic dystonia
  - With peripheral neuropathy: carcot-marie-tooth
  - Cerebellar

Kinetic (intention): disease of cerebellar outflow → MS, trauma, tumor, vascular disease, Wilson’s, drugs, toxins

Miscellaneous: psychogenic, orthostatic, rhythmical movements in dystonia, , oscillatory myoclonus, asterixis, clonus, nystagmus

**Essential Tremor**

Characteristics: usually presents with a postural tremor of the hands or head that is often worsened by psychic stress; can occur at any age
  - When laryngeal muscles are involved, the patient’s voice may shake as well
  - legs are usually spared in this condition.
  - Essential tremor usually becomes more prominent with age, though significant disability is rare.
  - Improved after drinking alcohol; exacerbated by action
  - MC caused by autosomal dominant – usually have family member with similar symptoms

Tx: beta-blocker (propranolol); Symptomatic treatment is limited to patients with lifestyle-limiting tremors. In addition to propranolol, other therapies include primidone, alprazolam, topiramate, or gabapentin.

**OBSTETRICS / GYNECOLOGY**

**Amenorrhea**

Primary: No menses age 13 with absence of secondary sexual characteristic; no menses by 15 with normal growth secondary sex
  - Causes: pregnancy, imperforate hymen, gonadal dysgenesis (turner’s syndrome), HPO axis abnormalities (anorexia, bulimia, weight loss, excessive exercise)
  - Dx: quantitative BHCG, FSH, prolactin, TSH, T3, free T4, estrogen, progesterone

Secondary: absence of menses for 3mo in women with previously normal menstruation or 6 mo in woman with history of irregular cycles
MC cause = pregnancy, endometrial atrophy, premature ovarian failure, pituitary dysfunction, drug use, herbs, hormonal medications, stress, extreme weight changes, eating disorders, excessive exercise

Dx: quant BHCG, TSH, prolactin if >200 CT of sella, progesterone challenge, FSH

Tx: treat underlying cause; use OCPs, cyclic progesterone 10mg for 10 days

Dysfunctional uterine bleeding

Types:
- Menorrhagia: prolonged/heavy bleeding (>7 days or >80 mL); regular intervals
- Metrorrhagia: variable amounts of bleeding at irregular, frequent intervals
- Polymenorrhea: short intervals (<21 days)
- Oligomenorrhea: long intervals (>35 days)

Causes:
- Reproductive tract disease → pregnancy, gestational trophoblastic disease, uterine lesions, iatrogenic causes (IUDs, contraception, HRT, psychotropic agents)
  - Uterine lesions: menorrhagia or metrorrhagia d/t increase in endometrial surface area/distortion of vasculature/having friable or inflamed surface → includes endometrial CA/sarcoma, endometrial hyperplasia, submucosal fibroid, endometrial polyps, endometritis, adenomyosis
- Systemic disease → blood dyscrasias (vW disease, prothrombin deficiency, leukemia, severe sepsis), Hypothyroidism, hyperthyroidism, cirrhosis
  - Hypothyroidism assc w/menorrhagia or metrorrhagia; hyperthyroidism assc with oligomenorrhea and amenorrhea
  - Cirrhosis can cause excess bleeding d/t low plts and less metabolization of estrogens

Endocrine causes → anovulatory vs ovulatory DUB
- Anovulatory
  - continuous production of estradiol-17 beta without corpus luteum formation and no progesterone release
  - unopposed estrogen = continuous proliferation of endometrium which eventually outgrows its blood supply and sloughs off in an irregular unpredictable pattern
- Ovulatory
  - Mid-cycle spotting after LH surge

Dx
1. Rule out pregnancy
2. Med reconciliation
3. PE → thyromegaly, hepatomegaly, GU infections, GI problems (hemorrhoids), pelvic structural abnormalities (polyps, fibroids)
4. Labs → CBC, iron levels, TSH, coags
5. Eval of uterus → endometrial bx or hysteroscopy, pelvic US

Management
- Structural problems can be corrected surgically → D&C (therapeutic and dx), hysteroscopy, endometrial ablation, hysterectomy
- OCPs can regularize cycles
- IV estrogen can be used acutely if pt is presenting with acute hemorrhage d/t DUB
- NSAIDs reduce menstrual blood loss

Ectopic Pregnancy

- Implantation of pregnancy anywhere but endometrium, 95% in fallopian tube (55% in ampulla of tube)
- MC cause = occlusion of tube secondary to adhesions
- r/f: hx of previous ectopic, previous salpingitis (caused by PID), previous abdominal or tubal surgery, use of IUD, assisted reproduction
- s/s: unilateral adnexal pain, amenorrhea / spotting, tenderness or mass on pelvic exam, dizziness, syncope, GI distress
  - ruptured ectopic: severe abdominal or shoulder pain, peritonitis, tachycardia, syncope, orthostatic HTN
- dx: serial increases of hCG are less than expected - >1500 should show evidence of developing intrauterine gestation on ultrasound → if not, suspect ectopic, transvaginal US >90% sensitive,
- tx:
  - methotrexate (if ectopic measures <4cm, bhCG <5000, hemodynamically stable, no blood disorders, no pulmonary disease, no peptic ulcer, normal renal function, normal hepatic function, compliant pt that can return for follow up
  - Administration of methotrexate is the appropriate treatment for an ectopic pregnancy unless there are contraindications to the use of the drug. These contraindications include current breastfeeding, active pulmonary disease, immunodeficiency, or hypersensitivity to methotrexate. The drug is a folic acid antagonist that inhibits DNA replication. The effectiveness of administration is similar to surgical treatment without the risk of surgical complications. Indications
for methotrexate therapy include a hemodynamically stable patient, hCG levels below 5,000 IU/L, mass <3.5 cm, no fetal cardiac activity, and the ability to comply with post-treatment follow-up. Methotrexate can be administered intravenously, intramuscularly, or orally. It can also be injected into the ectopic pregnancy directly, although this route of administration is not commonly used. Intramuscular administration is the route of administration that is most commonly used for treatment of ectopic pregnancy.

- surgical treatment: laparoscopy ➔ emergent situations / not meeting methotrexate criteria
- follow-up testing = crucial

**Endometriosis**

- presence of endometrial tissue outside endometrial cavity – MC found in ovary and pelvic peritoneum; sometimes transported to lymphatic system (retrograde menstruation); severity of symptoms does not equate to amount of endometriosis

- Theories of dx:
  - Retrograde menstruation (most likely): endometrium floats back out of fallopian tubes onto ovary/into cul-de-sac
  - Hematogenous/lymphatogenous spread
  - Coelomic metaplasia

- ds is estrogen dependent (decreases in low estrogen states)

- can happen as a result of obstructive anomaly (imperf. Hymen, transverse septum/longitudinal septum, cervical agenesis)
  - once the obstruction is removed, the endo usually resolves

- RF: early menarche, short cycles, heavy/prolonged cycles, early menarche, prolonged menses, Mullerian anomalies, family history, autoimmune hx

- Protective: multiparity, longer lactation, regular exercise

- Sxs: cyclic pelvic pain peaking 1-2 days before onset of menses
  - dysmenorrhea, chronic pelvic pain, dyspareunia, adnexal mass, infertility (dysmenorrhea, dyspareunia, dyschezia)
  - many women are axks
  - amount of endo doesn’t correlate to pain (depth of implantation correlates better)
  - decrease in pain w/surgical excision/ablation/cauterization

- P/e: could be subtle / nonexistent

- Dx: clinical + laparoscopy for direct visualization – surgical confirmation necessary for dx
  - imaging can only see it w/in the ovary
  - surgical dx: 2 of – endometrial epithelium, endometrial glands, endometrial stroma, hemosiderin-laden macrophages (seen on patho report)
  - surgical staging

- Complications: chronic pain, infertility, chronic infm d/o, chronic infm state

- Tx: Medical or surgical
  - Medical: NSAIDs, progestins, progestins, OCPs, Danazol, NSAIDs, GnRH agonist (put in state of pseudopregnancy)
    - can only give Danazol for 6 mos bc of bone loss (can do longer if you do add-back therapy)

- Increasing consumption of long-chain omega-3 fatty acids can decrease a woman’s risk of endometriosis. Having multiple childbirths, extended periods of lactation, and use of oral contraception may also decrease risk. Some protective factors include race, late menarche, and early menopause.

**Fetal Distress**

- Normal fetal HR between 120-160; >160 for 10 min – fetal tachy; <120 for 10 min – fetal brady

- Nonstress testing:
  - GOOD: >2 accelerations in 20 min (increased HR at least 15bpm from baseline lasting >15 seconds = fetal well being)
  - BAD: nonreactive – no fetal HR accelerations or <15bpm increase lasting <15 sec ➔ get contraction stress test

- Contraction stress test: measures fetal response to stress at times of uterus contraction
  - GOOD: no late decels in presence of 2 contractions in 10 min
  - BAD: repetitive late decels in presence of 2 contractions in 10 min, worrisome

- APGAR: appearance, pulse, grimace, activity, respiration – done at 1 and 5 min after birth
  - Score from 1-10 >7 normal, 4-6 fairly low, <3 = critically low

**Intrauterine Pregnancy**

**Fetus/Infant Nomenclature**

- Abortion: (either elective or spontaneous) < 20 weeks gestation or weight < 500 grams
- Premature Infant: 20-36 weeks gestation or 1000 - 25000 grams
- Full Term Infant: After 37-42 weeks gestation or > 2500 grams
- Postmature infant: > 42 weeks gestation

**Abbreviation of Obstetrical History:** G_P T P A L
T: Total number of **full-term** pregnancies (37-42 weeks)

P: Total number of **preterm** pregnancies (20-36 weeks)

A: Total number of **abortion**s (elective or spontaneous occurring before 20 weeks

