

While this is still a work in progress, please only distribute within the Penn Med community! We hope this does you some good. There is a range of completeness to the tables included, so the one request is that throughout the year if you add annotations and content that is valuable, please send them back to us, to contribute towards later versions. Thanks! Good luck with clinics, you'll do great!!

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MISC

phosphodiesterase inhibitors (e.g. sildenafil) = 1st line for erectile dysfunction in DM

1. contraindicated in patients treated with nitrates
2. use with caution in conditions predisposing to priapism
3. may have adverse reactions with concurrent use of drugs which interfere with metabolism of sildenafil (e.g. erythromycin, cimetidine)
4. give at least 4 hr interval if combining with an alpha-blocker (doxazosin for BPH) to reduce risk of hypotension

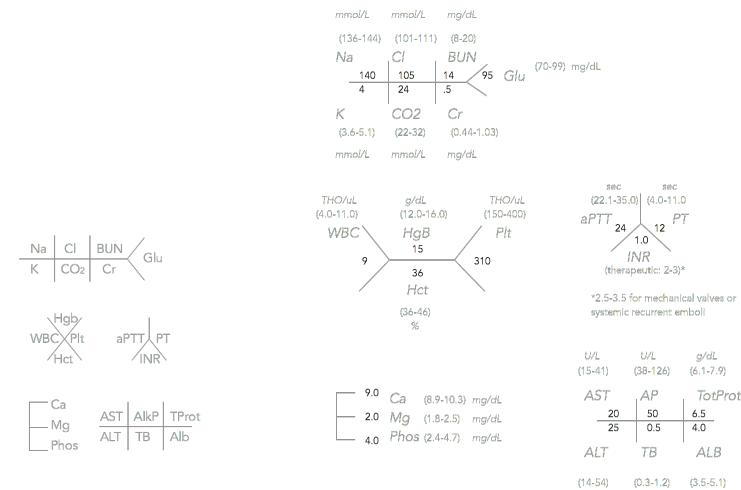
lyme dz:

stage	clinical manifestations of lyme dz
early localized (days - 1mo after tick bite)	Erythema migrans (80% of patients) fatigue, malaise, lethargy mild headache & neck stiffness myalgias & arthralgias
Early disseminated (weeks-months after tick bite)	Carditis (5% untreated patients) - AV block, cardiomyopathy Neurologic (15% untreated patients) - unilateral or bilateral cranial nerve defects (usually VII, meningitis, encephalitis) Muscular (60% untreated patients), migratory arthralgias Conjunctivitis (10% untreated patients) Skin (multiple erythema migrans) Regional or generalized lymphadenopathy
late or chronic (mo-ysrs after tick bite)	Muscular (60% untreated patients) - arthritis Neurologic : encephalomyelitis, peripheral neuropathy

BACK PAIN

vertebral osteomyelitis	Tenderness to gentle percussion on spinal processes pain not relieved with rest	IVDU, sickle cell anemia, immunosuppressed are at highest risk	Dx by MRI (most sensitive) ESR sig elevated > 100mm/hg Platelet count high as marker of inflammation/stress Rx = longterm IV abx +/- surgery
Ankylosing spondylitis	Pain and progressive limitation of back motion Sx worst in the morning, improve as day progresses		
Lumbar disk herniation	Acute onset pain +/- radiation down a leg Usually 2/2 an inciting event Pain worse with activity and improves with rest		
Lumbar spinal stenosis = narrowing of spinal canal with compression of 1 or more spinal roots	Pain radiating to buttocks and thighs Sx worsen with walking and lumbar extension (walking down hill), better w lumbar flexion (shopping cart) +/- Numbness and paresthesias	Usually patients > 60yo	Dx by MRI
Vertebral compression fracture	Local tenderness to palpation	Elderly patients with history of osteoporosis	

Quick Ref

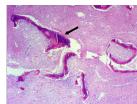


ID/Derm

Paget's disease	<p>osteoclast dysfunction = inc bone turnover/osteoclast bone breakdown -> compensatory inc in bone formation but aberrant/disorganized osteoid formation.</p> <ul style="list-style-type: none"> • bone and joint pain • skeletal/skull deformities • hearing loss 2/2 CN8 entrapment from enlarged cranial bones • spine bone pain/stenosis/ nerve compression, • long bone bowing deformities • osteosarcoma, giant cell tumors 	nl ca, nl phos, nl PTH markedly ↑ alk phos (may be incidental finding) (nl ggt = not liver) xray - femoral bowing, osteolytic or mixed lytic/sclerotic lesions. Bone scan is more sensitive, used for extent/locating skeletal involvements. results in " mosaic " pattern of lamellar bone - irreg lamellar bone w woven bone	Rx bisphosphonates.
primary hyperPTH	<p>2/2:</p> <ul style="list-style-type: none"> • parathyroid adenoma 90% • hyperplasia • carcinoma assd w: MEN1, 2A 80% are asx nonspecific sx - fatigue, weakness, mild depression hyperca sx: abd pain, renal stones, bone pain/fx, psych manifestations	inc or inappropriately nl PTH, inc ca, lo phos 24hr urinary ca >250mg urine ca:creat >0.02 (distinguish from familial hypocalciuric hyperca) loss of cortical bone mass	parathyroidectomy for sx patients
hypoPTH		low PTH, lo ca, inc phos	

Notes:

multiple myeloma may cause diffuse osteopenia due to osteoclastic activation



Fibrous dysplasia causes fibrous replacement of bone

hypervitaminosis A causes abundant mineralization of periosteum

OSTEOPOROSIS, OSTEOPENIA, OSTEOMALACIA

	hx/etiology	dx	
osteoporosis/osteopenia	<p>osteoblast dysfunction</p> <p>tiny frail white woman</p> <p>advanced age</p> <p>post menopausal</p> <p>medical hx of fracture w minimal trauma (fragility fracture)</p> <p>low body wt</p> <p>fm hx of hip fx</p> <p>current smoking</p> <p>Excessive ETOH</p> <p>meds - steroids, anticonvulsants</p> <p>2ndary causes: premature menopause, hypogonadism, malabsorption, inflammatory d/ o's - ibd, RA, hyperthyroid, hyperparathyroid, cushing, vit D def, chronic liver or renal dz</p>	<p>screen w 1x dexa >65yo. osteoporosis = t score < -2.5 (means 2.5 std devs below the mean). osteopenia = -2.5 < tsscore < -1</p> <p>nl ca, nl phos, nl PTH</p>	
osteomalacia	<p>hx:</p> <p>vit D def 2/2:</p> <ul style="list-style-type: none"> • malabsorption • intestinal bypass surgery • celiac sprue • chronic liver disease • chronic kidney disease <p>sx:</p> <ul style="list-style-type: none"> • asx • bone pain and muscle weakness • muscle cramps • difficulty walking, waddling gait 	<p>↓25-OH vit D</p> <p>↓serum ca and more ↓ phos (dec intestinal absorption)</p> <p>so ↑PTH (which worsens hypophos by further loss in urine)</p> <p>↓urinary ca</p> <p>talk phos,</p> <p>Xray - thinning of cortex w reduced bone density, poorly mineralized osteoid</p> <p>bilat and symmetric pseudofractures</p>	

IMMUNODEF SYNDROMES

			dx	risk of:
humoral immunity deficiency	igA			
	igG			
	igG3 alone	adult females, assd with recurrent sinopulm and GI infections		
	CVID	suppressed cell immunity and inc risk of malignancy		
	cell-mediated			infections from viruses, pathogens, fungi (intracellular replication)

Other causes of recurrent sinopulm infections:

+GI obstruction/panc dz, +infertility, +msk = CF
 ↓ dependent/lower lobes 2/2 aspiration while upright, or posterior segment of upper lobes= aspiration pneumonia
 altered consciousness = sz, alcoholism, drug OD
 neuro dysphagia = dementia, parkinsonian, cva, myasthenia
 GEjunction = esoph dz, gerd
 disruption of glottic closure = endotracheal intub, bronchoscopy, endoscopy
 sedation for procedures

HIV - IMMUNIZATIONS

Vaccine	Indications
HAV	Chronic liver disease (including hepatitis B and C) Men who have sex with men IV drug users
HBV	All patients without documented immunity to HBV
HPV	Men and women age 9-26
Influenza	Annually for all patients
Meningococcus	All patients age 11-18 Large groups living in close proximity (college students, military recruits, incarcerated patients) Asplenia or complement deficiency
Pneumococcus	PCV13 once PPSV23 8 weeks later, then every 5 years
Tetanus, diphtheria & pertussis	Tdap once Repeat Tdap for women during each pregnancy Td every 10 years following Tdap
Live vaccines -- MMR, varicella, zoster, live-attenuated influenza	Contraindicated if CD4+ cell count <200/uL

PCV13 = 13-valent pneumococcal conjugate vaccine

PPSV23 = 23-valent pneumococcal polysaccharide vaccine

OSTEOMYELITIS

	Vertebral osteomyelitis
S/Sx	Fever, back pain, focal spinal tenderness
Organism	Staph aureus >50% of cases of pyogenic spinal osteomyelitis. Gram-neg bacilli -- can be 2/2 to hematogenous spread of UTI
Workup	1. Blood cultures Inflammatory marker -- ESR, CRP markedly elevated. (leukocyte count may be normal) Plain spinal x-rays -- may be normal in first 2-3 wks 2. MRI for dx -- can detect abscess and cord compression 3. then CT-guided bone bx



COAGULATION DISORDERS

Warfarin mechanism:

Inhibits production of vitamin **K-dependent** clotting factors II, VII, IX, and X.
& Inhibits production of natural anticoagulants protein C and S

Prothrombotic						Bleeding
Warfarin-induced skin necrosis	Heparin-induced thrombocytopenia (HIT)	Antithrombin III deficiency	Factor V Leiden mutation	Antiphospholipid antibody syndrome (APS)	Factor VII deficiency	
Protein C production decreases faster (50% within first day) while levels of procoagulant factors (II, IX and X) decline more slowly = transient hypercoagulable state	Caused by autoantibodies to platelet factor 4 (PF4) complexed with heparin	Antithrombin III = vitamin K- Independent inhibitor of the clotting cascade	Increases risk for venous thromboembolism (DVT or PE)	False positive VDRL Prolonged PTT Thrombocytopenia	Bleeding diathesis characterized by bruising and hemorrhage	
Increase the risk for venous thromboembolism and skin necrosis, esp in patients with underlying hereditary protein C deficiency	Thrombocytopenia, arterial or venous thrombosis, and necrotic skin lesions at heparin injection sites within 5-10 days of therapy.	Predisposes to thrombus formation	Inc risk for cerebral mesenteric portal vein thrombosis	Inc risk for recurrent pregnancy losses/spontaneous abortions, arterial and venous thrombosis	Dx: <ul style="list-style-type: none">• VDRL (false positive)• Prolonged PTT• Thrombocytopenia	
Typically within first few days of warfarin therapy, esp at large loading doses		Anticoagulants Initiation of warfarin should not cause unusual hypercoagulability	Low dose aspirin and LMWH to avoid pregnancy loss			

INFECTIONS IN IMMUNOCOMPROMISED

	Histoplasmosis (disseminated)	Blastomycosis (uncommon in immunocomp hosts)	Coccidiomycosis	Aspergillosis	Sporotrichosis
	Dimorphic fungi Mold in soil, bird and bat droppings - exploring caves, spelunking, cleaning bird cages or coops	Contact with soil or rotting wood..			
Endemic region	Mississippi and Ohio River basins (central and southern)	great lakes, Mississippi and Ohio River basins (wisconsin)	Southwestern US		
Pathophys	Fungus targets histiocytes and reticuloendothelial system.				
Sx	Immunocompromised: Lymphadenopathy, pancytopenia, hepatosplenomegaly Palatal ulcers Disseminated can have fever, fatigue, wt loss	fever, cough, night sweats, wt loss Pulm -- multiple nodules or dense consolidation on CXR	fever, cough, night sweats Pulm -- localized pulmonary infiltrate	Fever, cough, dyspnea	Subq infection characterized by papule at the site of inoculation followed by development of subsequent papules along route of lymphatic flow Pulmonary sporotrichosis: chronic upper lobe, cavitary lesion.
Labs/ Imaging	CXR: hilar lymphadenopathy with or without areas of pneumonitis Diffuse reticulonodular or cavitary	Pancytopenia Elevated serum LDH and ferritin, liver enzymes	CXR: localized pulmonary infiltrate, hilar adenopathy, and/or pleural effusion.	CD4 count < 50/ microL	
Dx	Urine or serum antigen (rapid, very sensitive and specific) Fungal blood cultures are confirmatory but lower sensitivity and takes days to weeks	broad-based budding yeast from sputum confirms dx			
Rx	Mild/immunocompetent: no rx, or oral itraconazole Severe, or disseminated, or immunocompromised: Amphotericin B	if symptomatic, itraconazole or amphotericin B			

PCP

Defn	Fungal organism called pneumocystis jiroveci AIDS defining illness, CD4 count < 200/mL
S/sx	Hypoxia out of proportion to the radiographic findings is suggestive. nonproductive cough, progressive dyspnea, weight loss, tachypnea
Labs/Imaging	CXR = bilateral interstitial infiltrates and/or alveolar infiltrates, or normal Serum LDH levels are frequently elevated. Dx confirmed by organism in sputum (induced by hypertonic saline - specific but only 50% sensitive) or BAL aspirate (>90% sensitive and specific)

BONE MARROW TRANSPLANT

	CMV
timing	~45 days (2wks-4mo) post BMT
S/sx	fever, dyspnea, dry cough (2/2 pneumonitis) + abd pain, diarrhea (2/2 upper and lower GI ulcers) bone marrow suppression, arthralgias, myalgias, esophagitis
Labs/Imaging	CXR - multifocal diffuse patchy infiltrates HiresCT - parenchymal opacification or multiple small nodules
Dx	Bronchoalveolar lavage dx in most cases.

ANTICOAGULATION

can start as soon as 48-72 hrs after surgery w/out increased risk of bleeding
When treating DVT, use unfractionated or LMWH, bridge to warfarin ≥ 3 mo w goal INR 2-3. heparin prevents extension of the clot and devoft of future clots, does not lyse current clot.

	mechanism	labs	complications
unfractionated heparin		Platelet count $\geq 50\%$ from baseline (nadir of 30,000-60,000) follow aPTT: goal aPTT > 1.5-2 times normal, at which point warfarin is initiated ('heparin bridge')	Type 1 HIT — <ul style="list-style-type: none">Nonimmune direct effect of heparin on platelet activationusually presents within first 2 days of heparin exposure. Then platelet count normalizes with continued heparin therapy.No clinical consequences. Type 2 HIT — <ul style="list-style-type: none">Immune-mediated disorder due to antibodies to platelet factor 4 (PF4) complexed with heparin -> platelet aggregation, thrombocytopenia, thrombosis *arterial and venous)Presents 5-10 days after initiation of heparin therapySevere, may lead to life-threatening consequences *limb ischemia, stroke)
low molecular weight heparin (LMWH) = enoxaparin		normal aPTT	cannot be used in patients with severe renal insufficiency (estGFR < 30 mL/min/1.73m ² — reduced renal clearance increases anti-Xa activity levels and bleeding risk —> use unfx heparin
Factor Xa inhibitors (fondaparinux(injection), rivaroxaban (oral))	immediate onset of action		cannot be used in patients with severe renal insufficiency (estGFR < 30 mL/min/1.73m ² — reduced renal clearance increases anti-Xa activity levels and bleeding risk —> use unfx heparin
Warfarin	Co-administered with IV unfractionated or LMWH. Do not use alone due to initial hypercoagulable state from transient protein C depletion and risk of thrombosis and skin necrosis	takes up to 5-7 days to reach therapeutic levels can stop heparin bridge when INR is therapeutic	

OTHER HEME D/O'S

leukocytosis = EBV, CLL

	etiology	s/sx	labs	rx
TTP	dec AdamTS13 protease	hemolytic anemia and thrombocytopenia low grade fever, AMS dx usually clinical	hemolytic anemia = inc indirect bil, normocytic anemia, inc reticulocytes renal failure - elevated BUN and Cr peripheral smear: schistocytes	
sickle cell	usually chronic well-compensated hemolytic anemia w appropriate reticulocytosis <u>complications:</u> vasoocclusive crisis hyperhemolytic crisis/ aplastic crisis = 2/2 infxn/parvo b19, auto-splenectomy 2/2 vasoocclusion and pooling of rbc's in spleen. can → hypotensive shock acute chest syndrome	acute pain triggered by change in weather, dehydration, infxn pallor, sudden severe anemia rapidly enlarging spleen	dec Hg, absence of reticulocytosis < 1% splenectomy, hi chance of recurrence and risk of mortality	
aplastic anemia			pancytopenia	

IMMUNOSUPPRESSANT DRUGS

	Cyclosporine	tacrolimus	Azathioprine	Mycophenolate
Mechanism	Macrolide produced by fungi. Inhibits transcription of IL-2 and several other cytokines (mainly T helper lymphocytes) Aka is a calcineurin-inhibitor	Same as cyclosporine also a calcineurin-inhibitor	Inhibits purine synthesis	Reversible inhibitor of IMPDH (inosine monophosphate dehydrogenase), the rate-limiting enzyme in de novo purine synthesis
Side effects:	Nephrotoxicity: <ul style="list-style-type: none">Reversible acute azotemia or irreversible progressive renal diseaseHyperuricemia with accelerated gout, hyperK, hypoP, hypoMg.Rarerly HUS Hypertension: <ul style="list-style-type: none">2/2 Renal vasoconstriction and Na retentionFirst few weeks of therapyRx: CaChblockers Neurotoxicity <ul style="list-style-type: none">ReversibleHeadaches, visual disturbances, seizure, mild tremors, akinetic mutism Glucose intolerance Infection Malignancy: <ul style="list-style-type: none">Inc risk of squamous cell carcinoma of skin and lymphoproliferative diseasesGingival hypertrophy and hirsutism GI manifestations: <ul style="list-style-type: none">Anorexia, nausea, vomiting, diarrheacommon but mild	Similar to cyclosporine, but: NO gingival hypertrophy nor hirsutism. Higher incidence of neurotoxicity, diarrhea, and glucose intolerance.	Dose-related diarrhea, leukopenia, and hepatotoxicity	Bone marrow suppression

BLOOD TRANSFUSION REACTIONS (IMMUNOLOGIC)

Type	
Febrile nonhemolytic (most common reaction)	Fever and chill Within 1-6 hrs of transfusion Caused by cytokine accumulation during blood storage
Acute hemolytic	Fever, flank pain, hemoglobinuria, renal failure and disseminated intravascular coagulation Within 1 hour of transfusion Positive direct Coombs test, pink plasma. Caused by ABO incompatibility
Delayed hemolytic	Mild fever and hemolytic anemia Within 2-10 days after transfusion Positive direct Coombs test, positive new antibody screen Caused by anamnesis antibody response
Anaphylactic	Rapid onset of shock, angioedema/urticaria and respiratory distress Within a few seconds to minutes of transfusion Caused by recipient anti-IgA antibodies
Urticular/allergic	Urticaria, flushing, angioedema and pruritis Within 2-3 hours of transfusion Caused by recipient IgE antibodies and mast cell activation
Transfusion-related acute lung injury	Respiratory distress and signs of noncardiogenic pulmonary edema Within 6 hours of transfusion Caused by donor anti-leukocyte antibodies

IMMUNE THROMBOCYTOPENIA

s/sx	labs	rx	
preceded by viral infxn purpura, petechiae, ecchymoses mucosal/cutaneous bleeding - epistaxis, hematuria, gi bleed	isolated thrombocytopenia < 100,000 uL megakaryocytes on peripheral smear	if platelets ≥ 30,000/uL without bleeding - observe (usually self-limited w spontaneous recovery <6mo) if plt <30,000/uL or bleeding - IVIg or glucocorticoids	

LEUKEMIAS

	s/sx	labs	rx
CLL (chronic lymphocytic leukemia)	elderly often asx lymphadenopathy splenomegaly	lymphocytosis later anemia, thrombocytopenia on peripheral smear: <ul style="list-style-type: none">• hypercondensed nuclear chromatin,• smudge cells	
Hodgkin's disease		normal peripheral smears dx = LN bx pathognomonic = Reed Sternberg cells	
CML (chronic myeloid leukemia)	splenomegaly	no lymphocytosis left shift (more myelomonocytes, neutrophils), basophilia	

\ Anemia in 65yo

EXAMPLE GENERAL WORKUP:

sx	phys ex/ROS:	diffl dx	tests	further tests
SOB, DOE palpitations fatigue dizziness —> <3 —> pulm conj pallor, guiac + stool epigastric/LUQ pain —> ulcer esp if on nsuids ?colonoscopy		GI bleed	EGD (upper and lower) coags (PT/PTT)	if pt/ptt abnormal —> GI bleed from coagulopathy/liver dz • +wt loss, lymphad —> malignancies like leuk/lymph • +young —> sickle cell, thalassemias, g6pd def
			new onset angina (* post menopausal s/sx of angina/ami can be atypical)	ECG + trops
			CHF	
			Afib	ECG
			chem7	if low Hg/Hct - anemia w/u: • CBC with peripheral smear, retic count • iron studies • vit b12/folate

NOTES:
reduced o2 carrying capacity of blood 2/2 anemia exacerbates dyspnea from CHF

conj pallor is reliable as sign of anemia in elderly.

glossitis, dec vib/posit sense, ataxia, paresthesia, confusion, dementia, pearly gray hair at early age —> B12 def

jaundice —> hemolysis

splenomeg —> thalassemia or neoplasm

CAGE: cut back, annoyed, guilty, eye-opener

SKIN: ERYTHEMA AND SWELLING

	Thrombophlebitis	Toxic shock syndrome	Bacillary angiomatosis	Ludwig angina (rapidly progressive bilateral cellulitis of submandibular and sublingual spacs)
Organisms			Bartonella henselae and bartonella quintana Generally affects immunosuppressed patients (AIDS, hematologic malignancies, undergoing chemotherapy, organ transplant recipients)	Classically streptococcus and anaerobes from infected second or third mandibular molar.
Pathogenesis				
Signs/sx	Erythema, tenderness, and swelling of distal extremity along with palpable "cord-like" vein.	Diffuse erythematous skin rash that is not localized nor painful. Hypotension followed by multi-organ dysfunction.	Fever, weight loss, malaise, and abdominal pain Classic cutaneous lesion is a large pedunculated exophytic papule with a collarette of scale -- resembles large pyogenic granuloma or cherry angioma	Fever Dysphagia Odynophagia Drooling (from swelling of submandibular space and posterior displacement of tongue) Induration of submandibular space, +/- crepitus from anaerobes. Can die of asphyxiation.
Dx			Tissue biopsy and microscopic identification of organisms and the characteristic angiomatous histology -- biopsy with caution, prone to hemorrhage.	
Rx			Abx can lead to involution/regression	Intubation if necessary. Abx and removal of infected tooth.

skin:erythema and swelling continued....

	Necrotizing fasciitis	Abscess	Cellulitis	Pyomyositis (muscle abscess)
Organisms	Streptococcus pyogenes (group A streptococci) Staphylococcus aureus Clostridium perfringens Polymicrobial			
Pathogenesis	Bacteria spreads aggressively and rapidly through subq tissue and deep fascia, undermining the skin	Skin and soft tissue infections that have been successfully limited by immune system and tissue barriers.	Acute skin infection	(usually) limited to one muscle group and does not spread rapidly.
Signs/sx	Pain out of proportion to exam Systemic sx (fever and hypotension) Crepitus in 50% Tissue necrosis Most commonly involves extremities and perineal region	Systemic signs not likely Localized to a tender, fluctuant area and do not spread aggressively.	Warmth, erythema, edema, and tenderness	Fever, erythema, swelling, pain
Dx	CT: air in the tissue planes			
Rx	Surgical debridement and broad spectrum abx			

Macrocytic anemia				
	Iron studies	peripheral smear	Pathophysiology	rx
B12 (cobalamin) def	MCV > 100 fL elevated methylmalonic acid (MMA)		pernicious anemia, or short-bowel syndrome (hx of gastrectomy), malabsorption dz (bacterial infection, crohns, celiac), or vegan, or ETOH	IM B12 1000 ug daily for 7 days, then weekly 4 wks, then monthly for rest of life
folate def			assd w alcoholics	1mg daily until corrected

Normocytic anemia		
	causes	Rx
normochromic, hypoproliferative anemia	2/2 low epo 2/2 CKD	Epo indicated if Hct <30% or Hg <10 replete iron before starting epo — or else will cause iron def, particularly in chronic dz patients who already have low iron stores Sfx of Rx: <ul style="list-style-type: none">• worse HTN (20-50% pts): 10mmHg rise in dBP (unknown mechanism) —> rx by dialysis fluid removal or antihtnsives: beta blockers/vasodilators• Headaches (15% pts)• flu-like sx (5% pts)• red cell aplasia (rare)
chronic inflammation (anemia of chronic dz) — see above in microcytic anemia	normal iron stores but def capacity of using stored iron (dist from iron def by TIBC being low)	
renal insuff	low epo production	

ANEMIA

transfusion Hg < 7.0

	Microcytic anemia			
	Iron studies	peripheral smear	hx/sx/rx	Pathophysiology
Iron deficiency	Low iron Low ferritin Inc TIBC Low transferrin saturation (iron/TIBC)	also normochromic normocytic RBC	Rx - oral ferrous sulfate 325 mg three times a day	
	Low MCV hct can go below 30%			
Thalassemia (minor)	Hi iron Hi ferritin Low TIBC V hi transferrin saturation V. Low MCV <75 fL hct rarely below 30%	target cells, tear drop cells		
		beta thal will have hemoglobin A2 on electrophoresis (alpha thal = normal hg)		
Anemia of chronic disease (inflammation)	Low iron Normal/hi ferritin Low TIBC Normal/Low transferrin saturation	Low retic count relative to anemia severity (= impaired RBC production)	Commonly assd with chronic inflammatory disease (eg, infections, cancer, autoimmune disorders) Can also be observed in heart disease, diabetes mellitus, acute inflammation	impaired iron utilization = Iron trapping within macrophages -> reduced serum iron concentrations and poor iron availability for hemoglobin synthesis Low transferrin (TIBC) bc trying to be under the radar (aka not help pathogens use iron)
	Normal/low MCV		Rx the underlying inflammatory d/o often improves anemia	Also may have dec erythropoietin production and poor marrow response to erythropoietin
hereditary spherocytosis		spherocytes (diff dx: g6pd def, AIHA) Hi MCHC	hemolytic anemia, jaundice, splenomegaly Coombs neg (pos in AIHA) dx - eosin 5-maleamide binding test	most 2/2 autosomal dominant mutation of ankyrin gene --> abnormal rbc membrane scaffolding proteins --> less deformable --> splenic sequestration Rx - folic acid, transfusions, splenectomy

PURPURA

	hx	s/sx	dx	rx	prognosis
mixed cryoglobulinemia		palpable purpura proteinuria hematuria (glomerulonephritis) arthralgias peripheral neuropathy hepatosplenomegaly hypocomplementemia	circulating cryoglobulins	test for HCV Abs	
henoch-schonlein purpura		palpable purpura on buttocks abd pain arthralgias proteinuria hematuria - rbc casts on UA			
SLE	young adult females	skin - malar/discoid rash	Anti-nuclear Abs very specific: Anti-DNA & Anti-Sm Ab's	renal involvement	
microscopic polyangiitis		fever, malaise abd pain hematuria purpura	ANCA + otherwise normal serology		

Neuro/ Cards

Plasma Cell Disorders

	MGUS	Multiple myeloma	Waldenstrom's Macroglobulinemia	Amyloidosis (1° or 2°)
		excessive production of kappa/ lambda light chain	IgM monoclonal gammopathy	AL—monoclonal light-chain fragments AA—serum amyloid A. Asd with chronic inflammatory diseases (eg RA), infections, neoplasms
Sx	Mild sx or Asymptomatic	<ul style="list-style-type: none"> Anemia + bone pain with mvt Lethargy, wt loss Hypercalcemia (polyuria, constipation, confusion/ lethargy) Renal failure - Bence-Jones Lytic bone lesions Dec anion gap Infxns by encapsulated bacteria >40yo African American 2x incidence 	<ul style="list-style-type: none"> Anemia + bone pain Lethargy, wt loss Hyperviscosity syndrome = stroke, retinopathy, CHF, sensorimotor peripheral neuropathy Splenomegaly Coagulation abnormalities Cold agglutinin (AIHA) 	
Labs		<ul style="list-style-type: none"> Urine – Bence Jones ESR >55 Rouleaux RBCs 		
Dx		+ M spike (IgG or IgA) on SPEP or + UPEP	M spike (IgM) on SPEP	Congo red staining (apple green birefringence under polarized light) on tissue bx
		AND		
		↑plasma cells in bone marrow OR Osteolytic bone lesions OR Bence-jones proteinuria		
Rx		Chemo – Metastatic Radiation - Isolated lesions BMT to prolong survival	Chemo Plasmaphoresis	Chemo
BOTTOM LINE:		Back pain, anemia, renal dysfunction, elevated ESR		

RHEUMATOID ARTHRITIS

			rx
			methotrexate hydroxychloroquine TNF-inhibitors (infliximab, etanercept) +/-epo for anemia