L: Total number of **living** children

**Twins count as ONE pregnancy, TWO live children**

**Fetal movement (quickening) felt at:**
- Nulliparas: 18-20 weeks
- Multiparas: 14-16 weeks

**Signs of pregnancy:**
- **Chadwick’s sign:** bluish discoloration of vagina and cervix
- Increased basal body temperature
- **Skin changes:**
  - **Melasma/Chloasma** (dark patches on the face across the bridge of the nose or forehead)
  - **Linea nigra:** vertical line up the abdomen
  - Caused by stimulation of melanocyte
  - Hegar’s sign: softening between the fundus and cervix

**Uterine Growth:**
- 12 weeks at the symphysis pubis
- 20 weeks at the umbilicus
- after 20 weeks 1 cm for every week gestation (view image)

**Heart rate of baby:** 120 - 160
- Will be visible on the US at 6 weeks gestation

**Important Labs Changes:**
- **Cholesterol will INCREASE** and this is normal if elevated just repeat at the 6-week postpartum visit.
- BUN and Creatinine will be **DECREASED**

**First visit prenatal labs:** CBC, blood type, RH factor, antibodies to blood group antigens, Random glucose, VDRL (RPR), Hepatitis B, Rubella, Urine, Pap smear (if less than 1 year since last), Group B streptococcus, As indicated: Sickle cell trait, Cystic fibrosis, Tay-Sachs

**Every prenatal visit:** Maternal weight, Blood pressure, fundal height, fetal size and presenting part, urine dipstick for protein, glucose, ketones

**Recommended weight gain during pregnancy:** 20-35 lbs: average weight women, 40-45 lbs: underweight women, 10-15 lbs: overweight women

**Nutrition during pregnancy:**, Pregnant intake = increase in calories should be 300 kcal/day + folic acid (0.4 mg/day), iron (30 mg/day)

**Things to avoid during pregnancy:** Smoking, ETOH, drugs – teratogens, **Unpasteurized foods** (apple cider, soft cheese) – listeria, Raw meat, seafood – listeria, Deli meat – listeria, King mackerel, shark, swordfish, tuna, tilefish – mercury, Farm salmon - PCBs

**Mastitis**
- Mastitis: regional infection of breast from skin flora or oral flora of breastfeeding baby – organisms enter erosion or cracked nipple; main cause is clogged milk ducts
- Focal tenderness, erythema, differences in temperature from one region of breast to another
- Dx: physical exam, fever, elevated WBC
- Tx: I&D + oral abx (dicloxacillin; clindamycin with allergy) – if unresponsive to oral – admitted for IV abx, decrease time in between feeding (feed every 45 minutes / completely empty feeds)
  - Prevent with lubricating ointments

**Ovarian Cyst**
- Divided into functional cyst and neoplastic growths
- Functional: normal physiologic functioning of ovaries → follicular / corpus luteum
  - Follicular = MC – arise from failure of follicle to rupture during follicular maturation phase (3-8cm); most resolve spont.
  - Corpus luteum = luteal phase of menstrual cycle – can delay menstruation
- Hx: follicular tend to be asymptomatic, larger = pelvic pain; corpus luteum = local pelvic pain, amenorrhea, or delayed menses
- p/e: ruptured = pain, torsion = waxing and waning pain, n/v
  - Abdominal and pelvic ultrasound is the first imaging study of choice for suspected ovarian torsion because it is less expensive than and has similar diagnostic performance as computed tomography (CT) and magnetic resonance imaging (MRI). Definitive diagnosis is direct visualization of a torse ovary during surgery, and prompt operative evaluation is the mainstay of treatment to preserve ovarian function.
• dx: pelvic US
• tx: palpable ovary or adnexal mass in premenarchal or postmenopausal patient is suggestive of ovarian neoplasm; cysts >7cm that persist should be monitored with MRI; <7cm = observe with fu US + OCPs to suppress ovulation and cystectomy

Pelvic Inflammatory Disease

• Definition: ascending infection of the female GYN tract
• Sxs: potentially asxs, abdominal/pelvic/LBP, abnormal vaginal discharge, inter-menstrual bleeding or post-coital bleeding, fever, N/V if severe
• PE findings: uterine/adnexal tenderness, cervical motion tenderness w/chandelier sign, mucopurulent discharge from cervix, friable cervix, fever (<1/3)
• Sequelae: chronic pelvic pain d/t adhesions, infertility d/t tubal occlusion, ectopic pregnancy → d/t salpingitis, fitz-Hugh Curtis syndrome
• RF: Age <25, Multiple partners/partners w/multiples Hx of STD, Inconsistent condom use
• Dx: Sexually active and <= 25 OR hx of STI/multiple partners, tenderness on pelvic exam + no other etio dx and tx if these are met (err on the side of overtx d/t high incidence of adverse outcomes)
• Tx
  o Outpatient: Ceftriaxone IM x1 (or Cefoxitin IM/probenecid PO) AND Doxycycline (14 days)
    - add metronidazole if BV is present
    - if not getting better in 48 hours, they should return for inpatient tx w/IV abx
  o Inpatient: 24 hours of IV abx then sent home on 14 day course
    - Cefotetan IV or Cefoxitin IV AND doxycycline (PO or IV)
    - Indications: other condition can’t be r/o, pt is pregnant, doesn’t respond to OP tx, pt has severe N/V/high fever

Dysmenorrhea

• commonly found in those who ovulate regularly; pain usually lasts 1-2 days and is relieved by NSAIDs and OCPs
• Assoc w/endometriosis: pain begins prior to menses
  o Pain isn’t relieved by NSAIDs and OCPs
  o Often have dyspareunia as well
• Primary Dysmenorrhea: begins w/in 6-12 mos of menarche
• Patho: d/t excess PG and leukotriene production at menstruation → incr uterine contraction
  o blood vessels are vasoconstricted = decr blood flow
  o ischemia from contractions can cause pain
• Sxs: severe cramp that start w/menses and last 2-3 days (highest in first day), lower abd pain that radiates to back/thighs, h/a, nausea, diarrhea
• PE: normal
• Tx: NSAIDs = first line, OCPs (prevent ovulation), menstrual suppression, surgical (endometrium resection)

Placental abruption (abruptio placentae):

• MC cause third trimester bleeding - premature separation of normally implanted placenta from uterine wall after 20th week, resulting in hemorrhage between uterine wall and placenta – 50% occur before labor and after 30 weeks gestation
• r/f: hypertension, cocaine use, trauma, multiparity, smoking
• Primary cause: unknown – maternal HTN, prior history of abruption, maternal cocaine use, external maternal trauma, rapid decompression of overdistended uterus
• Sxs: third trimester vaginal bleeding with severe abdominal pain and / or frequent strong contractions (30% have no symptoms)
• Physical exam: vaginal bleeding and firm, tender uterus with small frequent contractions, 20% present with no bleeding (concealed hemorrhage)
• Dx: clinical; confirmed by inspection of placenta at delivery → presence of retroplacental clot with overlying placental destruction confirms diagnosis
• Tx: stabilize pt., prepare for possibility of future hemorrhage (blood products, crystalloid fluids, prompt delivery to control hemorrhage), prepare for preterm delivery, deliver if bleeding is life threatening or fetal testing is non-reassuring

Placenta Previa

• Types:
  o Complete previa: placenta completely covers internal os
  o Partial previa: placenta covers portion of internal os
  o Marginal previa: edge of placenta reaches margin of the os
  o Low-lying placenta: implanted in the lower uterine segment in close proximity but not extending to the internal os
• Vasa previa: fetal vessel may lie over the cervix
• Bleeding from placenta previa results from small disruptions in placental attachment during normal development and thinning of lower uterine segment during third trimester → may stimulate further uterine contractions → further placental separation and bleeding
• Fetal complications associated with previa: preterm delivery and its complications, preterm PROM, intrauterine growth restriction, malpresentation, vasa previa, congenital abnormalities
• s/sx: Painless vaginal bleeding!!! Usually occurs after 28 weeks of gestation
• r/f: prior c-section, multiple gestations, multiple induced abortions, AMA
• dx: ultrasound (transvaginal) - Vaginal exam contraindicated!!! Digital exam can cause further separation
• sonography
• Tx: strict pelvic rest (no intercourse) and modified bed rest
  o Blood transfusion may be necessary so get a type and screen if you discover previa via U/S
  o C-section is preferred delivery
  o Give Rhogam if Rh-
• Some studies show that deliver btwn 34-37 weeks may be optimal

Premature Rupture of Membranes
• membrane rupture before the onset of labor or regular uterine contractions. Prolonged rupture of membranes = >18 hours
• s/sx: sudden “gush” of clear or pale yellow fluid from the vagina that occurs after 38 weeks of gestation.
• Major risk = infection or cord prolapse
• Dx: clinical - pooling of amniotic fluid in the vaginal fornix on physical exam
  o confirmed by testing the pH of the vaginal fluid (Nitrazine paper); amniotic fluid usually has a pH range of 7.0 to 7.3 compared to the normally acidic vaginal pH of 3.8 to 4.2. The strips will turn blue if the pH is greater than 6.0 and indicates ruptured membranes. A
  o presence of arborization, or ferning, on microscopic evaluation of the vaginal fluid.
• Tx: bed rest and imminent delivery
  o >34 weeks – induce
  o 32-34 – collect fluid and check lung maturity then induce
  o <32 – start 2 doses steroid injection then delivery baby

Spontaneous abortion
• Termination of pregnancy before 20 weeks – occurs in 15-20% of pregnancies
• r/f: smoking, infection, maternal systemic parameters, drug use
• s/s: bleeding = variable, fundus of uterus may be boggy or tender
• dx: serial hCG titers, serum progesterone, serial US to confirm; US: inappropriate development or interval growth, poorly formed / unformed fetal pole, fetal demise; blood Rh status necessary tests to preclude Rh sensitization in mother
• tx: empty uterus, follow up with pelvic exams, titers, transvaginal US, dilation and curettage to complete emptying of uterus; immunoglobulin administered to Rh negative women, septic / abortion requires complete evacuation of uterine medical support, abx

Vaginal Discharge
• yeast infection, BV, HPV, trichomoniasis, herpes, cervicitis, foreign body (tampon), STI (chlamydia / gonorrhea), various sex practices, vaginal medicines / douching, menopause

1. Bacterial vaginitis - lack of lactobacilli = low hydrogen peroxide = high pH (>4.5); infection is polymicrobial (mostly Gardnerella vaginalis)

Vaginitis
Atrophic vaginitis

- **Dx:** milky vaginal discharge, pH > 4.5, amine “whiff” test (fishy odor), clue cells (gram negative)
  - **i.** AMSEL criteria: thin, white homogenous discharge, presence of clue cells in microscopic exam (stippled epithelial cell), pH > 4.5, fishy odor – must have 3/4
- **Tx:** metronidazole (PO or intravaginally) or clindamycin → recurrence is common d/t biofilm production → may need prolonged tx (6 mos).