SYSTEMIC LUPUS ERYTHEMATOSIS

etiology	s/sx	labs	rx
+/- hypersplenism, MAHA, AIHA, TTP, bone marrow dysfxn, aplastic anemia,		pancytopenia • anemia: 2/2 renal insuff SLE nephritis, iron def, anemia chronic disease, AIHA • leukopenia: 2/2 autoimmune-mediated destruction • thrombocytopenia: 2/2 immune-mediated destruction	

MULTIPLE MYELOMA

s/sx	dx	rx	px
back pain anemia renal dysfunction elevated ESR		Epo indicated if Hct <30% or Hg <10 <u>replete iron</u> before starting epo — or else will cause iron def, particularly in chronic dz patients who already have low iron stores	• worse HTN (20-50% pts): 10mmHg rise in dBP (unknown mechanism) —> rx by dialysis fluid removal or antihistsives: beta blockers/vasodilators • Headaches (15% pts) • flu-like sx (5% pts) • red cell aplasia (rare)
hypercalcemia 2/2 bone lysis (polyuria, constipation, confusion, anorexia, vomiting, weakness)			

Syncope

Abrupt and transient loss of consciousness with loss of postural tone, followed by spontaneous and complete recovery

Caused by:	Assd sx:	Assd labs/EKG findings:
Orthostatic Hypotension		
Impaired baroreceptor sensitivity/ autonomic failure	<ul style="list-style-type: none"> In elderly Presyncope sx 	
Volume depletion:		
	<ul style="list-style-type: none"> 2/2 diarrhea, decreased fluid intake, diuretic therapy, blood loss Dry mucous membranes, postural drop in BP (≥ 20 mmHg drop in systolic blood pressure with position change) 	<ul style="list-style-type: none"> >20:1 BUN:Cr ratio Lactic acidosis if late stages/severe vol depletion/ hypovolemic shock) In hematocrit (hemoconcentration) in pts with volume depletion fr diarrhea or vomiting Dec hematocrit if overt significant blood loss
Cardiac		
Structural		Syncope with exertion or during exercise
	<ul style="list-style-type: none"> Aortic stenosis, Hypertrophic cardiomyopathy Anomalous coronary arteries 	
Conduction		Prior history of coronary artery disease , myocardial infarction, cardiomyopathy, or reduced ejection fraction
	<ul style="list-style-type: none"> Ventricular arrhythmias 	
	<ul style="list-style-type: none"> Sick sinus syndrome Bradycardias AV block 	<ul style="list-style-type: none"> Sinus pauses on monitor Can be intermittent
		Prolonged PR interval or QRS duration
	<ul style="list-style-type: none"> Torsades de pointes (acquired long QT syndrome) 	Medications causing prolonged QT interval
	<ul style="list-style-type: none"> Congenital long QT syndrome 	<ul style="list-style-type: none"> Triggers – exercise, swimming, sudden noise, during sleep Family history of sudden death
Neurologic		
Vasovagal or neurally mediated syncope		<ul style="list-style-type: none"> Triggers – prolonged standing or emotional distress, painful stimuli Prodromal sx – nausea, warmth, diaphoresis
Seizure		<ul style="list-style-type: none"> Tonic-clonic movements, loss of bowel or bladder control, post-ictal phase

SYNCOPE CONT'D.

	hx	s/sx	dx	rx
AAA rupture	involves all aortal layers, does not create an intimal flap or false lumen. >3cm at level of renal arteries typically >60yo, men hx smoking, CAD	profound hypotn acute onset abd or back pain followed by syncope +/- pulsatile mass on exam complication: can create aortocaval fistula with inferior vena cava —> venous congestion in retroperitoneal structures (eg bladder —> distends veins in bladder that rupture —> gross hematuria)	————>	immediate emergent surgical repair

in patients with syncope (or exertional syncope) due to suspected structural heart disease (AS, hypertrophic cardiomyopathy, LV dysfunction, vtach, cardiac tamponade) = get TTE
 —> can follow w exercise stress testing

if suspicion for coronary disease, cardiomyopathy, or valvular heart disease —> exercise stress test

if suspicion for arrhythmia (sinus pauses, advanced AV block, vtach, vfib) as cause —> holter monitor

MYOPATHY

causes	sx	dx
connective tissue disease: <ul style="list-style-type: none"> • polymyositis, dermatomyositis • inclusion body myositis • vasculitis • mixed connective tissue disease 	fatigue myalgias prox muscle weakness sluggish ankle reflexes nl esr, elevated ck	1. TSH and T4 2. if nl, ANA abs, further w/u —> polymyositis
endo/metabolic: <ul style="list-style-type: none"> • hypothyroidism, thyrotoxicosis • cushing's syndrome • electrolytes (hypok, ca, phos) 	hypothyroid: always consider with unexplained elevation of CK	
drugs: <ul style="list-style-type: none"> • corticosteroids, statins • zidovudine, colchicine • alcohol, cocaine, heroin 	polymyositis: DTR usually nl, assd w other findings (raynauds, interstitial lung dz). ANA Abs + infxn, trauma, hyperthermia	

BREAST CANCER (V INFECTIOUS)

Nipple discharge in a non-lactating woman – esp if spontaneous, unilateral, localized to a single duct, pt is >40yo, bloody, or assd with mass

	Breast cancer		Infectious	
	inflammatory breast carcinoma		Cellulitis/abscess	mastitis
appearance	Peau d'orange = brawny edematous cutaneous plaque, overlying a breast mass.		Erythematous and edematous cutaneous plaque	
Prognosis				
Dx	Most present with axillary lymphadenopathy,			
Rx	1/4 are found to have subsequent metastatic dz		Abx that covers Staphylococci Should be encouraged to continue breastfeeding or breast pumping from the affected breast	

MENINGITIS & ENCEPHALITIS

	Signs/Sx	CSF findings
Bacterial meningitis	Sudden onset fever, stiff neck, headache, nausea, severe myalgias in otherwise healthy patient	Elevated wbc Elevated protein Decreased glucose
--Meningococcal meningitis (meningococcemia)	+ hypotension, tachycardia, intense myalgias, purpuric skin lesions, petechiae Within several hours of initial meningitis	
--Pneumococcal meningitis	Not asssd with acute onset of pupura or skin lesions	Elevated wbc Elevated protein Decreased glucose
--Later in course of Lyme disease	Erythema chronicum migrans	
Syphilitic meningitis	Not as sudden onset	
	Assd with peripheral rash of secondary syphilis -- palms of hands and soles of feet, and generalized lymphadenopathy	
Arboviruses -- eastern equine, western equine, St Louis and West Nile virus	Encephalitis presents with altered mental status, fever, and focal neurologic deficits without nuchal rigidity or signs of meningitis	
Other red rashes		
--Rocky Mountain spotted fever	Rash begins from ankles and wrists and spreads both centrally and to the palms and soles	Viral meningitis-like findings

WEAKNESS: MYASTHENIA GRAVIS V LAMBERT EATON

	mechanism	s/sx	dx	rx
myasthenia gravis	Autoantibodies ag postsynaptic receptors Muscle weakness provoked by repetitive or sustained use of the muscles involved	ptosis double vision sob, difficulty swallowing = autoantibodies ag post-synaptic receptors —> dec receptors avail —> weakness weaker with repetition , prox muscles. deep tendon reflexes (DTR) usually preserved	AchR Ab CT to screen for thymoma	if thymoma, thymectomy
lambert eaton	Autoantibodies directed ag voltage-gated calcium channels in the presynaptic motor nerve terminal —> Leads to defective release of Ach —> proximal muscle weakness h/o smoking, wt loss, lung mass, malaise	assd with small cell carcinoma of lung —> autoantibodies ag voltage-gated ca channels in presynaptic motor nerve terminal —> defective Ach release —> prox muscle weakness muscle strength improves with repetition , prox muscles loss of DTR	Electrophysiological studies confirm: Muscle response to motor nerve stimulation should increase with repetitive stimulation	Plasmapheresis Immunosuppressive drug therapy
polymyositis		proximal weakness (difficulty ascending and descending stairs, combing hair) nl reflexes	high CPK	
amyotrophic lateral sclerosis (ALS)				

WORKUP OF THYROID NODULE

single nodule
check TSH, T3, T4

hyper:
u/s of thyroid
radioactive iodide scan
— if single hot nodule —> toxic nodule
— if diffuse uptake —> graves
— if nothing —> acute thyroiditis (hashimoto's),
or cancer —> fine needle aspiration biopsy. if follicular cells, to distinguish bw adenoma and cancer, look for invasion of tumor capsule and blood vessels

hypo:
u/s of thyroid
radioactive iodide scan

—

papillary	follicular	medullary
<ul style="list-style-type: none"> • most common • slow infiltrative local spread - local lymph node involvement • unencapsulated • psammoma bodies • Hurthle cells • excellent prognosis 	<ul style="list-style-type: none"> • rarely have lymph node involvement • encapsulated - invasion of tumor capsule and blood vessels • Hurthle cells • mets to distal organs 	calcitonin secretion

- MR, TR

	very rare - struma ovarii = ovarian teratoma that produces thyroid hormones		
	subacute granulomatous (De Quervain's thyroiditis)	intense pain in thyroid region	
	Grave's disease		inc radioactive iodine uptake diffusely
	toxic multinodular goiter		"hot nodules" - inc uptake of iodine in toxic nodules with no uptake in rest of gland. heterogenous uptake of radioactive iodine.

hypothyroid	primary - autoimmune most common	fatigue dec appetite wt gain constipation cold intolerance	lo T3, T4 TSH >10 IU/L	
	secondary - pituitary gland dysfxn		lo T3, T4 low or appr nl TSH	
	tertiary - hypothalamus			
	generalized peripheral resistance to thyroid hormones	phys ex: cool pale skin coarse hair brittle nails delayed relaxation of deep tendon reflexes	elevated circulating T3, T4 nl to elevated TSH	
	subclinical hypothyroidism	no sxs	nl T3, T4 mild elevated TSH	

primary hypothyroidism can cause mild-mod hyperprolactinemia (due to TRH-induced stimulation of lactotrophs)

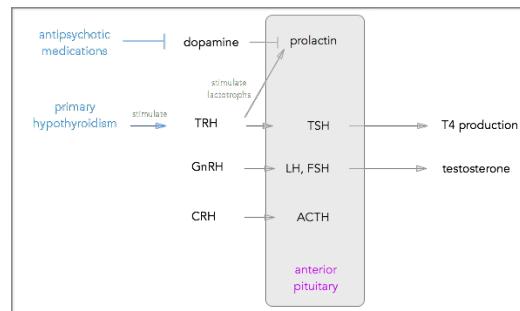
antipsychotic meds (eg risperidone) can block normal dopamine-dependent regulation of prolactin secretion -> cause hyperprolactinemia

rx for hyperthyroidism = propylthiouracil (PTU) and methimazole - sfx - agranulocytosis. us within 90 days of treatment, if fever and sore throat, check wbc, if <1,000, stop drug!

rx for hypothyroidism = levothyroxine.

interactions with levothyroxine:

- bile acid binding agents (cholestyramine), iron, ca, PPI = decreases absorption.
- phenobarb, rifampicin, phenytoin, carbamaz = increases hepatic clearance
- oral estrogen, tamoxifen, raloxifene, heroin, methadone = increases TBG concentration (and thus patient would require higher doses of L-thyroxine. same during pregnancy)
- androgens, glucocorticoids, anabolic steroids, slow-release nicotinic acid = decreases TBG concentration



DIURETICS/ANTIHYPERTENSIVES

rx HTN - nonpharmacologic

modification	recommended plan	apprx dec in systolic BP (mmHg)
wt loss	reduce BMI < 25 kg/m ²	5-20 per 10kg loss
DASH diet	diet high in fruits & veg and low in sat fat and total fat	8-14
exercise	30 m/day for 5-6 days/wk	4-9
dietary sodium	< 3 g/day	2-8
alcohol intake	2 drinks/day in men and 1 drink/day in women	2-4

Class of Drug	Examples	How it works?	Mortality Benefit?
ACE/ARB	Ie. Captopril, losartan	Limits ventricular remodeling	Improves mortality
B-blockers	Ie. Metoprolol, carvedilol, bisoprolol	Blocks the neurohormonal cascade that leads to disease progression	Improves mortality
COX inhibitors	Aspirin	Prevents platelet aggregation	Improves mortality in patient w/ underlying CAD
Loop Diuretics	Furosemide	Diuretic	Symptomatic relief
Aldosterone antagonist	Spironolactone, eplerenone	K+ sparing diuretic	Improves mortality
Cardiac Glycoside	Digoxin	Increases heart's contractility	Symptomatic relief

Renin is produced in the juxtaglomerular cells of the kidney in response to hypoperfusion. Renin cleaves angiotensinogen into angiotensin I, which is converted into angiotensin II by angiotensin-converting enzyme (ACE) in the lung. Aldosterone acts on the collecting ducts to increase renal sodium and water reabsorption. The net result of RAAS activation is increased blood pressure, total body sodium and water, and blood volume. As a result, any drug that blocks the effect of angiotensin II or aldosterone enhances natriuresis.

MI'S AND EKG'S

where	vessel	EKG leads involved	other notes
anterior MI	LAD	some or all V1-V6 (esp V1-V4)	can also cause second degree AV block
inferior MI	RCA or LCX	ST elevation II, III & aVF	commonly asdd with sinus bradycardia due to increased vagal tone in first 24 hours after infarction and dec RCA blood supply to SA node also asdd with hypotension, bradycardia, av block 1/3 involve right ventricle (esp if ST changes in I and aVL I- leftmost leads)
posterior MI	LCX or RCA	ST depression V1-V3 ST elevation I & aVL (LCX) ST depression I & aVL (RCA)	
lateral MI	LCX, diagonal	ST elevation in leads I, aVL, V5 & V6	
right ventricle MI (occurs in 1/2 of inferior MI)	RCA	ST elevation leads V4-V6R	

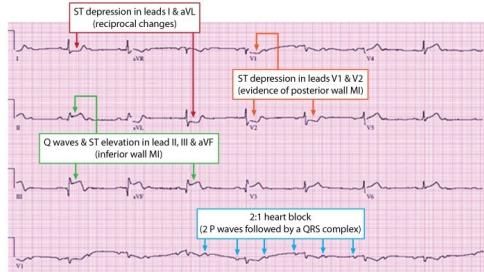
Posterior and inferior wall MI

RCA supplies AV node too — occlusion can cause AV block.

LAD supplies anterior walls of left ventricle, and anterior 2/3 of septum — occlusion can also cause second degree AV block.

LCX supplies posterolateral wall of left ventricle

Left main coronary — occlusion (both LCX and LAD) usually causes sudden death. ST elevations in anterior and lateral leads (I, aVL, V1-V6)



PROLACTIN & THYROID

	hx/etiology	sx	labs, imaging	rx
prolactinoma	suppression of gonadotropin-releasing hormone secretion from hypothalamus by prolactin TSH may also be normal or low depending on compressive effect on thyrotroph cells	premenopausal women - oligo/amenorrhea, infertility, galactorrhea, hot flashes, dec bone density post menopausal women 0 mass effect (ha, visual field defects) men: infertility, dec libido, impotence, gynecomastia	serum prolactin often >200 ng/mL rule out renal insuff (cr) and hypothyroidism (TSH, t4) MRI of pituitary	dopamine agonist - cabergoline trans-sphenoidal surgery
pituitary adenoma	usually adenoma is nonfunctioning arising from gonadotrops in pituitary gland - just secrete alpha subunit.	when large enough: <ul style="list-style-type: none">• headache• visual field defects• disrupt pituitary fxn	hypopituitarism = central hypogonadism (low LH and low testosterone) + central hypothyroidism (low TSH and T4) prolactin mild-mod inc (2/2 anatomic disruption of dopaminergic pathways that normally suppress prolactin secretion) if >200 ng/mL, suggests prolactinoma	trans-sphenoidal surgery
hyperthyroid	thyrotoxicosis: CV: <ul style="list-style-type: none">• angina 2/2 coronary vasospasm• sinus tach, PAC/PVCs, afib/afib/flutter• HTN, inc pulse pressure• inc contractility and cardiac output• dec SVR• inc myocard o2 demand• new onset exac heart failure• mitral valve prolapse often in post-partum period	painless	enlarged thyroid/swelling lid retraction tremor wt loss inc total and free T4 dec TSH thyroid scan - very low radioactive iodine uptake	
	subacute lymphocytic (painless) thyroiditis = inflammatory damage of thyroid follicles -> leakage of thyroid hormones into circulation -> thyrotoxicosis.			
	subacute granulomatous thyroiditis			
	levothyroxine overdose			
	iodine-induced thyrotoxicosis			

MULTIPLE ENDOCRINE NEOPLASIA

1	Pituitary	Parathyroid	Pancreatic
2A	Medullary thyroid	Parathyroid	Pheochromocytoma
2B	Medullary thyroid	Mucosal & intestinal neuromas Marfan's Syndrome	Pheochromocytoma

1: pancreatic endocrine tumor - ex: zollinger ellison = gastrinoma. MEN1 tumor suppressor gene on chromosome 11

2A and 2B: 2/2 germline mutations in RET proto-oncogene

think suspicious for MEN if:

2A = htn, palpitations, HA, diaphoresis

dx pheo: 24hr urine metanephrenes and free catecholamines or plasma free metanephrenes

POST-MI - COMPLICATIONS

	sx	img	rx	px
acute mitral regurgitation 2/2 papillary muscle ischemia or rupture	classically 2/2 posteroseptal MI's (solitary blood supply of posterior medial papillary muscle) but can occur with anterior MIs as well inc LA pressure -> pulm edema: orthopnea, babbasilar crackles blowing systolic murmur at cardiac apex		reversible w reperfusion if papillary muscle ischemia. rupture requires emergent surgery	
interventricular septum rupture	pansystolic murmur can lead to left-to-right shunt			
ventricular arrhythmias (not common cause of sudden death in immediate post MI period)	common in immediate post MI period: <ul style="list-style-type: none"> w/in 10 min = immediate/phase 1a (2/2 reentry) 10-60 min post MI = delayed/phase 1b (2/2 abnormal automaticity) vfib, vtach (sustained or nonsustained), vent premature beats 			
cardiac catheterization complications	at catheter insertion site - <ul style="list-style-type: none"> w/in 12 hrs: bleeding, hematoma (localized/ retroperitoneal extension) arterial dissection, thrombosis, pseudoaneurysm, av fistula. cholesterol embolism (atheroembolism) -> tissue or organ ischemia. <ul style="list-style-type: none"> immed - >30 days after intestinal ischemia, GI bleed, pancreatitis, aki skin most common = blue toe syndrome, livedo reticularis, gangrene, ulcers Hollenhorst plaques in retinal artery 2/2 internal carotid artery 		supportive statins	
post-myocardial pericarditis - Dressler's syndrome	1-6wks after MI sharp and pleuritic cp, pericardial friction rub			

post MI CHF:

LV systolic dysfxn -> LV dilation/remodeling/papillary muscle displacement -> MR 2/2 mitral annulus enlargement

impaired myocardial contractility -> dec Cardiac output -> inc norpi, renin, ADH -> inc SVR -> inc blood volume, inc preload, and short-term improves stroke volume but -> inc afterload -> inc left-sided pressures -> 2ndary right heart failure = pulm congestion -> pulm edema

MI MEDS

acute rx: PCI < 90 min of first medical contact to balloon time. and <12 hr of sx onset.

	aspirin + P2Y12R blocker (plavix)	nitrates	O2	heparin - unfxn, lmwh, or bivalirudin	beta blockers	ACEinhibitors	statins
Function	inhibits platelet aggregation and prevents recurrence of coronary artery blockage	vasodilators - dilate systemic veins + arterioles > coronary arteries by relaxing sm muscle cells —> lowers preload and LV end diastolic volume —> dec wall stress —> dec myocardial O2 demand arterial/arteriolar vasodilation —> dec systemic vasc resistance and BP —> dec wall stress —> dec myocardial O2 demand	for arterial sat <90%			limits ventricular remodeling in wks to mo's following MI should be started within 24hrs of MI	
Side effects		can induce reflex tachycardia with inc myocardial O2 demand and worsening angina. so use concomitant beta blockers also be careful in pts with hypotension, RV infarct, severe aortic stenosis			contraindicated in heart failure. bradycardia or cardiogenic shock		

for cocaine: IV benzos first for bp and anxiety, then aspirin, nitroglycerin & ca ch blockers for pain, cardiac cath. Contraindicated: beta blockers (leaves unopposed alpha stim) and fibrinolytics (risk of intracranial hemorrhage).

post MI:

	aspirin 75-325 mg/day	plavix	beta blockers	ACEinhibitors	statins
Function		for pts with UA, NSTEMI and post PCI for 12 mo (mortality benefit) for STEMI: if stent = 1 mo if drug eluting stent = 12 mo class of drugs called thienopyridines. antagonize ADP —> antiplatelet effect		limits ventricular remodeling in wks to mo's following MI should be started within 24hrs of MI	
Side effects					

PHEOCHROMOCYTOMA

sx	Rx		
high bp palpitations pounding headaches abd pain tremor excessive sweating (in paroxysms) varying intervals and inc in severity over time	alpha blockers first! giving only beta blockers leaves unopposed alpha —> ↑↑BP!	urine vanillylmandelic acid and metanephrines	

SCREENING FOR ADRENAL INSUFFICIENCY

Symptoms of Adrenal Insufficiency		Diagnostic Screening Tests for Adrenal Insufficiency			
		Basal Cortisol Level (early morning)	ACTH	Cortisol Response to cosyntropic	Origin of disease
Result of screening test	Primary Adrenal Insufficiency	LOW (<5ug/dL)	HIGH	Minimal Response	Adrenal gland disease/ Addison's Disease
	Secondary or tertiary adrenal insufficiency	LOW (<5ug/dL)	LOW	Minimal or suboptimal response	Pituitary or hypothalamic disease
	Unlikely to be adrenal insufficiency	>15ug/dL		Normal response >20 ug/dL	
	Indeterminate	5-15 ug/dL			

What is cosyntropic?	Cosyntropin is an ACTH synthetic analogue.
What does this test show?	Cortisol level is measured 30-60 min to help distinguish primary AI (adrenal disease/Addison's Disease) vs. central AI (pituitary/hypothalamic)
Why do this test?	Could make the diagnosis with cortisol and ACTH but the results of ACTH take

HIGH OUTPUT CARDIAC FAILURES

	types	sx	dx	rx
AV fistula (AVF) -> dec systemic vascular resistance -> inc cardiac preload ->	<ul style="list-style-type: none"> congenital - <ul style="list-style-type: none"> • PDA • angiomas • pulm AVF • CNS AVF acquired - <ul style="list-style-type: none"> • trauma • iatrogenic (femoral cath) • atherosclerosis (aortocaval fistula) • cancer 	w sig AV shunting, compensatory inc HR + SV when decompensates -> high output cardiac failure bc cannot meet O2 demand	doppler u/s	surgery for large AVF

CARDIAC TAMPOONADE

cardiac tamponade = Beck's triad = jugular venous distention, muffled/distant heart sounds, hypotension
+/- pulsus paradoxus >10mm Hg drop in systolic bp during inspiration
positive hepatojugular reflux
clear lungs (not vol o/)
compensatory tachycardia and inc contractility 2/2 sympathetic stimulation to maintain cardiac output

(etiology: fluid accumulation (eg from viral pericarditis/pericardial effusion) in pericardial cavity so intrapericardial pressure > diastolic vent pressure —> dec venous return to heart/both ventricles —> dec preload, stroke volume, cardiac output.
etiology of pulsus paradoxus: inspiration —> filling of right ventricle —> interventricular septum shifts towards left ventricle cavity —> further dec left vent filling).

rx - pericardiocentesis, pericardectomy

NOTE:

inspiration = lowers intrathoracic pressure and increase venous return to right ventricle

PRIMARY ADRENAL INSUFFICIENCY

Diffi Dx:

HCTZ (acts on distal kidney) - can cause hypokalemia, hyperglycemia, hyperuricemia
aldosterone acts to increase sodium resorption in distal renal tubules

mechanism:

causes	mechanism	s/sx	dx
extrapulmonary TB in adrenal gland	↓cortisol ↓adrenal sex hormone and ↓aldosterone secretion —> kidney inappropriately loses Na while retaining K and H at distal tubule —> normal anion gap, hyperK and hypoNa metabolic acidosis	acute: most commonly w shock abd tenderness w deep palpation unexplained fever n/v/wt loss/anorexia chronic: gradual fatigue, weakness n/v/abd pain/wt loss/anorexia hyperpigmentation or vitiligo borderline hypertension electrolyte abnormalities (hypona, hyperK, hypoglyc, hypercalcemia) anemia, eosinophilia	hi dose (250 ug) ACTH stim test -> measure ACTH and serum cortisol: 1ary adrenal insuff = low cortisol, hi ACTH 2ary/3ary adrenal insuff: low cortisol, low ACTH
granulomatous disease (eg histoplasmosis, coccidioidomycosis, cryptococcosis, sarcoidosis)			
other: autoimmune infections (tb, hiv, disseminated fungal) hemorrhagic infarction (eg meningococcemia, anticoagulants) metastatic cancer (eg lung)			

ADRENAL INSUFFICIENCY

	hx/etiology	sx		rx
primary adrenal insufficiency	TB most common cause in developing countries	hypotn pigmentation hypona hyperK eosinophilia	TB - adrenal calcification	glucocorticoids and mineralocorticoids
	fungal infxn (and sometimes meds to treat like ketoconazole - inh steroid synthesis)			
	CMV			
	autoimmune (Addison's) - Abs ag adrenal enzymes responsible for steroid synthesis 80% in developed countries	markedly elevated ACTH low serum cortisol		
	assd with autoimmune conditions - thyroid, parathyroid, ovaries, pernicious anemia, vitiligo			
	adrenal hemorrhage (esp pts on warfarin and acute stress like sepsis)	acute onset imaging shows blood in acute stage		
	adrenoleukodystrophy - young males, 2/2 accumulation of very long chain fatty acids w/in adrenal glands		enlarged adrenal glands without any calcifications	
acute adrenal crisis	central insuff due to chronic glucocorticoid use (>20mg pred or equivalent for >3wks) —> HPA axis suppression	unexplained n/v/abd pain hypona, hyperK hypoglycemia hypotension cushingoid features - buffalo hump, central obesity, moon face, wt gain		may not respond appropriately to stress (surgery, infection, bleeding, MI) and require higher doses "stress doses" of short-term glucocorticoids during acute condition

HEART FAILURE

Signs/sx:

left sided	elevated pro-brain natriuretic peptide (proBNP) = secreted in response to ventricular stretch and wall tension when cardiac filling pressures are elevated. = secreted by cardiac myocytes low BNP rules out acute heart failure w very high NPV	S3 = soft diastolic sound produced by tensing of the papillary chordal apparatus when there is rapid influx of blood into the ventricle in early diastole. aka blood sloshing into "big baggy heart"/ ventricle	+/- wheezing - 2/2 bronchial wall edema crackles on lung exam CXR - pulm vascular congestion and interstitial edema	
right sided	JVP distension Kussmaul's sign - inc in JVD with inspiration	peripheral edema	hepatomeg	clear lungs
	causes	sx	rx	
right ventricular	pulm htn 2/2 inc pulm arterial pressure (primary) or inc pulm venous pressure (left ventricular failure) • COPD (most common) • PE (also common) • Interstitial lung disease (eg idiopathic pulmonary fibrosis)	ECG: partial or complete RBBB, right axis deviation, RVH, right atrial enlargement ECHO: pulmonary HTN, dilated right ventricle, tricuspid regurg	• Dyspnea on exertion, • weakness, fatigue, lethargy • Exertional syncope (due to cardiac output) • Exertional angina (due to myocardial demand) exam: • Peripheral edema • inc JVP with prominent a wave, reduced carotid upstroke • Widely split and loud (pulmonic component of) S2	doesn't present as right heart failure until late in the disease requires high preload to maintain BP — so IV fluids NOT nitroglycerin and diuretics supplemental O2 diuretics treatment of underlying etiology IV inotropes for severe decompensation
	OSA	catheterization: gold std. right ventricular dysfunction, pulmonary HTN, no left heart disease	• Right sided heave • Pulsatile liver from congestion +/- ascites • Tricuspid regurgitation murmur	
	chest wall disorders (eg kyphoscoliosis)			

left ventricular arr	primarily diastolic dysfxn aka preserved left ventricular ejection fraction (HFPEF)	restrictive cardiomyopathy - 2/2: <ul style="list-style-type: none">infiltrative - sarcoid, amyloidstorage dz - hemochromatosisendomyocardial fibrosisidiopathic constrictive pericarditis	echo - symmetric thickening of ventricle	sx of right sided heart failure predominate - prominent jvd, bilateral ankle edema, tender hepatomegaly left sided heart failure sx too - bibasilar rales, pleural effusion	only hemochromatosis is reversible. rx with phlebotomy (remove iron from bloodstream) sarcoid or scleroderma - steroids can slow progression and prolong survival but not reversible.
		hypertrophic cardiomyopathy	echo - interventricular septum is thickest	syncope in 15-25% pts presyncope or cp with exertion fam hx of sudden death crescendo-decrescendo murmur at apex and LLS sternal border: <ul style="list-style-type: none">softer with squatting/ handgrip (inc preload and venous return and inc LV cavity size)louder with straining/ valsalva/abrupt standing (dec preload and ventricular size)	beta blockers - <ul style="list-style-type: none">slows heart and prolongs diastole -> more filling -> less outflow obstrnalso antianginal effect if can't tolerate bblockers, ca ch blockers/diltiazem
	primarily systolic dysfxn	<ul style="list-style-type: none">ischemic heart diseasehypertension (chronic high left ventricular diastolic pressures -> atrial dilatation, can -> afib)cardiomyopathy		normal or decreased pulse pressure, weak carotid upstroke, cold pale extremities	cardioselective beta blockers (carvedilol, sustained-release metoprolol succinate, atenolol, bisoprolol)
both	dec cardiac contractility				

Notes:
for borderline/low EF < 55%, inc risk of cardiotoxicity 2/2 trastuzumab (aka herceptin) with chemo.