2. **Candidiasis:** infection of the vaginal tract w/candida (MC is albicans)

- **Sxs:** thin discharge, fishy odor
- **Dx:** milky vaginal discharge, pH > 4.5, amine “whiff” test (fishy odor), clue cells (gram negative)
  - **i.** AMSEL criteria: thin, white homogenous discharge, presence of clue cells in microscopic exam (stippled epithelial cell), pH > 4.5, fishy odor – must have 3/4
- **Tx:** fluconazole (150 mg PO x1) – if its really bad, can give another dose 72 hours later, vaginal cream (Miconazole, terconazole, clotrimazole, etc) – 7 day course typically works better

3. **Diabetes mellitus** is a predisposing factor for **recurrent vulvovaginal candidiasis** since hyperglycemia enhances the ability of *Candida albicans* to bind to vaginal epithelial cells. The patient above should be tested for **diabetes** due to recurrent **vulvovaginal candidiasis**, especially since she has other known risks (elevated body mass index and history of hypertension). Glycated hemoglobin (also called A1C) is used to screen, diagnose and monitor prediabetes and diabetes. Patients with vaginitis may present with **vulvar pruritus** and **burning**, as well as erythema and edema of the labia majora and minora.

3. **Trichomonas:** caused by parasitic protozoan Trichomonas Vaginalis; can affect fertility so we want it treated well

- **Sxs:** itching/burning, dyspareunia, thick white discharge, beefy red vaginal mucosa
- **Dx:** wet mount → KOH and saline + microscopy; pH < 4.5 (normal); BD affirm → DNA test; Yeast cx if recurrent (look for different type of yeast
- **Tx:** Fluconazole (150 mg PO x1) – if its really bad, can give another dose 72 hours later, vaginal cream (Miconazole, terconazole, clotrimazole, etc) – 7 day course typically works better

4. **Atrophic vaginitis**

- **Def:** atrophy of vaginal and vulvar tissues d/t hypoestrogenic state (often seen in menopause)
- **Sxs:** dryness, burning, irritation, low lubrication, pain/discomfort w/sex, urinary urgency, dysuria, frothy white/grey discharge
- **PE:** fragile tissue, fissures, petechiae, labia minora resorption, loss of moisture and rugae and elasticity, prominent meatus, urethral erosion or prolapse
- **Dx:** clinical
- **Tx:** First-line therapy for symptomatic relief of vulvovaginal atrophy is with **non-hormonal vaginal moisturizers and lubricants.** If therapy does not result in symptom relief, low-dose vaginal estrogen (insert, ring, cream) therapy may be used if the woman has no contraindications (estrogen-dependent malignancy). Sexual activity and/or use of vaginal dilators can help maintain healthy vaginal epithelium.
  - **Partner tx:** warrants full STI screenin, pt should be retested in 2 weeks- 3 mos. To ensure successful tx (“test of cure”)

**PSYCHIATRY / BEHAVIORAL MEDICINE**

**Generalized Anxiety Disorder**

- **definition:** excessive anxiety or worry a majority of days / more days than not in a 6-mo period associated with >3: fatigue, restlessness, difficulty concentrating, muscle tension, sleep disturbance, irritability, shakiness, HA
- **management:**
  1. antidepressant: SSRI (paroxetine and escitalopram); SNRIs – venlaxafine
  2. buspirone (buspar): simulates serotonin receptors and blocks dopamine – may take weeks for improvement; does not cause sedation; s/e: dizzy, nervous, nausea
  3. benzodiazepines (short term); beta blockers
  4. psychotherapy

**Generalized anxiety disorder (GAD)** is a common psychiatric disorder often seen in the primary care setting. It is characterized by **excessive and persistent worrying that occurs more days than not for six or more months**. Other clinical manifestations include **insomnia, headaches, difficulty relaxing, and fatigue**. The anxiety symptoms experienced with GAD are difficult to control and cause significant distress and impairment in activities of daily living. GAD is **two times more common in women than in men** and is the **most common psychiatric disorder seen in the elderly**. Diagnosis is determined using the **Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria.** Recommended treatment is with a combination of **pharmacotherapy and psychotherapy.**

**Serotonergic antidepressants, such as sertraline, are prescribed for generalized anxiety disorder in doses equal to those used in major depressive disorder.**
Panic Disorder

- **Criteria:** sx not due to substance, medical condition or other mental disorder, recurrent, unexpected expected attacks (at least 2) not related to trigger, familial trait, panic attack followed by concern of more attacks, worry about implication of attacks, significant change in behavior related to attacks
  1. **Panic Attacks:** feature of many different anxiety disorders but not disorder itself
     - episode of intense fear or discomfort with 4+ following sx developing abruptly, reaching peak in 10 minutes – palpitations, trembling, sweating, choking, SOB, chills, dizzy, nausea, chills, hot flashes, paresthesias, fear of dying, losing control
  - **Management:** benzos for acute attack

- **Dominant Symptoms:** sudden onset palpitations, chest pain, choking sensation, dizziness, feelings of unreality, secondary fear of dying, losing control, going mad
- Childhood exposure to sexual or physical abuse and childhood smoking increases the risk of developing panic disorder in adulthood.
- **Alcohol use MC associated with panic disorder**
- **Management:**
  1. SSIRs 1st line long term tx: paroxetine, sertraline, fluoxetine
  2. Benzo: for acute attack; TCAs (imipramine)
  3. CBT – focus on thinking / behaviors (relaxation, desensitization, examine behavior consequence) = most effective, in fact just as effective as anti-depressants
- Check labs first:TSH, CMP, CBC

Phobic Disorders

- **General Characteristics:** irrational fear and disproportionate excessive anxiety when presented with object / situational event; exposure = immediate increased anxiety and can → panic attack; all → avoidance / apprehension; pt. knows fear is excessive / unreasonable (insight)
- **Dx:** made if response to phobic stimuli interferes with daily routine, social functioning, or occupational functioning
- **Comorbidities:** MDD, substance abuse, other anxiety disorders, personality disorders
- **Specific Phobias:** More common than social phobias; last 6+ months; fear of specific object / situation
  1. Animal: fear of specific animals or insects
  2. Natural environment: fear of natural phenomena (storm, height, water, lightening)
  3. Blood injection injury: fear of needles or invasive procedure
  4. Situation: fear of specific situations (bridges, tall buildings, flying, driving, elevators)
  5. Other: fear of situations → choking, vomiting, illness in children; fear of loud noises / clowns
- **Agoraphobia:** intense anxiety about placing oneself into situation in which incapacitating problem could occur and no help would be available; may occur with or without hx of panic disorder → avoid situations
  1. Dx criteria: any of sx that are characteristic of panic attack may be present; pt. may have incapacitating or embarrassing rx (lack of bowel / bladder control); duration 6+ months
  2. Sx may render pt. unwilling / unable to leave home
- This patient has developed a phobia as the result of hearing stories about her cousin, an example of informational transmission, a cognitive factor in the development of a phobia.
- **Tx:**
  1. SSRI (paroxetine, fluoxetine, sertraline, venlafaxine) = 1st line – 2. if unsuccessful → benzo 3. TCA (imipramine) but this is less effective
  2. B-blockers (propranolol) – reduce autonomic hyperarousal sx and tremor associated with performance situations
  3. Insight-oriented therapy + graded exposure – systematic desensitization + exposure therapy = most effective
  4. Specific phobias can be treated with short-term benzo and b-clocker as adjuncts

PTSD

- **MC in young adults:** combat, violence, rape, assault
- 1. Exposed to traumatic event and actual / threatened death / injury or violation to self or others 2. Response may involve helplessness, dissociative sx, avoidance of associated stimuli, emotional numbing, increased autonomic arousal
- **Criteria:** trauma is re-experienced: >1 month recollections, distressing dreams, acting/ feeling as if event were recurring, physiologic distress, and avoidance of related stimuli (thoughts, feelings, conversations)
  - **Re-experiencing trauma:** intrusive memroies, dreams, flashbacks
Avoidance: social withdrawal, emotional detachment, sense of foreshortened future

Hyperarousal: insomnia, irritability, difficulty concentrating, exaggerated startle response

Management: 1. Antidepressants (SSRI’s = first line → paroxetine, sertraline, fluoxetine, TCA’s, MAOIs); CBT (psychotherapy, counseling)

Selective serotonin reuptake inhibitors are used as first-line therapy for post-traumatic stress disorder (PTSD) in combination with cognitive and behavioral therapies. PTSD is a severe disorder characterized by intrusive thoughts, sleep disturbance, nightmares, and hypervigilance as a result of a traumatic experience or event. Pharmacologic treatment is used to decrease the severity of the symptoms. Selective serotonin reuptake inhibitors (SSRIs) are used as first-line therapy because they have been proven to most effectively decrease the symptoms of PTSD.

Acute Stress Disorder

- Similar to PTSD but sx <1mo; anxiety as a result of extraordinary life stress event
- Treatment: counseling / psychotherapy; if persistent tx as PTSD

Bipolar I Disorder

- Definition: >1 manic episode and occasional major depressive episodes
- r/f: family history = strongest risk
- mania: abnormal and persistently elevated, expansive or irritable mood at least 1 week with marked impairment of social / occupational function – 3+:
  - mood: euphoria, irritable, labile, dysphoric
  - thinking: racing, disorganized, expansive, grandiose
  - behavior: physical hyperactivity, pressured speech, decreased need sleep, increased impulsivity / risk taking, increased goal directed activity
  - DIGFAST: distractibility, impulsivity (poor judgement, spending sprees, reckless driving), grandiosity (increased self esteem), flight of ideas (racing thoughts), activities (psychomotor agitation), sleep (decreased need), talkativeness (pressured speech)
- screening: mood disorder questionnaire
  - When staff-assisted mental health care is available, screening for depression and bipolar disorders is recommended for patients 12 to 18 years of age
- treatment: 1. mood stabilizer – 2nd or 1st generation anti-psychotic – may add SSRI for depressive sx 2. Good sleep hygiene
  3. Cognitive, behavioral, and interpersonal therapy

Bipolar II Disorder

- definition: hypomania + major depressive episode
  - hypomania: period of elevated, expansive or irritable mood at least 4 days that is different from usual non-depressed mood but does not cause marked impairment (no psychotic features) – 3+:
    - mood: euphoria
    - thinking: racing, disorganized, expansive, grandiose
    - behavior: physical hyperactivity, pressured speech, decreased sleep need, excessive involvement pleasurable activities
- screening: mood disorder questionnaire
- management:
  - mania: lithium, valproate, 2nd generation antipsychotics
  - depression: lithium, valproate, carbamazepine, 2nd gen antipsychotic
  - mixed: atypical antipsychotic, valproate

Major Depressive Disorder

- definition: depressed mood + anhedonia with >5 assoc sx almost every day, most of day, 2 weeks
  1. fatigue, insomnia or hypersomnia, guilt, worthlessness, recurring thoughts of death or suicide, psychomotor agitation, significant weight change >5%, decreased concentration / indecisiveness
  2. somatic: constipation, HA, skin changes, chest or abdominal pain, cough, dyspnea
  3. ^^ sx cause clinical distress / impairment in social, occupational or other important areas of functioning
  4. NO MANIA OR HYPOMANIA; STRONG FAMILY HX COMPONENT
- Screening: Beck Depression Inventory for Primary Care
• Childhood maltreatment has been associated with a greater risk of relapse or recurrence of major depressive disorder after successful treatment. The rate of recurrence over twenty years is approximately 40 percent. The risk of recurrence is greatest within the first few months after treatment.

• Management:
  1. Psychotherapy: 1st line in mild to moderate depression – 15% commit suicide (esp in M 25-30 / F 40-50yo)
  2. Medications: SSRI = 1st line, SNRI, TCA
  3. CBT: exposure and response prevention, psyceducation, support groups
  4. ECT in pts who fail medical therapy, previous response to ECT, rapid response in pt with severe sx

• New diagnosis: look for diabetes / lipid disorders

• SIGECAPS (depression)
  § S: sleep changes
  § I: Interest lack thereof
  § G: Guilt excessive
  § E: Energy lack
  § C: Concentration Decrease
  § A: Appetite altered
  § P: psychomotor dysfunction (agitation)
  § S: Suicidal Thoughts

• A major depressive episode must consist of either persistently depressed mood most of the day, nearly every day for at least two weeks or loss of interest or pleasure in most activities, nearly every day for at least two weeks.

Suicide

• Depression and suicidal ideation are common complaints seen in the primary care setting. Any patient who reveals having thoughts of suicide should be assessed further to determine more details about the thoughts of suicide, as well as intent and plan. Risk factors for suicide include psychiatric illness, history of previous suicide attempts, individuals who have never been married, previous or active military service, childhood abuse, family history of suicide, and access to weapons. Women attempt suicide twice as often as men, but men are three times more likely to be successful. Management of a patient who is suicidal includes risk factor reduction, managing the underlying cause, close monitoring, and follow up. Determination of the lethality of the patient’s current medication regimen is part of the risk reduction process. Selective serotonin reuptake inhibitors (SSRIs) seem to be safer in the case of an overdose than other agents. SSRIs, such as fluoxetine, are therefore the agents of choice in the treatment of depression for patients who are potentially suicidal

• Increased risk = SADPERSONS: male Sex, Age, Depression, Previous attempt, Excess alcohol or substance abuse, loss of Rational thinking, lack of Social supports, Organized plan, No spouse, Sickness

• Highest rate = Caucasian men, age >85

• any patient presenting with a possible suicide attempt should have an emergent psychiatric evaluation
• always get acetaminophen level in pt. with overdose – can present without sx early on and is in losts of meds
• girls more commonly attempt compared to boys
• percentage of students in grades 9 through 12 reported that they had seriously considered attempting suicide in the 12 months preceding the survey = 14.5%

Dysthymic Disorder (persistent depressive disorder)

• Mild chronic form of major depression – chronically depressed mood >2y in adults (>1 in children); severity of mood does not meet criteria for MDD
• Manage: similar to major depression
• Persistent depressive: includes chronic major depressive disorder + dysthyrmic disorder
• Persistent depressive disorder, or dysthymia, is defined as a period of at least two years of feeling sad, down, or depressed most of the time and on most days, with at least two of the following additional symptoms: decreased or increased appetite, insomnia or hypersomnia, fatigue, low self-esteem, impaired concentration, and hopelessness.

Cyclothymic Disorder

• pt described as moody, erratic, impulsive, somewhat volatile; similar to bipolar but less severe; 15-20% risk of bipolar disorder
• definition:
  o recurring periods of less severe depressive episodes and hypomania over 2 year period, with symptom free periods lasting for no more than 2 months at a time
  o depressive episodes not severe enough to be classified as MD episode; no manic / mixed episodes
• management: similar to bipolar I – mood stabilizers and antimanic drugs = 1st line
<table>
<thead>
<tr>
<th>Disorder</th>
<th>Mania/mixed</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar I</td>
<td>Mania</td>
<td>Typical; not required</td>
</tr>
<tr>
<td>Bipolar II</td>
<td>Hypomania only (no mania)</td>
<td>Yes</td>
</tr>
<tr>
<td>MDD</td>
<td>Never</td>
<td>Yes</td>
</tr>
<tr>
<td>Cyclothymia</td>
<td>Never (but periods of elevation)</td>
<td>Sx but no full episode w/in 1-2 yrs</td>
</tr>
</tbody>
</table>

**Postpartum Depression**

- **Treatment**: Selective serotonin reuptake inhibitors such as **sertraline** are the most commonly used medications for postpartum depression. They have fewer side effects and are considered safer than tricyclic antidepressants, especially in depressed women who may be at increased risk for medication overdose. In one study, infant serum levels of sertraline and paroxetine were undetectable. It is also recommended that a woman with postpartum depression be started on a medication that she had taken previously with a good response, unless there is evidence of potential harm to her infant.
- **Strongest r/f**: PPD in previous pregnancy

**Delirium**

- Acute syndrome caused by medical condition, substance, intoxication or withdrawal or medication side effect → AMS
  - Ex: sepsis, sundowning, ETOH withdrawal, opiate withdrawal, sunstroke
- Rapid onset, short-term, reversible!!!
- **Criteria**:
  - Disturbed level of consciousness (decreased attention span / lack of environmental awareness)
  - Cognitive change – memory deficit, disorientation, language disturbance, visual / auditory hallucinations
  - Rapid onset within hours / days with fluctuating course
  - **Evidence of causal physical condition**
- Dx: history, CT/MRI, CBC, blood cultures, CXR, UA, BUN, electrolytes, glucose, utox to r/o infection
- Tx: treat underlying cause / supportive care; sedation when necessary

**Alzheimer’s Disease**

- Age related progressive cognitive decline, affects 5% of those aged 71-80 years, and near 40% of those aged over 90 years.
- s/s: gradual, progressive memory loss, difficulty word-finding, concentration problems, emotional lability, personality changes, social withdrawal, difficulties with dressing, cooking, balancing the checkbook, and maintaining hygiene. There are multiple types of dementia: Alzheimer disease, vascular dementia, and other less common dementias
- dx: **Folstein Mini-Mental State Examination (MMSE)** or the Memory Impairment Screen. The MMSE may be useful to provide a baseline for future comparison. Controversy exists over the use of memantine and anticholinergic medications in the treatment of dementia.
  - **Alzheimer disease** = MC: 2/3 dementia cases; irreversible; early language / visuospatial defects
    - Severe memory deficits; clues don’t help memory retrieval
    - r/f: advanced age, family hx
  - **vascular**: ¼ cases; r/f: HTN, dyslipidemia, DM, smoking, adv age
  - **lewy body**: cognitive fluctuations, visual hallucinations, Parkinsonism
  - **frontotemporal dementia**: personality, and social behavior changes, non-fluent speech
  - **neurodegenerative conditions**: Huntington disease, metabolic abnormalities
- irreversible causes: alzheimer’s, vascular dementia, Creutzfeldt-jakob
- reversible: depression, B12 deficiency, syphilis, hypothyroidism, NPH, drug use, intracranial mass
- tx: cholinesterase inhibitors (donepezil); NMDA antagonists (memantine) → don’t cure, just slow progression
- other cause major / mild neurocognitive disorders: frontotemporal lobar degeneration, lewy body disease, vascular disease, traumatic brain injury, substance / medication use, HIV, prion disease, parkinson’s disease, huntington’s disease
- dx: mini mental exam / MoCA
  - labs: TSH B12, MRI / CT
- tx: supportive: cholinesterase inhibitors can sometimes temporarily improve cognitive function
Huntington Disease
- Autosomal dominant, incurable neurodegenerative dz → progressive motor / psychiatric dysfunction, dementia, chorea; usually occurs between 30-50yo; life expectancy 15-25 years after symptom onset; high risk suicide
- 50% chance of receiving the disease from a parent
- s/sx: chorea, rigidity, hypotonia, saccadic eye movements, psych symptoms, cognitive decline
- dx: clinical symptoms, MRI, family history, genetic testing
  - Genetic testing = 40+ CAG repeats
  - MRI = cerebral atrophy and atrophy of caudate nucleus
  - Chorea = nonrepeating complex involuntary rhythmic movements
  - Dementia, mutism, dysphagia
- Tx: currently incurable – treat chorea with risperidone / haloperidol
  - Tetrabenazine depletes dopamine → first drug to specifically treat chorea; neuroleptics also help
- Fatal in 15-20 years