SECONDARY HYPERTENSION

	hi renin hi aldo	lo renin hi aldo (plasma aldo:renin >20)	lo renin lo aldo
	2ndary hyperaldo	primary hyperaldo (Conn's syndrome)	non-aldosterone causes
	renovascular hypertension <ul style="list-style-type: none">(ex: 2/2fibromuscular dysplasia - noninflammatory and nonatheroscleroticunilateral renal artery stenosis - abd bruits and episodes of flank pain, edema malignant hypertension renin-secreting tumor diuretic use	aldosterone-producing tumor bilateral adrenal hyperplasia	congenital adrenal hyperplasia deoxycorticosterone-producing adrenal tumor cushing syndrome exogenous mineralocorticoids pheochromocytoma (classic triad - ha, sweating, palpitations w tachycardia)
clinical presentations	metabolic alkalosis	htn mild hypernatremia +/- hypokalemia - muscle weakness metabolic alkalosis	
etiology	aldosterone saves sodium (inc Na reabsorption), K secretion, and H secretion in distal renal tubules. Na reabsorption increases water absorption, but in a few days spontaneous diuresis (aldosterone escape) makes volume status ~normal and only mild hyperNa (143-147) without sig peripheral edema . alkalosis 2/2: <ul style="list-style-type: none">hypOK directly increases renal bicarb resorption.inc H secretion		
other dx criteria/ supporting	fibromuscular dysplasia - severe/resistant htn women <50yo, acei or ARB doesn't affect BP but inc creatinine >0.5-1mg/dL. sx of brain ischemia (amaurosis fugax, horner's, tia, stroke), carotid/vertebral artery involvement (ha, pulsatile tinnitus, dizziness). dx - ctangi, u/s, if inconclusive, arteriography, f/u w BP and creatinine and renal u/s.	confirmatory = oral saline load --> adrenal suppression testing abd CT and adrenal venous sampling --> distinguish b/w unilateral adenoma and bilat hyperplasia	
rx		unilat adrenal adenoma = surgery. if poor candidates/refuse, aldosterone antagonists (spironolactone, eplerenone)** bilat adrenal hyperplasia = aldosterone antagonists	

**spironolactone - progesterone and androgen receptor antagonist cause sfx like gynecomastia/menstrual irregularities - hypoK, hypoNa, hyperuricemia, hyperglycemia
ace-i's - sfx - hyperK 2/2 dec angiotensin II, elevated cr 2/2 reduced GFR
eplerenone - selective mineralocorticoid antagonist
fibromuscular dysplasia - renal, carotid, vertebral arteries, non inflammatory and nonatherosclerotic.

AMENORRHEA

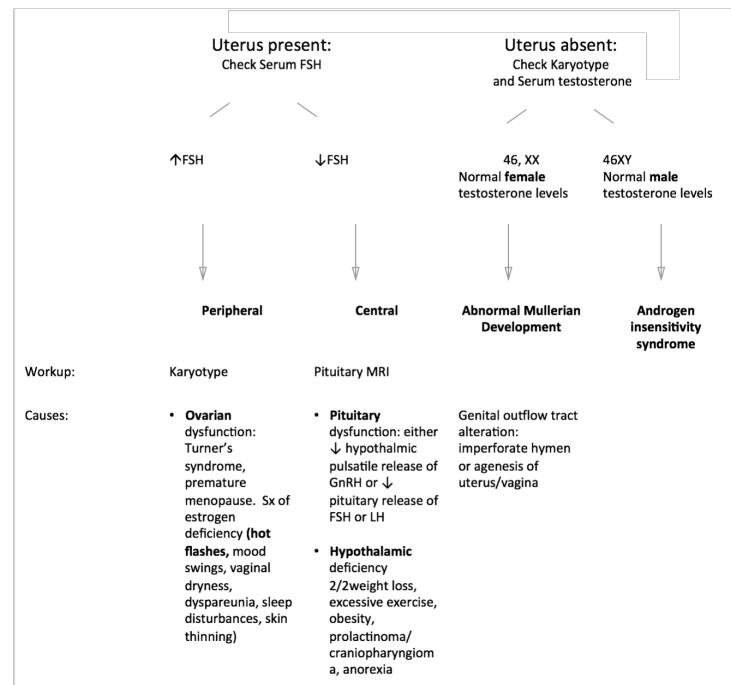
1° = woman who has never menstruated. Normal up to age 16 if has secondary sexual characteristics. If absent secondary sexual characteristics, evaluate at age 14.

2° = menstrual-age woman who has not menstruated in 6 mo

(absent breast development indicates estrogen deficiency)

Most common cause = pregnancy. Exclude before further workup.

Most common anatomic cause of 2° amenorrhea = Asherman's Syndrome: scarring of **uterine** cavity after D&C



Acute decompensated heart failure —

2/2:

- (most commonly) left ventricular, systolic or diastolic dysfunction. +/- additional cardiac disease (MI, arrhythmia, MR or AR)
- uncontrolled severe HTN
- renal artery stenosis
- severe renal disease with fluid overload

sx:

- acute dyspnea
- orthopnea
- paroxysmal nocturnal dyspnea
- htn or hypotn if severe
- tachycardia
- tachypnea
- diffuse crackles w possible wheezes/cardiac asthma
- possible S3, JVD, peripheral edema

rx:

- supplemental O2
- IV furosemide (+/- if hypotension/shock)
- +/- vasopressor (norepi) if hypotension/shock
- +/- IV nitroglycerin

COR PULMONALE

Common etiologies	COPD (most common) PE (also common) Interstitial lung disease Pulmonary vascular disease (thromboembolic) OSA
Symptoms	Dyspnea on exertion, fatigue, lethargy Exertional syncope (due to ↑ cardiac output) Exertional angina (due to ↑ myocardial demand)
Examination	Peripheral edema inc JVP with prominent a wave Widely split and loud (pulmonic component of) S2 Right sided heave Pulsatile liver from congestion Tricuspid regurgitation murmur
Imaging	ECG: partial or complete RBBB, right axis deviation, RVH, right atrial enlargement ECHO: pulmonary HTN, dilated right ventricle, tricuspid regurg R heart catheterization: right ventricular dysfunction, pulmonary HTN, no left heart disease

REPRODUCTIVE/GERM CELL TUMORS

		origin	
leydig cell tumors	most common type of testicular sex cord stromal tumors	principal source of testosterone + capable of estrogen production via aromatase	
seminomas			betaHCG somewhat elevated if contain syncytiotrophoblastic giant cells
yolk sac tumor		endodermal sinus tumor	
choriocarcinoma		germ cell tumor	inc beta-HCG
teratoma			inc serum AFP or beta-hCG (may indicate coexistent germ cell tumor)

TYPE 1 DIABETES

Consider if sx - wt loss, polydipsia, polyuria. patient is stuporous, rapid Kussmaul breathing. get finger stick glucose, then cbc/ABG if in DKA.

POLYCYSTIC OVARIAN SYNDROME (PCOS)

hx/sx	labs	rx
irreg menstrual periods hirsutism = acne	<ul style="list-style-type: none"> elevated testosterone inc LH/FSH ratio type 2 DM or insulin resistance (OGT >200) 	<ul style="list-style-type: none"> OCP or clomiphene citrate - induces ovulation metformin - for dm, helps correct hirsutism 2/2 slight suppression of androgen production, wt loss.

D/O OF SEXUAL DEVELOPMENT

dx	cause	breast devpt	reproductive organs	axillary & pubic hair	karyotype
complete androgen insensitivity syndrome	x-linked mutation of androgen receptor	yes	cryptorchid testes, absent uterus, and upper vagina	minimal to absent	46 XY
mullerian agenesis (mayer-rokitansky-kuster-hauser syndrome)	hypoplastic or absent mullerian ductal system	yes	absent or rudimentary uterus and upper vagina	normal	46 XX
transverse vaginal septum	malformation of urogenital sinus and Mullerian ducts	yes	normal uterus, abnormal vagina	normal	46 XX
tuner syndrome	complete/partia absence of 1 X chromosome	variable (depending on ovarian function)	Normal uterus and vagina, streak gonads	normal	45 X
Complete XY gonadal agenesis	SRY gene mutation on Y chromosome	No	Normal uterus and vagina, streak gonads	minimal to absent	46 XY

HEART FAILURE MEDICATIONS

	Mechanism	Affect on RAAS (renin, angiotensin I, aldo)
Loop diuretics		Decreased blood volume stimulates renin release that in turn increases angiotensin II and aldosterone concentrations hRenin hAng-II hAldosterone
Hydrochlorothiazide		
K-Sparing		
ACE inhibitors	Prevent conversion of angiotensin I to angiotensin II	
Direct renin inhibitors (eg, aliskiren)		iAng-II iAldosterone
Angiotensin receptor blockers	<p>Prevent angiotensin II from acting on angiotensin receptors.</p> <p>Unlike ACE inhibitors, angiotensin receptor blockers do not decrease angiotensin II levels but decrease aldosterone production.</p>	-- Ang-II iAldosterone
Aldosterone receptor antagonists		-- Ang-II hAldosterone (by blocking the mineralocorticoid receptors)

Cardiorenal syndrome - ex in heart failure patients with volume overload but low cardiac output → poor renal perfusion. Rx with IV loop diuretics to improve renal perfusion

MURMURS/HEART SOUNDS/RUBS

type	cause	etiology	where heard?	sx	ekg
systolic murmur	aortic stenosis	<ul style="list-style-type: none"> age-related sclerocalcific changes bicuspid aortic valve HOCM 	<ul style="list-style-type: none"> harsh ejection (cresc-decresc) murmur right 2nd intercostal space, radiation to carotid arteries (HOCM - best at apex and LLsternal border) pulsus parvus et tardus = delayed and diminished carotid pulse point of maximal impulse inc in intensity 	<p>cp, dyspnea, dizziness, syncope</p> <p>HOCM at younger age - murmur:</p> <ul style="list-style-type: none"> softer with squatting/ handgrip (inc preload and venous return and inc LV cavity size) louder with straining/ valsalva/abrupt standing (dec preload and ventricular size) 	<p>echo - for structural heart disease</p> <p>pts with symptomatic severe AS should be referred for aortic valve replacement</p>
	tricuspid regurg	<ul style="list-style-type: none"> endocarditis chagas dz (trypanosoma cruzi) thyrotoxicosis 	holosystolic accentuated with inspiration		conduction abnormalities are UNcommon
	mitral regurg (MR)	<ul style="list-style-type: none"> mitral valve perf as complication of mitral valve endocarditis chagas dz thyrotoxicosis 		acute CHF	
	Atrial septal defect (ASD)	ejection systolic murmur over left second intercostal space 2/2 inc blood flow across pulm valve +/- mid-diastolic murmur for large ASDs 2/2 inc flow across tricuspid valve			

TYPE 2 DIABETES MEDS

Screen patients who:	dx
have BP > 135/80 >45yo or addl risk factors for diabetes: <ul style="list-style-type: none"> HTN, prior CV disease Dyslipidemia (low HDL, hi TG) hx glucose intolerance physical inactivity 2st degree relative w diabetes hi risk race/ethnicity (AA, latino, Native American, Asian, Pacific Islander) Women w children's birth wt \geq9lbs hx gestational DM hx PCOS 	A1c \geq 6.5% FBG \geq 126mg/dl random glucose >200 w sx of hyperglycemia OGT - 75g load 2hrs, \geq 200 (more sensitive test for insulin resistance/dm in PCOS)

Medication	decrease in A1c	Points to remember
Metformin (biguanide)	1-2%	<ul style="list-style-type: none"> initial therapeutic agent for most type 2 diabetics Weight neutral, low risk of hypoglycemia lactic acidosis is a life threatening complication
Sulfonylureas	1-2%	<ul style="list-style-type: none"> generally added to patients with metformin failure weight gain and hypoglycemia are main side effects
pioglitazone (TZDs)	1-1.5%	<ul style="list-style-type: none"> used if unable to tolerate metformin or sulfonylureas side effects: weight gain, edema, CHF, bone fracture, bladder cancer Low risk of hypoglycemia when used alone or with metformin can be used in renal insufficiency
insulin	1.5-3.5%	<ul style="list-style-type: none"> basal insulin added as second agent in metformin failure with A1c > 8.5% prandial short acting insulin added for inadequate glycemic control with combination of oral antidiabetic drugs and basal insulin weight gain and hypoglycemia are main concerns
DPP-IV inhibitors (eg sitagliptin)	0.5-0.8%	<ul style="list-style-type: none"> low risk of hypoglycemia weight neutral can be used in renal insufficiency
GLP-1 receptor agonist (eg exenatide)	0.5-1.0%	<ul style="list-style-type: none"> possible second agent for metformin failure, especially if weight loss is desired low hypoglycemia risk when used alone or with metformin

if inadequate control on metformin, add second drug.

add insulin if HbA1c >8.5% (risk of wt gain and hypoglyc)

GLP-1 agonist (exenatide or liraglutide) - r/o acute pancreatitis

thiazolidinediones (pioglitazone) - r/o inducing CHF in pt with heart disease

DIABETES PHARMACOLOGY

	Hypoglycemia	Weight gain/ Weight loss	Important Side Effects/ Toxicities
Metformin	No	Loss	GI upset Lactic acidosis
Sulfonylureas	Yes	Gain	
Pioglitazone (TZDs)	No	Gain	Hepatotoxicity CHF Bone Fractures Bladder Cancer
Insulin	Yes	Gain	
DPP-IV inhibitors	No	Neutral	
GLP-1 receptor agonist (exenatide)	No	Loss	Pancreatitis

diastolic murmur	aortic regurgitation (AR)	valvular disease (leaflet) <ul style="list-style-type: none"> • congenital (most common in developed countries) • rheumatic heart dz (developing countries) • endocarditis • bicuspid ao valve • trauma • myxomatous degen • ankylosing spondylitis • acromegaly • meds (fenphen) 	• decresc early diastolic murmur <ul style="list-style-type: none"> • left sternal border (3rd and 4th intercostal spaces) • patient sitting up, leaning forward, holding breath in full expiration 		
		aortic root disease <ul style="list-style-type: none"> • ex: perivalvular abscess 2/2 infective endocarditis +/- IV drug use • htn • aortitis 2/2 syphilis • ankylosing spondylitis • dissecting aneurysm • ehlers-danlos • marfan syndrome • IBD, RA 	right sternal border	syncope	endocarditis + perivalvular abscess can —> conduction abnormality 2:1 2nd degree AV block — iv drug use inc risk of periannular extension
	mitral stenosis (MS)		late diastolic murmur opening snap	pulm edema afib	
pericardial friction rub	acute pericarditis	<ul style="list-style-type: none"> • viral most common • bacterial • connective tissue dz (eg SLE) • uremia 		sharp and pleuritic CP - improves by sitting up and leaning forward	diffuse concave upward ST-elevations across precordial and limb leads, PR elevation in aVR (except in uremic pericarditis)
	constrictive pericarditis	<ul style="list-style-type: none"> • idiopathic • viral • cardiac surgery/ radiation therapy • TB 		fatigue and DOE periph edema and ascites inc JVP +/- pericardial knock pulsus paradoxus kussmaul's sign	nonspecific, afib, or low voltage QRS jvp tracing has prominent x&y descents

carotid bruit	indications for carotid endarterectomy:	men	asymptomatic: 60-99% stenosis symptomatic: 50-69% stenosis (grade IIA) 70-99% stenosis (Grade IA)
		women	symptomatic and asx: 70-99% stenosis

Midsystolic soft murmurs in asx young patient - usually benign. no futher w/u needed.
 Diastolic and continuous murmurs - always investigate.