Parkinson Disease
- Caused by degeneration of basal ganglia in substantia nigra; causes resting tremor
- Tremor: resting tremor that’s asymmetric; disappears with voluntary movement; pill rolling, bradykinesia, rigidity, postural instability
- Dx: based on clinical impression: no physiologic or blood tests to confirm; gold standard = neuropathologic exam; MRI of brain = nondiagnostic but can rule out structure abnormalities
- Tx: dopamine agonist

Psychotic Disorders
- Loss of touch with reality: schizophrenia, bipolar disorder, depression, organic (injury, alcohol)
- Psychosis can be caused by both organic (medical) and functional (psychiatric) etiologies. It is critical for the clinician to exclude organic causes of psychosis before transferring the patient to psychiatric services. The delay in diagnosis and therefore treatment is potentially harmful to the patient. Unfortunately, it can be difficult to differentiate the etiologies. Patients with organic causes of psychosis tend to have recent memory deficits, psychomotor retardation, visual hallucinations, emotional lability, disorientation and occasional periods of lucidity. Additionally, those with organic psychosis are more likely to have a sudden onset of symptoms, abnormal vital signs or physical examination findings and social immodesty. In patients over 40 years of age without a prior psychiatric history, an organic cause of psychosis should always be assumed.

Delusional Disorder
- Presence of delusions (false beliefs) for at least 1 month; may be bizarre; no hallucinations or disorganized speech / behavior
- Persistent, nonbizarre delusions not explained by other psychotic disorders. It is a fixed false belief that has a certain level of plausibility
- Paranoid disorders, delusions about things that could happen in real life
- Behavior is not obviously odd, functioning not significantly impaired
- Types of delusions
  - Erotomanic: / love another person (famous or powerful) is in love with patient
  - Somatic: patient has physical defect or medical conditions
  - Jealous: patient’s partner having an affair
  - Persecutory: patient or another person is mistreated or persecuted = MOST COMMON
  - Grandiose: inflated self-worth, power, knowledge, identity; belief that pt. is famous
  - Reference: random events take on personal significance
  - Control: some agency takes control of thoughts, feelings, behaviors
  - Nihilism: exaggerated belief in futility of everything
  - Doubles: family member or close person has been replaced by identical clone
  - Mixed: characteristics of more than one type of delusion
- **Parasitosis: Delusions of parasitosis (DoP)** is a delusional disorder involving the **firm belief** by the patient that the pruritus is caused by an infestation of insects or parasites. Patients present with **self-inflicted skin manifestations** from scratching or digging and may bring a sample of debris, lint, or pieces of skin that they say contain the insects or parasites. Diagnosis involves excluding any true skin infestations, such as scabies, as well as ruling out systemic disease that may cause pruritus. Once a physical etiology has been excluded, diagnosis is through meeting criteria established by the Diagnostic and Statistical Manual of Mental Disorders (DSM). Initial management is by establishing a strong therapeutic alliance with the patient and respecting the patient’s autonomy in all encounters. First-line pharmacologic treatment is with antipsychotic medications.
  - **Unspecified**: delusion can’t be clearly determined or characterized
  - **Tx**: same as schizophrenia – antipsychotics / SSRIs can decrease delusional beliefs; avoid directly challenging the patient
    - First-line medications to treat delusional disorder are antipsychotics, including aripiprazole.
  - The term **delusional disorder** refers to a condition whose core feature is persistent, nonbizarre delusions not explained by other psychotic disorders. It is a **fixed false belief that has a certain level of plausibility**. The delusion may emerge gradually and become chronic, and sometimes is associated with a precipitating event. Behavioral, emotional, and cognitive responses generally are appropriate, and neither mood disorders nor schizophrenic illness is present. There are several types of delusions, and the predominant type is identified to make the diagnosis. Minimal deterioration in personality or function and the relative absence of other psychopathologic symptoms have been considered important evidence for distinguishing this disorder from schizophrenia and other psychotic condition.

  **Schizoaffective Disorder**
  - **Definition**: meets criteria for MD episode, manic episode, or mixed episode, during which criteria for schizophrenia also are met → mixture of psychotic and mood symptoms
    - **Schizophrenia + mood disorder (major depression or bipolar d/o)**
  - **Criteria**: delusions or hallucinations lasting for 2 weeks without mood disorder sx help differentiate schizoaffective d/o from mood disorder with psychotic features
  - Carries better prognosis than schizophrenia but worse prognosis than mood disorder
  - **Tx**: target psychotic and mood sx: second generation/atypical antipsychotic (paliperidone) are first line; mood stbilizers (lithium or valproate) or antidepressant can be added; psychosocial support

  **Schizophrenia**
    - **Paranoid**: preoccupied with delusions of persecution or grandeur – usually tense and guarded
    - **Disorganized**: unorganized behavior, disorganized speech, inappropriate affect; word salad, neologism
    - **Catatonic**: silent, does not respond to external stimuli
    - **Residual**: socially withdrawn
  - **Hallucinations**:
    - **Auditory**: MC – sound or a void – voice often in 3rd person or can be command hallucinations
    - **Visual**: simple (flashing light) or complex (face)
    - **Olfactory**: stench or foul smells common
    - **Tactile**: insects on skin or being touched
    - **Somatic**: sensation arising from within the body
    - **Gustatory**: can be apart of persecutory delusions (tasting poison in food)
  - **Neologisms** are nonsense words invented by the patient. This is a common symptom in schizophrenia.
  - **Pathophysiology**:
    - **Positive sx**: hallucinations, delusions, disorganized speech and thinking, movement disorders (catatonic behavior), caused by excess dopamine receptors in mesolimbic pathway
    - **Negative sx**: flat emotional affect: social withdrawal, lack of emotional expression, communication and reactivity, silent patients. Caused by dopamine dysfunction in the mesocortical pathway (decreased dopamine); serotonin (SHT) also thought to play a role
    - **patients with schizophrenia have decreased CNS grey matter, increased size of ventricles, increased CNS dopamine receptors – 10% incidence in pts with 1st degree relative that is schizophrenic**
  - **management**:
    - **1. Antipsychotics** – dopamine receptor antagonists – 2nd generation = 1st line treatment (clozapine, risperidone, olanzapine); 1st generation (chlorpromazine / haloperidol = increased extrapyramidal sx)

  **Schizophreniform Disorder**
• Fits criteria for schizophrenia but <6mo duration (last between 1 and 6 months)

**Intimate Partner Abuse / Domestic Abuse**
- 24% women and 12% men experienced domestic violence in their lifetime
- Increases during pregnancy and postpartum
- More common among black, Hispanic, native American women
- when confronted with pt. who may be a victim: 1. Immediate medical attention to address physical sequelae, 2. Recognition of suspected abuse / engagement of pt. with non-threatening questioning to confirm whether abuse has occurred 3. Provision of contact information for referral agencies and make referral immediately
- Precautions: present options; woman who leaves abusive partner has 70% greater risk of being killed by batterer than woman who stays
- battered victims have suffered blow to their eg defenses may not be assertive enough to believe that their rights have been violated
- not uncommon to find battered women who believe they deserved beating
- Treatment:
  - medical attention to address physical needs; recognition of abuse + non-threatening questioning; contact numbers for referral agencies; present options
  - victim and children: open-ended questions → more direct; supportive psychotherapy in safe environment
  - abuser: referral for therapy, treatment for substance abuse / concurrent psychiatric problems, gradual reuniting with family

**Rape**
- definition: act of sexual aggression perpetrated on spouse, known partner, strangers
- approach: hx and physical exam including genital and rectal examinations should be completed as soon after event as possible
  - rape = psychiatric emergency and legal situation; all procedures = documented, clothing saved, samples taken
  - rape kit: history, how specimen samples are collected and under what conditions and how samples should be handled to ensure evidence handled properly
  - explain purpose of procedure and inform what is being done
- Prevention of STD and pregnancy: prophylactic abx therapy and pt. should be given options of emergency contraception
- Counslening: pt. should talk to mental health professional ASAP + follow-up counseling

**SUBSTANCE RELATED DISORDERS**
- General characteristics: MC abused drugs = alcohol, nicotine, caffeine
- Substance use: inappropriate use of a substance resulting in significant impairment → 2+ of the following 11 maladaptive behaviors in a 12 month period
  1. Tolerance: decreased effect over time when same amt. substance used or need to increase to get to baseline
  2. Withdrawal: sx with onset closet to cessation of substance
  3. Use of increasingly larger amounts of substance or over over longer period than intended
  4. Unsuccessful efforts to stop or decrease amount of substance used
  5. Significantly more time spent attempting to acquire or use substance or recover from its effects
  6. Continued use of substance despite awareness of adverse consequences (fails to meet home / school / work obligations, repeatedly uses substance n hazardous situations, cravings / strong desire to use, continues to use despite interpersonal / social problems)
- Intoxication: maladaptive behavioral or psychological changes attributed to recent ingestion of substance; reversible and not caused by mental disorder / medical condition
- Severity: mild (2-3 sx), moderate (4-5 sx), sever (6+ sx)
- Epidemiology: lifetime prevalence = 17%; most likely age groupu = 18-24 M>F; in US substance abusers have 3x greater risk having mental disorder; r/f measured through CAGE questionnaire (below)
- Marijuana, cocaine, hallucinogens = most commonly used
Alcohol Related Disorders

- s/s: intoxication = slurred speech, ataxia, facial flushing, erratic behavior, loss of inhibition, euphoria
  - chronic abuse: acne rosacea, palmar erythema, hepatomegaly, dupuytren contracture, testicular atrophy, gynecomastia
- screening: CAGE – cut down, annoyed / criticized for drinking, guilty, eye opener
- alcohol use d/o = strong urge / craving to use alcohol
- diagnostics: elevated GGT (early sign), ALT, AST, lactate dehydrogenase, MCV, decreased BUN, decreased LDL and red blood cell volume
- withdrawal sx: shakes, jitters 8-18 hours after stopping, peak 24-48 hours; abnormal perceptions, n/v (8-18 hours), seizures, hallucination (within 2 days), delirium tremens (2-3 days but can occur up to a week after)
  - 12-24 hours: Irritable, diaphoretic, tachycardia, insomnia, tremor, autonomic hyperactivity
  - 24-48 hours: Seizure
  - patients may develop alcohol withdrawal with mild symptoms, alcohol related seizures or in the most serious and life-threatening form of withdrawal, delirium tremens. The patient described here has several abnormal vital signs (fever, tachycardia, hypertension). These abnormalities are concerning for major alcohol withdrawal which is a constellation of symptoms which may include anxiety, irritability, tremors, tachycardia, fever, hypertension, decreased seizure threshold and both auditory and visual hallucinations. In its most severe form, patients develop delirium tremens, which is a severe hyper-adrenergic state with confusion, hallucinations and hemodynamic instability. This condition is life-threatening and requires aggressive treatment with benzodiazepines and possibly antipsychotics.
    - In ED: give glucose, thiamine (to regenerate NAD), fluid repletion, supportive measures
- tx:
  - nonpharm: education, coping skills, relaxation therapy, family therapy, psychotherapy, health and nutritional counseling, AA
  - pharm:
    - withdrawal = benzos (diazepam = chlordiazepoxide or Librium) + folic acid and MVI, thiamin may prevent Wernicke’s encephalopathy; antipsychotic may be indicated for alcoholic halucinosis
    - disulfiram (Antabuse) – alcohol-deterrent that causes nausea with consumption
    - naltrexone: maintenance therapy (decrease cravings and perhaps relapse rates)

Cannabis Related Disorders

- mild euphoriants with some sedative effects
- MOA:
  - Marijuana is the most widely used illegal psychoactive substance in the world. Its psychoactive properties come from delta-9-tetrahydrocannabinol which is chiefly found in the flowering heads of the female plant. Delta-9-tetrahydrocannabinol is a partial agonist at both the cannabinoid 1 and cannabinoid 2 receptors. Cannabinoid 2 receptors are found on immune cells and some neurons, and stimulation of these receptors does not lead to positive reinforcing or rewarding effects. In contrast, cannabinoid 1 receptors are located throughout the body, including the dopaminergic mesolimbic brain circuit, otherwise known as the body’s brain reward system. It is the stimulation of these receptors which leads to the potential for abuse of marijuana. Cannabis can be smoked, inhaled as a vapor, or ingested orally. Smoked and inhaled cannabis has a rapid onset of action, while ingested cannabis has a slower absorption and leads to less intense effects. The potency of cannabis is determined by the ratio of delta-9-tetrahydrocannabinol to cannabidiol contained in the substance. Cannabidiol is not psychoactive and tends to inhibit or lessen the effects of delta-9-tetrahydrocannabinol, so the lower the ratio of delta-9-tetrahydrocannabinol to cannabidiol, the lower the potency of the drug. Negative health consequences of cannabis use include decreased memory, attention, and concentration. Some users may also experience transient psychosis. A cannabis use disorder, similar to that seen in other drugs of abuse, can develop. Not all users of marijuana develop cannabis use disorder. Genetic predilection and environmental factors play important roles in determining those who will progress from recreational use to cannabis use disorder.
- s/s intoxication: disconnected speech, recent memory impairment, emotional lability, depersonalization, confusion, increased HR, conjunctival injection, decreased body temp
- adverse reactions: panic, psychosis, depression (rare) – chronic psychotic states secondary to cannabis use have been reported in eastern cultures where doses are presumably much higher
  - amotivational syndrome: low drive, poor judgment, introversion, loss of insight, poor communication skills, depersonalization – occurs in people who use marijuana heavily on regular basis for many months / years
• no clear whether heavy cannabis use causes or results from this condition of low motivation
• adverse effects of intermittent use = not study

• withdrawal does not require medication but anxiolytics can be used
  o **Withdrawal** usually occurs within 24 to 48 hours of stopping the drug, and symptoms include malaise, irritability, insomnia, diaphoresis, night sweats, GI disturbance, and drug craving. The withdrawal symptoms usually peak by day 4 and are resolved by day 10-14.
  o CBT and motivational incentives are successful

• Detectable in urine for 1 month

**Hallucinogen Related Disorders** – psilocybin (shrooms), mescaline (peyote), LSD, DMT

• induce altered states of awareness that resemble those of natural psychoses

• **Phencyclidine** (PCP) is a hallucinogenic drug that can be insufflated, smoked, ingested, or injected. It can cause violent or bizarre behavior, horizontal and vertical nystagmus, disorientation, and auditory hallucinations. If the intoxication is mild, supportive care is usually sufficient to manage the patient. Should the patient be agitated or violent, the first-line treatment is benzodiazepines.

• **s/s intoxication:** alteration of mood (euphoria), vividness of real or fantasied sensory illusions and hallucinations, synesthesia (overflow from one sensory modality to another) confusion, time slowing, loss of body boundaries, grandiosity, omnipotence

• **adverse reactions:** acute panic attacks, psychosis, flashbacks, precipitation of underlying psychosis

• **LSD intoxication:** dilation of pupils, increased deep tendon reflexes, muscle weakness, HTN, tachycardia, fever

• **Tx:** supporting and reassuring person and diminishing stimulation around the person until it wears off; quiet room, talking to help distinguish psychotic sx from reality; severe panic = oral diazepam; avoid antipsychotic medication due to adverse anticholinergic reactions from hallucinogen + antipsychotic

**Inhalant Related Disorders**

• **Definition:** substances that contain mind-altering properties when inhaled (huffing / sniffing) – high only lasts several minutes (glue, aerosol, shoe polish, gas, lighter fluid, leather cleaner, paint thinner)

• **Adverse reaction:** seizure, coma, death; addiction uncommon but possible

• **Sx:** belligerence, aggressiveness, apathy, euphoria, impaired judgement, dizziness, poor coordination, slurred speech, unsteady walk, lethargy, slow movement / reflexes, muscle weakness, tremor, blurred vision, stupor, com; clears within a few minutes to hours after exposure

• **erythematous rash about the mouth** is a common finding in patients inhaling solvents (glue, paint thinner, lacquer). It is usually caused by a contact dermatitis to the solvent and other chemicals in the substance abused and may be associated with a secondary bacterial infection. Additional clinical features include mood swings, erratic behavior, headache, nosebleed, facial flushing, salivation, visual changes, nausea, vomiting, anorexia, unusual breath or body odor, coughing, wheezing, tachycardia, dysrhythmia, slurred speech, ataxia, disorientation, tremor, loss of consciousness, hallucinations, nystagmus, and poor attention. Chronic pulmonary, neurologic, psychiatric, cardiovascular, hematologic, renal, and hepatic disorders may result from prolonged abuse. Diagnosis is established by a thorough history and physical. Acute treatment is largely supportive, though respiratory, hematologic, renal, hepatic, and cardiovascular complications may require more intensive treatment. Ongoing psychiatric and primary care are paramount in long-term treatment, as additional behavioral and psychiatric comorbidities are common, including abuse of other substances.

• **Long/term effects:** damage kidney, liver, nerve fibers, brain cells

• **Tx:** educational campaigns; treat the seizure, CBT, individual / family therapy

**Opioid Related Disorders** – heroin, oxycodone, codeine, fentanyl, morphine

• **Intoxication s/s:** drowsiness, impaired concentration, bradycardia, hypotension, constricted pupils, slurred speech, flushing
  1. Hypoventilation and respiratory depression, CNS depression, miosis

• **Withdrawal s/s:** lacrimation, rhinorrhea, sweating, yawning, anxiety hypertension, tachycardia, n/v, abdominal cramps, muscle/joint pain, mydriasis, lacrimation
  1. Adrenergic hyperactivity (CNS excitation, tachypnea, tachycardia, hypertension)
  2. GI sx: abdominal cramping, n/v/d
  3. Mydriasis
  4. Yawning, lacrimation
  5. Give clonidine for withdrawal

• **Tx:**
  1. Naloxone to reverse effects
     • Support the airway!
     • Provide supplemental oxygen before administering naloxone
Naloxone (pure opioid antagonist)!!!