Endo/ Rheum/ Heme

Hepatic encephalopathy -

rx:

- supportive (volume repletion), give adequate nutrition, and lower serum ammonia (oral or enema lactulose, if refractory after 48 hrs, rifamixin)

2. treat precipitating cause:

- medications - sedatives
- hypovolemia
- infection
- excess nitrogen load - ex: GI bleed
- electrolyte abnormalities - ex: hypokalemia (met alkalosis converts ammonium to ammonia (which can cross BBB))

Colonoscopy findings:

- hundreds of colonic polyps - familial colonic polyposis (FAP) - autosomal dominant, 2/2 mutations in adenomatous polyposis coli (APC) gene. 100% risk of cancer. Rx proctocolectomy.
- melanosis coli - dark brown discoloration of colon with pale patches of lymph follicles shining through.

Lynch syndrome - high risk of extracolonic tumors, most common is endometrial carcinoma

ARRYTHMIAS

		causes	ekg	sx	rx	px
SVT - supraventricular tachycardia ~ any tachycardia originating above His-bundle	afib	most common foci location @ pulmonary veins  classification: <ul style="list-style-type: none"> atrial atrioventricular ventricular unifocal multifocal Reentry Reentrant Repetitive Reentrant with multiple foci Reentrant with multiple pathways 	absent p waves - replaced by tiny chaotic fibrillatory waves, irregularly irregular R-R intervals, narrow QRS complexes 	all: palpitations +/- dizziness, lightheadedness, SOB, diaphoresis, CP, presyncope, syncope	for all: if hemodynamically stable: <ul style="list-style-type: none"> 1. vagal maneuvers (eg carotid sinus massage, valsalva, eyeball pressure) OR IV adenosine = helps identify type of SVT bc temporarily slows conduction via AV node and may unmask "hidden" p-waves in flutter or atrial tach. can terminate pSVT <p>medical mgmt: av nodal blockers (NOT for WPW):</p> <ul style="list-style-type: none"> beta blockers ca ch blockers digoxin adenosine <p>if hemodynamically unstable afib with rr: immediate synchronized cardioversion</p>	prolonged periods of rapid ventricular rates can lead to tachycardia-mediated cardiomyopathy
paroxysmal SVT ekg - mostly narrow complex tachycardia QRS <120ms 	AVRT - atrioventricular reentrant tachycardia sk - abrupt onset and offset	wolff-parkinson-white (WPW) preexcitation syndrome = accessory atrioventricular bypass tract	slurred upsloping R-waves (delta waves)		WPW - drugs that inc refractoriness of AV node increases conduction across accessory pathway so rx is cardioversion or procainamide to return to sinus rhythm	
	AVNRT - atrioventricular nodal reentry tachycardia	reentrant circuit formed by 2 separate conducting pathways within AV node.		sudden onset and termination rapid (140-250/min) regular rhythm narrow QRS complexes, absence of definite P waves (may be buried right after QRS complex)		' = can lead to tachycardia-mediated cardiomyopathy
	atrial tachycardia	+ AV block = dig tox		HR 150-250 bpm (slower than flutter)		
	junctional tachycardia					
	aflutter	reentrant circuit around tricuspid annulus , with slowing of impulse through cavotricuspid isthmus region	rapid "sawtooth" flutter waves	HR 250-350 bpm		' = can lead to tachycardia-mediated cardiomyopathy
	AV block	perivalvular abscess from endocarditis +/- iv drug use lyme dz MI inc vagal tone (sleep, pain) metabolic (hyperK) meds (beta blockers, ca ch blockers)	P-QRS dissociation constant R-R interval T wave inversions suggest MI 			if symptomatic, temporary pacemaker, rx underlying cause if irreversible cause, permanent pacemaker
	sinus tachycardia	panic attacks			alprazolam	

ventricular tachycardia	monomorphic		wide QRS complex		if hemodynamically stable, amiodarone or lidocaine if hemodynamically unstable, immediate defibrillation	' = can lead to tachycardia-mediated cardiomyopathy
polymorphic	torsades de pointes		cyclic/sinusoidal alteration of QRS	prolonged QT interval predisposes - fluc/moxifl, HIV, electrolyte imbalances	if hemodynamically unstable, immediate defibrillation if conscious and stable, IV magnesium	

figure 0* SVT

- Usually there are no regular P waves as they are buried within the QRS complexes, but retrograde P wave can occur.
- Retrograde P waves: seen at the beginning or end of a QRS complex when the atria & ventricles are not simultaneous. Can appear as spikes on QRS complexes or as inverted P waves.

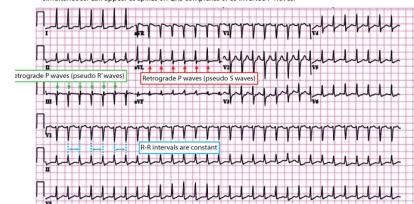
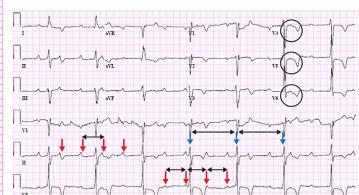


figure 1*

Diff Dx of acquired long QT syndrome

Medications	diuretics (due to electrolyte imbalances) antiemetics (eg ondansetron) antipsychotics (eg haloperidol, quetiapine, risperidon) tricyclic antidepressants selective serotonin reuptake inhibitors (eg citalopram) antiarrhythmics (eg amiodarone, sotalol, flecainide) antianginal drugs (eg ranolazine) anti-infective drugs (eg macrolides, fluoroquinolone, antifungals)
metabolic disorders	electrolyte imbalances (hypoK, hypoMag, hypoCa) starvation hypothyroidism
bradycardias	sinus node dysfunction AV block (2nd or 3rd degree)
others	hypothermia myocardial ischemia/infarction intracranial disease HIV infection

Figure 2* More on complete AV block (3rd degree):



ASCITES

cause	SAAG	total ascites protein	ascitic amylase	other
alcohol hepatitis				
pancreatic ascites 2/2 chronic pancreatitis (2/2 chronic etoh)	<1.1 g/dL	>3 g/dL	>1000 IU/L	
malignancy-related (eg hepatocellular carcinoma)	<1.1 g/dL			
secondary bacterial peritonitis (2/2 perf peptic ulcer or bowel)	>1.1 g/dL	<1g/dL glucose >50 mg/dL		PMN > 250 cells/uL free air under diaphragm on cxr
spontaneous bacterial peritonitis	>1.1 g/dL	<1g/dL glucose >50 mg/dL		

splenomegaly - malaria, lymphoma (hodgkin), infectious mononucleosis 2/2 ebstein-barr virus

liver (amebic) abscess - echinococcus. endemic area, occasionally jaundice.

"anchovy paste". dx w/u, CT scan, MRI. confirm = serum Ab for amebiasis. supporting = leuk>10,000 or elevated alk phos.

rx empiric oral metronidazole. do not aspirate unless no impvt.

hepatic adenoma - benign epithelial tumors as solitary mass in right hepatic lobe. young and middle aged women w hx of OCP usage. palpable abd mass, hepatomegaly, or jaundice.

gastroparesis - rx with metoclopramide (prokinetic and antiemetic) - sfx risk of extrapyramidal side effects (eg tardive dyskinesia). or IV erythromycin (acute rx)

antiemetics - antihistamines (promethazine, diphenhydramine) or 5HT3 antagonists (ondansetron, granisetron)

granulomas = GI TB, sarcoid, yersinia, crohns

cirrhosis:

sx = nonspecific - anorexia, wt loss, weakness, fatigue, muscle cramps
jaundice, pruritis, GI bleed (melena, hematemesis), encephalopathy (confusion, sleep disturbances), amenorrhea/anovulation, hypogonadism in men.

phys ex =

skin - telangiectasias, caput medusae,

Chest - gynecomastia

Abd - ascites, hepatomegaly, splenomegaly

GU - testicular atrophy

Ext - palmar erythema, Dupuytren's contracture, clubbing

MISCELLANEOUS

normal liver span is 6-12 cm in midclavicular line

statins - inhibit HMG-CoA reductase. Can cause hepatic dysfunction. Myalgias/myopathy-

>7.5g single dose. may be ask for first 24 hrs, or n/v/anorexia. then severe liver injury.
if ingestion of single >7.5 g dose and within 4 hrs, give activated charcoal. (not if chronic ingestion or unknown amt ingested)
Regardless, of dose or timing, check acetaminophen level, and dose N-acetylcysteine accordingly

symmetric prox muscle weakness or tenderness (2/2 decreasing coenzyme Q10 synthesis)

metastasis:

colon -> liver most common

lung cancer -> liver, bone, brain, adrenal glands

liver <- (mets most common - GI, lung, breast, skin (melanoma))

signs of portal htn: esophageal varices, spider nevi, palmar erythema, caput medusa. thrombocytopenia and coagulopathy often seen.

FFP has all clotting factors.

liver synthesizes all factors except factor VIII. Vit K dependent factors are II, VII, IX, and X.

for hi volume bleeds - 2 large bore IVs, T&S, platelets if <50,000/mm³, if heatemesis w/r/o aspiration - endotracheal intubation to secure airway.

celiac disease - "malabsorption and iron def anemia"

= small bowel malabsorption -> bulky, foul-smelling stools, def of vit A (hyperkeratosis), D and calcium (bone pain 2/2 osteomalacia, fx 2/2 osteoporosis), K (easy bruising), iron (pallor/anemia, fatigue)

gold std = villous atrophy small bowel bx. serum IgA antiendomysial and antiTTG Abs + (but might be negative because of assd IgA deficiency). would see low serum and urine excretion of Dxylose test.

pernicious anemia - autoimmune d/o where body makes anti-intrinsic factor Abs. leading cause of B12 def
etiology: anti-intrinsic factor Abs decrease amt of functional IF to facilitate B12 absorption. Also develop a chronic atrophic gastritis with decreased production of intrinsic factor by gastric parietal cells —> inc 2-3x r/o intestinal-type gastric cancer and gastric cardinoid tumors.

spontaneous bacterial peritonitis - intestinal bacterial direct translocation, or hematogenous spread to liver and ascites - us gram neg (ecoli, klebsi)

ascitic fluid PMN ≥250 cells/uL, +cx and exclusion of 2ndary causes of peritonitis

SAAG ≥1.1g/dL = portal htn caused the ascites

Ascites protein <1g/dL & glucose >50 mg/dL

rx - empiric abx like 3rd gen cephalosporins (cefotaxime).

More on Afib management. two concerns to manage:

rate vs rhythm control	anticoagulation
antiarrhythmic drugs for those w recurrent symptomatic episodes, or LV systolic dysfxn due to uncontrolled AFib.	risk of stroke or systemic embolism = CHADS2-VASC (essentially weighs benefit of anticoagulation/whether worth the risk) <ul style="list-style-type: none"> • CHADS2 = 0 = no anticoag indicated. • CHADS2 = 1 = oral anticoag, or aspirin if cannot. • CHADS2 ≥ 2 = oral anticoag strongly recommended. (for nonvalvular afib, rivaroxaban Xa inhib)

More on tachycardia-mediated cardiomyopathy:

ss: progressive dyspnea, dec exercise tolerance, tachyarrhythmia/palpitations, s/sx of CHF. may have murmur 2/2 LV dilation
—> dx by ekg, echo, assessment for CAD as alternate cause for LV dysfunction

—> rx by aggressive rate control or restore to sinus rhythm = av node blocking agents, antiarrhythmic drugs, catheter ablation

ANTIARRHYTHMIC DRUGS - 1

	Lidocaine (class I B antiarrhythmic)	Amiodarone (class III)	Metoprolol
Function	Ventricular arrhythmias, not atrial arrhythmias	Rhythm control for Afib or underlying left ventricular systolic dysfunction Ventricular arrhythmias/tach	
Side effects	do not use prophylactically in ACS because could increase risk of asystole.	<p>Cardiac:</p> <ul style="list-style-type: none"> Sinus bradycardia, heart block Risk of proarrhythmia - QT prolongation and risk of torsades de pointes <p>Pulmonary:</p> <ul style="list-style-type: none"> Chronic interstitial pneumonitis (cough, fever, dyspnea, pulmonary infiltrates) most common <p>Endocrine:</p> <ul style="list-style-type: none"> Hypothyroidism Hyperthyroidism <p>Gastrointestinal/hepatic</p> <ul style="list-style-type: none"> Elevated transaminases, hepatitis <p>Ocular visual disturbances:</p> <ul style="list-style-type: none"> Corneal microdeposits Optic neuropathy <p>Dermatologic:</p> <ul style="list-style-type: none"> Blue-gray skin discoloration <p>Neurologic:</p> <ul style="list-style-type: none"> Peripheral neuropathy <p>50% of pts on long-term treatment develop significant side effects, should monitor with period thyroid and haptic fn markers.</p>	<p>Bradyarrhythmias</p> <p>Acute worsening of heart failure</p> <p>Bronchoconstriction</p> <p>Fatigue, weight gain</p>

ENT - PATHOLOGY

		Cause	Sx
Serious otitis media	Most common middle ear pathology in pts w AIDS	Presence of middle ear effusion without evidence of an acute infection	Conductive hearing loss Dull tympanic membrane that is hypomobile on pneumatic otoscopy
Otosclerosis		Bony overgrowth of stapes	Conductive hearing loss