2. Slow taper methadone or clonidine with adjuncts (ibuprofen for muscle cramps, loperamide for diarrhea, promethazine (anti-histamine / anti-nausea – Phenergan) or dicyclomine (bentyl) for GI distress; benzos for mild withdrawal

3. Ongoing maintenance: methadone, naltrexone, buprenorphine, or combination of the latter with naloxone

**Sedative, hypnotic, or anxiolytic related disorders** – “downers” that affect CNS; most = prescription drugs (benzos, barbiturates → prone to dependence)

- Longer term use of 10-40 mg benzos can result in physical dependence
- **Overdose**: sx of intoxication and overdose mimic drunkenness – drowsiness, slurred speech, lack of coordination, memory impairment, confusion, nystagmus, moodiness, faulty judgement – occur in much higher doses with benzos that barbiturates but alcohol + benzos can cause OD
  - **OD tx**: induce vomiting or gastric lavage to clear stomach; send blood / urine / gastric content for tox analysis; monitor and support respiratory / cardiac function for at least 24 hours
  - **Comatose / semi-comatose**: attempt gastric lavage if drug taken <12 hrs earlier, alkalinate urine to increase excretion; support life function via intubation, oxygen, plasma expanders, vasopressors

- **Withdrawal**: seizures and cardiovascular collapse and death; sx = agitation, anxiety, anorexia, vomiting, increased HR, postural hypotension, hyperreflexia, tremor, seizures, delirium, hypothermia, cardiovascular collapse
  - **Withdrawal tx**: substitution of barbiturate or long acting benzo (diazepam) for abused DNS depressant with gradual tapering
  - If dependent on both opioids + barbiturates, barbiturate withdrawal is carried out first
  - May take several weeks to d/c benzo with careful monitoring

**Stimulant Related Disorders** – caffeine, cocaine, amphetamines/methamphetamine, pseudoephedrine, diet pills

- **Acute intoxication**: agitation / aggression, impaired judgment, euphoria, elevated blood pressure, transient psychosis, tachycardia, dilated pupils, hallucinations
- **Withdrawal s/s**: fatigue, depression, headache, profuse sweating, muscle cramps, hunger
- **Tx**: benzos to reduce agitation; short-term antipsychotics for psychotic sx

**Tobacco Related Disorders:**

- **Definition**: nicotine – changes brain to cause cravings → use / withdrawal; MC substance use disorder in the US; most preventable cause of disability and early death
- **5x**: impariment or distress within a 12 mo period bc of tobacco use, taking tobacco in larger amounts or over a longer period of time than originally intended; having strong craving / urge to use toacco; having strong desire to cut down; making unsuccessful efforts to do so; spending a lot of time trying to obtain / use tobacco products; use tobacco despite problems ti causes in major areas of life; using tobacco in situations where it’s hazardous; increasing amount to reach desired effect
- **Withdrawal sx**: irritability, anxiety, difficulty concentrating, increased appetite, depressed mood, insomnia; peak 2-3 days after abstinence and last 2-3 weeks.
- Those with alcohol / substance use disorders have lower rate quitting; family link
- **Tx**: pharmacological, behavioral, psychosocial – patch, gum, Chantix
  - Integrated / combined treatment
  - nicotine replacement therapies (patch, gum, lozenge, inhaler, nasal spray) – low cost but less effective than varenicline and bupropion; more steady delivery nicotine than cigs
  - Chantix (varencline) – relieve craving and withdrawal, reduce reinforcing effects of nicotine – most effective of pharm interventions – BB warning for cardiovascular adverse events; may cause depressed mood, agitation, suicidality
  - Buproprion (zyban) – antidepressant that reduces cravings and other withdrawal effects – effective but less than Chantix; do not use with sseizure disorders, current use of buproprion, MAOIs, electrolyte abnormalities, eating disorders
  - Other - Individual psychical intervention – counseling, motivational interviewing, CBT; Group support; Mobile technologies; Organization interventions
Sympathomimetic Toxidrome

- **sympathomimetic toxidrome** is seen with the acute abuse of cocaine, amphetamines, or decongestants. **Cocaine** causes release of dopamine, epinephrine, norepinephrine, and serotonin. The greatest impact comes from the adrenergic stimulation by norepinephrine and epinephrine. Norepinephrine causes vasoconstriction by stimulating alpha-adrenergic receptors on vascular smooth muscle. Epinephrine increases myocardial contractility and heart rate through stimulation of beta-1-adrenergic receptors. Norepinephrine and epinephrine also cause vasoconstriction by stimulating alpha-adrenergic receptors on vascular smooth muscle. Epinephrine increases myocardial contractility and heart rate through stimulation of beta-1-adrenergic receptors. In addition to causing catecholamine release, the reuptake of these neurotransmitters is inhibited. Clinically, patients are usually hypertensive and tachycardic and exhibit mydriatic pupils. In massive overdoses, cardiovascular collapse can result in shock and wide-complex dysrhythmias. CNS effects include seizures. Sympathomimetic toxidrome is sometimes difficult to distinguish from anticholinergic toxidrome. The difference is that patients usually present with dry mucous membranes with an anticholinergic overdose, whereas patients are diaphoretic with sympathomimetics. Treatment is usually supportive.

- *don't use beta blockers* → this can lead to unopposed alpha-receptor stimulation and cardiovascular collapse.

**HEMATOLOGY**

**Acute / Chronic Lymphocytic Leukemia**

- **ALL**: child + LAD + bone pain + bleeding + fever + >20% blasts
  - **Tx**: highly responsive to **chemo**; in relapse → bone marrow transplant
- **CLL**: middle aged pt – often asymptomatic, fatigue, LAD, splenomegaly
  - **Dx**: SMUDGE cells on peripheral smear, mature lymphocytes
  - **Tx**: observation, if lymphs >100K or symptomatic → **chemo**

**Acute / Chronic Myelogenous Leukemia**

- **AML**: auer rods + >20% blasts in adults >50yo
  - **s/sx**: anemia, nosebleeds, bruising thrombocytopenia, neutropenia, splenomegaly, gingival hyperplasia, bone pain
  - **tx**: combination chemo, bone marrow transplant
- **CML**: WBC >100K + hyperuricemia + adult >50yo
  - 70% asymptomatic until pt has blast crisis (acute leukemia)
  - **Dx**: Philadelphia chromosome (translocation chromosome 9 and 22), splenomegaly
  - **Tx**: Gleevec (imatinib) which makes this chronic dz state

**Anemia**

- **Chronic Disease**: normochromic/normocytic; tx = epo / treat underlying disease
- **Aplastic**: decreased WBC, decreased RBC, decreased platelets – will have normal MCV and decreased reticulocytes; dx = pancytopenia
- **B12 deficiency**: ↑ MCV > 100 (macrocytic anemia), Hypersegmented Neutrophils and normal folate, decreased vibratory and position sense
  - **Etiology**: Pernicious anemia (antibody to intrinsic factor), gastrectomy, vegans
  - **Glossitis**: Smooth beefy, sore tongue. Neurologic symptoms (poor balance, low proprioception)
  - **Dx**: Megaloblastic anemia (MCV > 100). Hypersegmented neutrophils, Elevated serum MMA, Elevated homocysteine, Pernicious anemia: Schilling test (less than 10% radiolabeled vitamin B12 in urine. Normal results when repeated with administration of intrinsic factor
  - **Tx**: Lifelong IM B12: 1-3 ug/d (animal products, fortified cereal) for pernicious anemia, IV Cyanocobalamin 1 mg IM daily × 7 d, then weekly × 4 wk, then monthly for life, PO B12 1-2 mg PO daily for vegans and bariatric surgery, Years to deplete stores
- **Folate deficiency**: decreased folate, increased MCV – looks like B12 with no neuro dysmptopms, usually in alcoholics
  - **Dx**: CBC, hypersegmented PMNs, elevated homocysteine, normal MMA
  - **Tx**: PO folic acid, avoid ETOC / folic acid antagonists, green leafy vegetables, yeast, legumes, fruits, animal products
- **G6pd**: after infection or medication in AA male + Heinz body + bite cells on smear; hemolytic
  - **Flare triggers**: fava beans, antimalarials, sulfonamides
  - **Tx**: avoid harmful drugs, monitor infection, blood transfusion
- **Hemolytic**:
  - **Autoimmune**: ↑ Retic, ↑ LDH, ↓ Haptoglobin, and ↑ Bilirubin (indirect)
  - **Hereditary spherocytosis**: ↑ Retic, ↑ LDH, ↓ Haptoglobin, and ↑ Bilirubin (indirect) and the presence of spherocytes
- **G6PD deficiency:** after infection or medication (oxidative stress) in an African American male (x-linked) + Heinz Bodies and Bite Cells on smear (damaged hemoglobin - G6PD protects RBC membrane)
- **Sickle cell:** (Very ↑ Retic count + Pain in African American male, Hemoglobin electrophoresis: Hemoglobin S, Blood smear: Sickled RBCs, Howell-Jolly bodies, target cells)
  - Dx: hemoglobin electrophoresis
  - Tx: hydroxyurea + vaccines
- **Thalassemia:** Very ↓ MCV (microcytic and hypochromic) with a normal TIBC and Ferritin, elevated iron and family history of blood cell disorder
  - Beta thalassemia major
    - Most severe, Mediterranean descent, failure to thrive
    - Hemoglobin electrophoresis: Hemoglobin A2 and F
    - Treatment: transfusion dependent. iron chelation (deferoxamine
  - Beta thalassemia trait
    - Mild anemia, often misdiagnosed as iron deficient
    - Hemoglobin electrophoresis: Hemoglobin A2
  - Alpha thalassemia
    - Chinese and southeast Asians
    - Hemoglobin electrophoresis: Hemoglobin H (H disease), Hemoglobin Bart's (hydrops fetalis), Hemoglobin A (trait)
- **Iron deficiency:** ↓ MCV (microcytic), ↓ MCH (hypochromic), ↑ TIBC, ↓ Ferritin (best test, low iron stores), Target cells, pica and nail spooning
  - Most common anemia in the US
  - Always consider GI bleed
  - Associated with pica and nail spooning
  - Diagnostic studies:
    - Microcytic Hypochromic anemia
    - Low Ferritin (best test)/Fe, high TIBC
    - Target cells
    - Treatment: FeSO4 325 mg TID; Packed red blood cells when Hgb <8