HIV ASSD...ESOPHAGITIS

Common esp when CD4 < 100/uL				
Painful swallowing and substernal burning.				
Candida albicans (most common) = white plaque, oral thrush	HSV = herpetic vesicles and round/ovoid ulcers , concurrent perioral/oral HSV	CMV = linear ulcers , concurrent perioral/distal esophagus	Idiopathic/aphthous = concurrent oral aphthous ulcers	Other causes (medications -- potassium supplements, tetracyclines, bisphosphonates) have direct chemical effect on mucosa (pill esophagitis). AR drugs usually do not.
Rx empirically w 3-5 days of oral fluconazole If no thrush or fail to respond to empiric rx: Esophagoscopy w bx, cytology, and culture to determine the specific etiology.	Rx: valacyclovir and acyclovir			

Diff Dx: of wt loss, anorexia, cognitive deficits, fatigue
+hyperpigmentation = Chronic primary adrenal insuff
Inc appetite, not anorexia. = undx or uncontrolled diabetes
MDD

ANTIARRHYTHMIC DRUGS - 2 (CONT'D)

	Class III antiarrhythmic (Dofetilide)	Digoxin	Verapamil
Function	Systolic dysfunction - Positive inotropic effect RVR 2/2 flutter or afib - Negative dromotropic (increases AV refractoriness)		
Side effects	Risk of torsades de pointes in 3% of patients Thyroid and hepatic effects significantly less common than with amiodarone Nausea, vomiting, diarrhea Anorexia Visual disturbances Confusion	Cardiac arrhythmias Constipation	Impaired cardiac conduction and contractility Potential worsening bradycardias CHF

Atropine for symptomatic sinus brady, or AVnodal block

for chronic stable angina:

anti-anginal:			preventative:		
nitrates (long: isosorbide dinitrate, isosorbide mononitrate)	beta blockers (+/- ca ch blocker (diltiazem, felodipine)	aspirin	statin	behavior mod
use short-acting form for acute relief long-acting for persistent angina	1st line. improves exercise tolerance decreases myocardial contractility and HR —> dec angina mortality benefit for pts w MI	peripheral and coronary vasodilation —> dec angina			<ul style="list-style-type: none"> smoking cessation regular exercise and wt loss control bp and diabetes

CHEST PAIN EVALUATION

patient is:	pretest probability of CAD —>	able to exercise?	result?	
• men <40 • women <50 • atypical cp • no sig cardiac risk factors (nonsmoker, no fam hx of premature CAD)	low	—> —> —>	no addl testing	
	intermediate	y - exercise EKG/ imaging test n - pharmacologic stress imaging test	positive = coronary angiography	
	high	—> —> —>	possible CT coronary angio, start meds to treat CAD	

CARDIAC ARREST MANAGEMENT

start CPR, O2, attach defibrillator	• vfib • pulseless vtach	shock then CPR q2min and IV access	if shockable rhythm, shock	if shockable rhythm, shock then CPRx2 min amiodarone
	• asystole • PEA	CPR x 2 min IV access Epi 1 mg q3-5m advanced airway	otherwise: CPRx2 min Epi 1mg q3-5 min ?advanced airway ?rx reversible causes	otherwise: CPRx2 min Epi 1mg q3-5 min ?advanced airway ?rx reversible causes
		^— (repeat) —I		

reversible causes of PEA: 5 H's and T's

sx or sustained monomorphic VT or hemodyn unstable afib = immed synchronized electrical cardioversion

Patients with HIV	+ Oral thrush, mild sx	Candida likely		Empiric treatment (eg, fluconazole) Endoscopy if no improvement with treatment
	- Oral thrust, severe sx	Dx: endoscopy for likely viral (eg HSV, CMV) etiology:		
		White plaques = candida		Fluconazole Resistant voriconazole, echinocandins (caspofungin), or amphotericin
		Large linear ulcers = CMV likely,		Ganciclovir Acyclovir — not useful bc the virus does not encode the thymidine kinase enzyme to convert acyclovir to its active form
		Vesicles & round/ ovoid ulcers (usually multiple, small, well circumscribed) = HSV likely	Cells w ballooning degeneration and eosinophilic intranuclear inclusions	Acyclovir
		Aphthous ulcers (noninfectious)		Symptomatic therapy -- topical corticosteroids. Recurrent - prednisone

DYSPHAGIA - ENT

		organism	Signs/sx	Rx
Pts witho ut HIV	Ludwig anginaÂ (rapidly progressive bilateral cellulitis of submandibular and sublingual spacs)	Classically streptococcus and anaerobes from infected second or third mandibular molar.	Fever Dysphagia Odynophagia Drooling (from swelling of submandibular space and posterior displacement of tongue) Induration of submandibular space, +/- crepitus from anaerobes. Can die of asphyxiation	Intubation if necessary. Abx and removal of infected tooth.
	[diff dx — Cervical actinomycosis	Actinomyces -- anaerobic, gram +, filamentous branching bacteria colonizes the oral cavity	Risk factors: malnutrition, poor oral hygiene, diabetes mellitus, immunosuppression, local tissue damage (eg irradiation) Presentation: Chronic slowly progressive, nontender indurated mass Extends through tissue planes to form abscess, fistula, and draining sinus tract Mandible is most commonly involved site	Penicillin for prolonged (12 hrs) + surgical excision for more severe cases (extensive abscesses, persistent sinus tracts)

DRUG O/D TOXICITY - CARDIAC

	hx/ s/sx	dx	rx
TCA overdose	• cns - drowsiness, delirium, coma, sz (2/2 gaba inhibition), resp depression • cv - sinus tach, hypotension, prolonged pr/qrs/qt intervals -> vtach, vfib • anticholinergic - dry mouth, blurry vision, dilated pupils, flushing, hyperthermia, urinary retention		if QRS > 100 ms, sodium bicarb (alleviates inhibitory action of TCAs on fast sodium channels -> improve hypoten and dec risk risk of ventricular arrhythmias). also give if vtach or vfib. within 2 hrs, activated charcoal if sz, give benzo (gaba agonist) supportive - supplemental o2, intubation, iv fluids
beta blocker overdose	wheezing 2/2 bronchospasm bradycardia 2/2 AV block + hypotension —> cardiogenic shock (cold clammy) delirium, sz hypoglycemia		atropine and IV fluids first. if no impvt of BP -> glucagon (increases cAMP and higher intracell ca -> augment cardiac contractility) if still no impvt —> calcium, glucose/insulin, epi.
ca ch blockers	similar to bblocker tox without wheezing		
cholinergic agents			
digoxin tox	bradycardia normal BP blurred vision, abn color perception fatigue, ha abd pain atrial tachycardia w AV block (inc ectopy in atria or ventricles, and inc vagal tone)		digoxin specific antibody

HEMODYNAMICS OF SHOCK

	RA pressure (preload)	PCWP (preload) ~ LA pressure or LEDp	SVR (afterload)	Cardiac index (pump function)	mixed venous O2 sat
(normal value:)	mean 4mm Hg	mean 9mm Hg		mean 1150 dynes sec/cm ⁵	2.8-4.2 L/min/m ² 60-80%
hypovolemic shock	dec	dec	—> inc	dec	dec
cardiogenic shock	inc	inc	—> inc	v dec	dec
septic/distributive shock	nl or slightly dec	nl or slightly dec	dec —> inc with progression to hypodynamic phase	inc	inc

—> means compensatory

bold is primary/cause

ACUTE BACTERIAL RHINOSINUSITIS

- | | |
|----------|--|
| Pathogen | <ul style="list-style-type: none"> Usually preceded by viral URI Streptococcus pneumoniae Haemophilus influenzae |
| Sx | <ul style="list-style-type: none"> Purulent nasal discharge Facial pain Fever |
| Dx | <p>Complicated:</p> <ul style="list-style-type: none"> Periorbital edema Vision abnormalities Altered mental status <p>A clinical diagnosis</p> |
| Rx | <ul style="list-style-type: none"> Persistent symptoms ≥ 10 days without improvement Severe symptoms, fever ≥ 39 C, purulent nasal discharge, or face pain ≥ 3 days, Worsening symptoms ≥ 5 days after initially improving viral URI <p>Oral amoxicillin-clavulanic acid</p> <p>+ intranasal corticosteroids if hx of allergic rhinitis</p> |

DYSPHAGIA

	sx	dx	complications/rx	rx
oropharyngeal	difficulty initiating swallowing assd with coughing, choking, or nasal regurgitation	videofluoroscopic modified barium swallow		
esophageal	<p>can initiate swallowing but has difficulty passing food down the esophagus</p> <p>dysphagia with solids then liquids = mechanical obstrxn</p> <p>dysphagia with solids and liquids both at onset, or intermittent dysphagia = motility disorder</p> <p>progressive dysphagia = achalasia or systemic sclerosis aka scleroderma</p> <p>progressive dysphagia = stricture or cancer</p> <p>nonprogressive = esophageal rings</p>	<p>barium swallow before endoscopy if hx of prior radiation, caustic injury complex stricture, or surgery for esoph/laryng cancer (risk of perf)</p> <p>barium swallow is more effective in evaluating motility d/o's. further eval with motility studies/ manometry to confirm dx.</p> <p>o/w endoscopy and if neg, barium swallow</p>		

ENDOCARDITIS

	in IVDU (++ risk in HIV) Tricuspid/Right-sided > aortic valve	left-sided/mitral
Signs/Sx	<p>Fevers, chills</p> <p>Septic emboli common (occur in up to 75% of pts): Lung -- pleuritic chest pain, dyspnea, and/or cough Fewer peripheral manifestations splinter hemorrhages Janeway lesions</p> <p>Often lacks audible tricuspid valve murmur (due to relatively low pressure gradient across the valve) [tricuspid regurg - holosystolic murmur of lower sternum, increases in intensity with inspiration)</p>	Intermittent fever fatigue new holosystolic murmur
Dx	<p>Requires high degree of suspicion</p> <p>CT may show pulm septic emboli, usually at periphery: Pulmonary infiltrates Abscesses Infarction Gangrene Cavities</p>	+ bl cx
Organism	Most common -- Staph aureus in IVDU >=50% cases	<ul style="list-style-type: none"> staph aureus - prosthetic valves, intravascular catheters, implanted devices (pacemakers, defibrillators), IV drug users. most common hosp-assd streptococci - most common community acqd viridans group strep (strep sanguinis, mitis, oralis, mutans, sobrinus, milleri)- dental procedures, bx/incision of resp tract. coag neg staph - IV catheters, prosthetic valves, pacemakers or defibrillators enterococci - nosocomial UTI strep bovis - colon ca, IBD fungi - immunocomp host, chronic indwelling catheters, prolonged abx
Complications	Septic emboli - to lungs	<p>splenic abscess 2/2 hematogenous spread or septic emboli — presents with classic triad: fever/chills, leukocytosis, & LUQ pain. left-sided pleural effusion with left-sided pleuritic chest pain, splenomegaly. 2/2 staph, strep, salmonella. dx by abd CT Rx abx & splenectomy, +/- percutaneous drainage if poor surg candidate</p>
Rx (empiric)	<p>Native valve: Cover methicillin-susceptible and resistant staphylococci, streptococci, and enterococci Ex: Vanc</p>	<p>vancomycin to cover: staphylococci (methicillin-susceptible and -resistant) streptococci enterococci</p>
Post-culture sensitivity results	<ul style="list-style-type: none"> Amp-sulbactam for penicillin-resistant enterococcus and HACEK organisms Penicillin G for penicillin-susceptible viridans streptococci. Aminoglycosides (gentamicin) Clindamycin for ppx for high risk patients undergoing invasive dental procedures. 	<p>viridans group streptococci (ex strep mutans) - very susceptible to pcn with MIC of <0.12 ug/ml</p> <p>= IV aqueous penicillin G q4-6 hrs of 24hrs continuous infusion or IV ceftriaxone once daily for 4 wks (easier for home administration)</p> <p>if pcn allergy, IV vanc</p>

PULM

ESOPHAGUS

	etiology	sx	dx	complications/rx	rx
GERD			do upper GI endoscopy if have alarm symptoms (dysphagia, odynophagia, wt loss, anemia, gi bleeding, recurrent vomiting) or men >50yo w >5yr (chronic) sx and cancer risk factors (tobacco)	predisposes to: <ul style="list-style-type: none">• erosive esophagitis• peptic strictures and/or• Barrett's esophagus (intestinal metaplasia of lower esophagus)	initial trial of PPI (daily for 2 mo) if rereactory, switch PPI or use BID
esophageal (peptic) stricture	2/2 GERD, radiation, systemic sclerosis, caustic ingestion	dysphagia for solids not liquids no wt loss	barium swallow - symmetric lower esoph narrowing		
adenocarcinoma	typically in pts who have had GERD sx >20 yrs.	subtle sx retrosternal discomfort mild dysphagia to solid foods burning sensation	barium swallow: asymmetric narrowing of esoph lumen		
achalasia	esophageal motility d/o	presents w dysphagia of both solids and liquids food regurgitation	barium swallow - <ul style="list-style-type: none">• aperistalsis• poor emptying of barium• dilation of proximal esophagus• bird beak narrowing at GE junction		
vascular rings	aortic arch vessels encircle trachea +/- esophagus	dysphagia is usually the presenting complaint			
zenker diverticulum	posterior lower cervical esophagus near cricopharyngeus muscle, most common in elderly	dysphagia and regurg, foul-smelling breath, at risk for aspiration pna	contrast esophagram	surgical	

Inflammatory bowel dz: Crohn's vs Ulcerative colitis	bimodal age distribution 20yo, 60yo			
Crohns - two patterns • fibrostenotic obstructing pattern • penetrating fistulous pattern	Crohn's - most commonly terminal ileum but anywhere mouth to anus, rectum generally spared		neutrophilic cryptitis: • Crohn's = extends transmurally through entire bowel wall, skip lesions, cobblestone appearance, creeping fatty appearance of mesentary, fistulas, fissures, perianal disease. non-caseating granulomas are pathognomonic. • UC = superficial in mucosal surface, crypt abscesses	conservative - bowel rest, ng tube, steroids or abx severe - emergent surgery w subtotal colectomy and end-ileostomy
UC (and Crohns involving colon)- subacute presentation of abd pain with bloody stool	UC - limited to colon, always involves rectum , may involve terminal ileum. complications: acutely worse - toxic megacolon: dx = <u>radiographic distension</u> <u>>6cm + at least 3 of:</u> • fever >38 C, • HR >120 • neutrophilic leukocytosis > 10,500, • anemia + <u>at least 1 of:</u> • volume depletion • altered sensorium • electrolyte disturbances • hypotension			

melena = black or tarry stool = GI bleed above the ligament of Treitz

PNEUMONIA

	Hx	Sx	Phys Exam/imaging	Dx	Rx
Community acquired pneumonias					
Strep pneumo (most common - adults)	Nursing home				Preventative -- vaccination with pneumovax Risk assessment using CURB65 -> outpatient, inpatient, icu: Empic therapy: Outpt = macrolide/doxycycline or beta lactam + macrolide if comorbid condition, inpatient, or icu Icu could also do beta lactam + macrolide
Staph aureus (relatively uncommon cause of CAP)			Can be assd w/ necrotizing bronchopneumonia resulting in pneumatoceles (small abscess cavities)	Gram + cocci in clusters on gram stain	
H flu					
Legionella 2-10% (gram -- rod, primarily intracellular)	Travel associated, linked to cruise ship and hotel water supplies	• High-grade fever >39.0 C • GI • Neuro	Rales CXR = focal lobar consolidation Sputum gram stain shows many neutrophils but no organisms (stains poorly bc primarily intracellular)	Bacterial Cx on charcoal agar +/- urinary antigen testing	Macrolides (azithromycin) Or Newer generation fluoroquinolones (levofloxacin)
mycoplasma pneumoniae (leading cause of 'atypical' pneumonia)		nonproductive cough Headache rash	CXR = may have interstitial pattern	no organism on gram stain. +/-2 cold agglutinins present in blood	
Nosocomial pneumonia					
MRSA very likely					Vancomycin
klebsiella pneumoniae	diabetics, alcoholics	currant jelly sputum	cavitation empyema	gram - encapsulated rods	
pseudomonas aeruginosa	CF patients, bronchiectasis			gram - rod	
Aspiration pneumonia					
Anaerobic organisms	Neuro disorders (advanced dementia, parkinsons dz, stroke), poor dentition	subacute	leading cause of abscesses -> CXR fluid filled cavity		Clindamycin
Cryptococcal infection					Fluconazole