### Aplastic Anemia
- Loss of blood cell precursors → hypoplasia of bone marrow, RBCs, WBCs and platelets without reticulocytosis
- Causes: chemicals, drugs, radiation (ACE-I, sulfonamides, phenytoin, chemo, radiation)
- s/sx: severe pallor, weakness, petechiae, ecchymosis, mucosal bleeding, severe infection
- dx: decreased WBC, RBC, platelets; most accurate = bone marrow biopsy
- tx: stop causative agent, RBC transfusion, bone marrow transpaaent, immunosuppressive agents

### Clotting Factor Disorders
- Proteins that respond in cascade to form fibrin strands that strengthen platelet plug
- **Von Willebrand:** MC genetic bleeding disorder, autosomal dominant
  - Decreased vWF and decreased factor VIII; vWF found in plasma, platelets, walls of blood vessels; when factor missing / defective, platelets can’t adhere to the vessel wall at site of injury so bleeding doesn’t stop as quickly as it should
  - Presentation: excessive bleeding after cut / increased menstrual bleeding – no hemarthrosis (small amounts of superficial bleeding); hx of bleeding problems – bruise easily, bleed excessively
  - Tx: DDAVP (desmopressin) or transfusion of concentrated blood clotting factors containing vWF
- **Hemophilia:** X linked recessive = usually in males
  - Hemarthrosis, bruising, bleeding, **increased PTT**, normal PT and platelets, normal bleeding time decreased factor VIII or IX on assay
  - Dx: functional assay for factor VIII or IX to confirm diagnosis
  - Tx: replacement of factor VIII or IX
    - Hemophilia A: decreased clotting factor VIII – 80% of cases
    - Hemophilia B (Christmas disease): decreased clotting factor IX

### Hypercoagulable States
- **Pneumonic PVCs!!!:**
  - Platelets (too many >1 million) or overactive (TTP, heparin-induced thrombocytopenia, HUS, HELLP)
Vascular injury: plaque, trauma, burns
Clotting factors: anticlotting factors protein C, protein S, antithrombin II deficient / not working
Stasis / Surgery

- Virchow triad: stasis, hypercoagulable state, vascular injury
- Acquired hypercoagulable states: malignancy, pregnancy, nephrotic syndrome, ingestion of meds (estrogen), immobilization, myeloproliferative dz, US/Crohn’s, behcet’s syndrome, polycythemia vera, intravascular devices, DIC, hyperlipidemia, antiphospholipid syndrome
- Heparin can cause HIT, causing decrease platelets followed by platelet activation causing clotting and infarction
- Lupus anticoagulants: IgM or IgG immunoglobulin is seen in 5-10% of pt with SLE but MC without lupus or in those taking phenothiazines

- **Factor V Leiden (MC):** procoagulant clotting factor – amplifies production of thrombin → clot formation
  - Mutated factor V resistant to breakdown by activated protein C → hypercoagulability
  - Increased DVT and PE especially in young patients
  - Dx: activated protein C resistance assay; normal PT/PTT
  - Tx: LMWH bridge to warfarin; long term antithrombotic therapy not recommended

- **Protein C Deficiency:** vitamin K dependent anticoagulant liver protein that stimulates fibrinolysis and clot lysis (inactivates factor V and VIII) – potentiated by protein S
  - Increased risk recurrent DVT / PE; may have family hx
  - Dx: protein C / S functional assay: decreased protein C / S activity levels
  - Tx: heparin and oral anticoagulation for life

- **Protein S Deficiency:** vitamin K dependent that is a cofactor for activated protein C, which inactivates procoagulant factors Va and VIIIa → reducing thrombin generation
  - VTE = risk
  - Dx: protein C or S functional assay: decreased protein C or S activity levels
  - Tx: heparin / oral anticoagulation for life

- **Antithrombin III Deficiency:** recurrent venous thrombosis and PE, repetitive intrauterine fetal death (IUFD)
  - Antithrombin III = natural anticoagulant; inhibits thrombin (IIa), Xa and other proteases; potentiated by Heparin
  - Associated with VTE; first episode 20-30yo
  - Asymptomatic pt require anticoagulation only before surgical procedures
  - Pt with thrombotic events require high dose IV heparin then oral anticoagulation indefinitely

- **Antiphospholipid Antibody Syndrome:** autoimmune; often associated with SLE; characterized by thromboses and recurrent spontaneous abortions
  - Autoantibodies react against platelet membranes, activating endothelial cells and platelets → complement mediated thrombosis
  - Dx: lupus anticoagulant, anticardiolipin, DRVVT test, prolonged PTT
  - Tx: high dose IV heparin with thrombotic events then oral anticoagulation indefinitely

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**Easy Bruising**

- HIT, ITP, TTP, HUS, hemophilia, DIC, Von Willebrand
- Meds – NSAIDs = MC, anticoagulation / antiplatelet, glucocorticoids, antidepressants, antibiotics
- Protein malnutrition, vitamin C deficiency, vitamin K deficiency
- s/sx: petechiae, purpura, LAD, hepatosplenomegaly (chronic liver disease), hypermobile joints (ehlers danlos), mitral valve prolapse (marfan)

**Sickle Cell Anemia**

- Sickled cells on peripheral smear + HgbS on hemoglobin electrophoresis
- Chronic hemolytic anemia occurs almost exclusively in blacks
- Sickle-cell shaped RBCs clog capillaryies causing organ ischemia (crises)
- Very high retic count can be used to monitor event (decreases as pt improves)
• Dx: HgbS on hemoglobin electrophoresis; sickled cells, polychromasia, reticulcytosis, howel jolly bodies, mildly increased WBCs, Hgb 8-10, Hct 20-30
  o RBCs = normochromic, normocytic
  o Hb SS = disease
  o Hb SA = trait
  • Two parents with sickle cell trait = 1 in 4 chance of having child with Hb SS
• Tx: high flow O2, pain control during crisis, supportive transfusion when Hgb <6
• Infection, bone marrow aplasia, lung involvement can develop acutely and be fatal; normocytic hemolytic anemia = characteristic

**Lymphoma**

• **Hodgkin’s: HIGHLY CURABLE – painless LAD + reed-sternberg + bimodal age (20s/50s) + B sx**
  o Bimodal; peaks 20s and 50s
  o Reed-sternberg cells
  o Painless LAD; contiguous spread to local lymph nodes
  o B symptoms common: fever, weight loss, night sweats
  o Associated with EBV
  o Excellent 5 year cure rate
  o Dx: CXR to check for mediastinal adenopathy
  o Tx: chemo, radiation, highly curable

• **Non-Hodgkin’s: HIV pt + IG sx + painless LAD**
  o >50 yo; increased risk immunosuppression
  o B cells and T cells
  o Peripheral, multiple nodes; non-contiguous extranodal spread (GI and skin = MC)
  o B sx not common
  o Not associated with EBV
  o Variable cure rate
  o s/sx: SOB, intussusception, bowel obstruction, abdominal masses
  o tx: rituximab, chemo, variable course

**Polycythemia**

• primary: malignancy of bone marrow → overproduction RBCs but can also affect WBC / platelet
  o s/sx: pruritus after hot bath, swelling, burning pain, rubor of hands / feet / gout, hyperviscosity (HA, blurred vision, dizziness, DVT, PE, bleeding, splenomegaly
• secondary: increase in Epo – usually altitude related, hypoxic disease associated, bloodletting
• dx: 4 H’s: hypervolemia (increased RBC), hisaminemia (increased histamine due to release from mast cells), hyperviscosity (increased hematocrit = increased viscosity) and hyperuriecemia
• positive Jak2 tyrosine kinase mutation
• dx: bone marrow biopsy
• tx: repeated phlebotomy to lower crit to <42%
  o older pt with hydroxyurea +/- aspirin
  o anagrelide to decrease platelet count

**Idiopathic Thromobcytopenic Purpura**

• Autoimmune ab reaction to platelets → splenic platelet destruction after acute infection – chronic in adults; acute / self-limited in kids
• Primary ITP: no underlying condition
• Secondary ITP: underlying condition i.e. HIV, HCV, SLE, CLL
• Presentation: 1-2 weeks after viral infection
• Dx: isolated thrombocytopenia and otherwise normal CBC and peripheral blood smear
  o Primary: isolated thrombocytopenia <100,000 without a cause
  o Secondary: isolated (<100,000) with an underlying cause (ie HIV)
  o Positive direct coombs test
• Tx: observation in pt with platelet count >30,000 and no bleeding
  o Steroid with <30,000
  o IVIG with <30,000 with CI to steroids, refractory to steroid tx or bleeding / high risk bleeding
Splenectomy = second line tx with refractory Thrombotic Thrombocytopenic Purpura

- **TTP**: decreased platelets + anemia + schistocytes
- **Purpura + FAT RN** → fever, anemia, thrombocytopenia, renal failure, neurological sx
  - Triggers: drugs (quinine, ticlopidine, clopidogrel, cyclosporine), SLE, infections, AIDS, malignancies
  - Dx: CBC normal except low platelets, schistocytes (RBC fragments) on smear (-) coombs test
- Hemolytic uremic syndrome: decreased platelets + anemia + renal failure (associated with E.coli O157 – children with epoure to E.coli (ground beef) + severe kidney problems
- TTP vs ITP: ITP = insidious and chronic from TTP which is acute febrile disease with multi-organ thrombosis
- Tx: plasmapheresis (plasma exchange)
  - adults with TTP also give steroids
  - HUS refractory to plasma exchange / steroids → eculizumab

**DIC**

- Abnormal activation of coag sequence → formation of microthrombi throughout microcirculation → consumption of platelets, fibrin, coag factors
- s/sx: hemorrhage, bleeding, thrombosis occur spontaneously
- dx: decreased platelets, increased bleeding time, increased PT, increased PTT, + d-dimer
- tx: cryoprecipitate, FFP, platelet transfusion, heparin, treat cause