TB - PPD

PPD/TST Induration	Patients to treat
>= 5 mm	HIV-positive patients Recent contacts of known TB case Nodular or fibrotic changes on chest x-ray consistent with previously healed TB Organ transplant recipients and other immunosuppressed patients
>= 10 mm	Recent immigrants (<5 years) from TB-endemic areas Injection drug user Residents and employees of high-risk settings (eg prisons, nursing homes, hospitals, homeless shelters) Mycobacteriology lab personnel Higher risk for reactivation TB (eg, diabetes, prolonged corticosteroid therapy, leukemia, end-stage renal disease, chronic malabsorption syndromes) Children <4 years of age, or those exposed to adults in high-risk categories
>= 15 mm	All of the above plus healthy individuals
If -- PPD: Does not have latent TB, no rx.	
If +PPD: Hx, PhysEx, CXR to rule out active TB Ä	
If CXR is neg, treat for latent TB: 9 mo isoniazid (INH) + pyridoxine to prevent possible neuropathy or 3 mo once weekly INH and rifapentine by direct observed therapy	If CXR is pos, treat for active TB: Isoniazid, rifampin, ethambutol, pyrazinamide for 8 weeks (2 mo). Then (continuation phase) INH + rifampin for additional 4 mo.

Tuberculin skin test (TST) is used to identify asymptomatic patients with prior exposure to mycobacterium tuberculosis and latent tuberculosis infection.

= intradermal injection of purified protein derivative PPD from *M. TB*.

= delayed hypersensitivity response measured by **size of induration** not erythema 48-72 hrs after administration

GI BLEED

	hx	s/sx	dx	rx
mallory-weiss tears (10% of upper GI bleeds)	2/2 vomiting (inc intragastric pressure)	tears in submucosal arteries of distal esophagus and prox stomach		90% stops spontaneously if not, vasopressin, endoscopic injection, electrocautery
esophageal varices	2/2 portal hypertension	ruptured dilated submucosal veins at gastroesophageal junction		
iatrogenic	2/2 endoscopy	immed after procedure		
stress ulcers	ICU or burn unit setting			
peptic ulcer dz				
gastritis				
esophagitis				
angiodyplasia	dilated, ectatic, thin-walled vessels lined by endothelium. chronic painless bleeding often underlying aortic stenosis (disrupts vonwillebrand multimers) or ESRD (uremic platelet dysfxn) that makes prone to bleeding age >60yo	anemia, painless GI bleeding aortic stenosis murmur	colonoscopy, upper endoscopy, small-bowel enteroscopy, or capsule endoscopy	
diverticulosis	most common cause of painless lower GI bleeding		colonoscopy - multiple outpouchings of mucosa through hypertrophied muscle layers	
hemorrhoids		blood on surface, not mixed with, stools	detected on rectal exam	
colon cancer	painless chronic bleeding		colonoscopy - (hyperplastic polyps are non-neoplastic)	

DIARRHEA - IMMUNOCOMP

no diarrhea = mycoplasma, aspergillus, PCP (immediate postxpt)
+ diarrhea - lung = cryptosporidium

HIV patients			
Non-opportunistic	Opportunistic infections	Non-infectious	
Salmonella Campylobacter Entamoeba Chlamydia Shigella Giardia lamblia	CMV Cryptosporidium Isopora belli Blastocystis MAC HSV Adenovirus HIV	Kaposi sarcoma Lymphoma of GIT tract	
Sx: Hematochezia and lower abdominal cramps usually 2/2 colonic infection with: Cdiff, CMV, Shigella, E.histolytica, or campylobacter	HSV usually assd w painful esophagitis in HIV pts Bloody diarrhea and normal stool exam is highly suspicious for CMV colitis -> colonoscopy w bx	Kaposi is assd w nonbloody diarrhea, no colonic ulcerations.	
Disseminated MAC	CMV colitis	Crypto	E histolytica
Chronic non-bloody diarrhea and weight loss	Sx: Chronic bloody diarrhea, abdominal pain, CD4 <50 cells/uL, normal stool exam W/u: Colonoscopy = mucosal erosions and colonic ulceration. + Bx = large cells with eosinophilic intranuclear and basophilic intracytoplasmic inclusions ("owl's eye effect") Rx: Ganciclovir. If failure/intolerance, Foscarnet.	Profuse, watery nonbloody diarrhea Trophozoites on stool exam.	Bloody diarrhea Colonoscopy = flask-shaped colonic ulcers.
Involves small intestine			
Bx + culture for dx			

TB/HEMOPTYSIS

pmh:	<ul style="list-style-type: none"> • endemic area (mexico, philippines, china, vietnam, india, Dominican Republic, Haiti), lived in US <5 yrs, esp first year • immunocompromised (HIV, on immunosuppression) • hx of hematologic malignancy or head/neck cancer • homeless, alcoholism, work in healthcare field
Sx	chronic low grade fever, night sweats, weight loss, cough productive of blood tinged sputum wt loss extrapulmonary sites - liver, spleen, kidney, bone, adrenal gland
labs	acid-fast bacilli smear, cx
Imaging	reactivation of latent TB = cavitary lesion on cxr pathy/nodular opacity, multiple nodules, cavity... involving apical-posterior segments of upper lobes of the lungs
Rx	if suspicion for tb, respiratory isolation is first step. until dx confirmed or refuted

Diff Dx of hemoptysis:

pulmonary	bronchitis pulmonary embolism bronchiectasis lung cancer
cardiac	mitral stenosis/acute pulmonary edema
infectious	TB lung abscess
hematologic	coagulopathy
vascular	AV malformations
systemic diseases	Wegener's granulomatosis Goodpasture's syndrome SLE, vasculitis

Causes of hemoptysis (most common - chronic bronchitis, bronchogenic carcinoma, bronchiectasis
+malaise and throat pain and yellow sputum = acute bronchitis
+chronic prod cough for 3 mo in 2 successiv yrs = chronic bronchitis
+fever = pna, lung abscess
+chest pain = pulm infarct
+constitutional signs (wt loss, significant hemopt) = malignancy or tb
+ hx recurrent resp tract infections, copious mucopurulent sputum + crackles/rhonchi/wheezing = bronchiectasis

CT indicated if suspect PE, mass lesions, bronchiectasis, or vascular malformations

if hi res ct doesn't give clear dx, or has recurrent episodes of hemoptysis, or want to assess mass lesions
= bronchoscopy

In case of massive hemoptysis (>600ml/24hr or 100ml/hr), establish adequate patent airway, place bleeding lung in dependent position, and bronchoscopy (can localize site and also intervene)

DIARRHEA

	hx/etiology	s/sx	dx	rx
adrenal insuff		wt loss fatigue muscle weakness orthostatic hypotension headache		
malabsorption		wt loss edema vit def		
watery diarrhea	cdiff			
inflammatory diarrhea	salmonella			

VOMITING - FOOD BORNE DISEASE

By symptom:	
Vomiting predominant	Staph aureus Bacillus cereus Norovirus (eg Norwalk)
Watery diarrhea predominant	Clostridium perfringens Enterotoxic escherichia coli Enteric viruses Cryptosporidium Cyclospora Intestinal tapeworms
Inflammatory diarrhea predominant	Salmonella (both typhi and non0typhi) Campylobacter Siga toxin producing escherichia coli Shigella Enterobacter Vibrio (usually parahaemolyticus) Yersinia
Non-GI symptoms	Botulism (descending paralysis) Ciguatera toxin (paresthesia) Scombrotoxin (flushing, urticaria) Listeria (meningitis) Vibrio vulnificus (cellulitis, sepsis) Hepatitis A (jaundice) Brucellosis (fever, arthralgias)

COPD - RX

	Stage/intensity of management		notes
acute exacerbation of COPD	<p>1. acute medical management</p> <p>(cardinal sx =</p> <ul style="list-style-type: none"> • increased dyspnea • increased cough (freq and more severe) • increased sputum production (chg in color & volume) <p>cxr = hyperinflation ABG = hypoxia, CO2 retention, resp acidosis w compensatory met alkalosis)</p>	<ul style="list-style-type: none"> • oxygen with target sat 88-92% • inhaled short-acting bronchodilators (eg albuterol) • inhaled anticholinergics (eg ipratropium) • systemic glucocorticoids • and antibiotics (eg levofloxacin) for patients with 2/3 cardinal sx, mod-to-severe exacerbation, or mech ventilation <p>failure = continued sx -> noninvasive vent support</p>	<ul style="list-style-type: none"> • combo of short-acting anticholinergic (ipratropium bromide) + beta adrenergic agonist (albuterol) is better than either alone. • mild to mod = oral glucocorticoids (pred 40mg daily)// severe exacerb = IV glucocorticoids (methylpred) • 5 days rx
	<p>2. NPPV = noninvasive positive pressure ventilation (ventilatory support)</p> <p>(2 hr trial)</p>	decreases work of breathing, improves alveolar ventilation = dec PaCO2 inc PaO2 inc tidal volume inc minute ventilation dec RR failure = hypoxemia, severe respiratory distress, and/or acidosis -> invasive mechanical ventilation	shown to decrease mortality, rate of intubation, hospital length of stay, and incidence of nosocomial infections
	<p>3. invasive mechanical ventilation</p>	req'd in <ul style="list-style-type: none"> • hypercapnic patients with poor mental status (eg somnolence, lack of cooperation, inability to clear secretions), • hemodynamic instability, • profound acidemia (pH<7.1) 	
chronic	maintenance Rx	long acting beta2 agonists (eg salmeterol) long-term supplemental O2 indicated if PaO2<55, SaO ₂ <88%, hct >55, or evidence of cor pulmonale	proven to prolong survival and improve QOL

PTX 2/2 COPD (VERSUS)

- = acute onset chest pain, SOB, reduced breath sounds, hyperresonant, catastrophic worsening of resp sx
- +elevated PaCO₂ w diffuse rhonchi and wheezing = diffuse sputum obstruction
- +coarse crackles bilaterally (not wheezes) = acute pulm edema 2/2 acute CHF
- +chest pain, SOB, cough w sputum, fever, dullness to percussion, crackles, bronchial breath sounds, slower onset = PNA

CONSTIPATION

	hx	s/sx	dx	rx
vit D toxicity —> hyperCa by inc GI absorption in Ca	>4000 IU daily - meds for treating hypoPTH, or 2ndary hyperPTH from renal failure, or psoriasis topical vit D	+ abd pain + polydipsia		
hypothyroidism		+cold intolerance +fatigue +wt gain		
diverticulitis	RUQ pain, tenderness and guarding, low grade fever,	complications - if not resolve with IV abx, suspect abscess, fistula, frank perforation - by CT		

SMALL BOWEL OBSTRUCTION (SBO)

proximal vs. mid/distal. simple (luminal occlusion) vs. strangulated (loss of blood supply)

	s/sx	dx	rx
complete proximal	early vomiting abd discomfort/bloating	xray - abnormal contrast filling	
mid/distal	delayed vomiting colicky abd pain prominent abd distention constipation hyperactive bowel sounds	xray - dilated loops	
strangulated	peritoneal signs - rigidity rebound signs of shock (late findings)- fever, tachycardia, leukocytosis		
causes:	<ul style="list-style-type: none"> • adhesions - most common 2/2 abd operations inflammation • children - congenital Ladd's bands • Crohn's chronic fibrosis • rare - peptic ulcer disease. (proximal SBO) 		

HYPOXEMIA AND RX

Hypoxemia = measured via arterial blood gas, pulse ox, or hematocrit.

$$\text{Alveolar O}_2 = \text{PAO}_2 = (\text{FiO}_2 \times [\text{Patm} - \text{PH}_2\text{O}]) - (\text{PaCO}_2 / R), \quad R = 0.8$$

Arterial O₂ measured directly by blood gas

A-a gradient = PAO₂ - PaO₂, [Normal A-a gradient < 15, increases with age. >30 is abnormal regardless of age.]

A-a gradient is elevated by anything that results in impaired gas exchange, interstitial dz, processes that cause V/Q mismatch (ex PE)

	ex:	A-a gradient	PaCO ₂	Corrects with supplemental O ₂ ?
Reduced inspired oxygen tension	high altitude	normal	normal	yes
hypoventilation	CNS depression	normal	inc	yes
Diffusion limitation	interstitial lung disease	inc	normal	yes
shunt	intracardiac shunt, extensive ARDS	inc	normal	no
V/Q mismatch	obstructive lung disease, atelectasis, pulmonary edema & pneumonia	inc	normal or inc	yes

V/Q mismatch is due to worsened imbalance of blood flow and ventilation resulting in depressed PaO₂.

Ventilation is obstructed and blood flow is unchanged - ex: emphysema

$$\rightarrow O_2 \downarrow, CO_2 \uparrow$$

When blood flow is excessive relative to ventilation - ex: pulmonary edema, effusion, pna, atelectasis, PE

$$\rightarrow O_2 \downarrow \quad \text{may have dec PaCO}_2 \text{ 2/2 compensatory tachypnea.}$$

Shunt: bypasses blood flow around ventilated alveoli to prevent gas exchange in the blood

ex: extensive ARDS (lung is poorly aerated, lung is stiff and less compliant)

ex: large left-to-right intracardiac shunt (eg ventricular septal defect) lowers compliance by increasing pulmonary blood flow, elevating pulmonary arterial and/or venous pressures, and causing fluid leakage into the interstitium and alveoli

causes of pleuritic chest pain (from irritation and inflammation of visceral and parietal pleurae): pulm embolism w subsequent minor or massive pulm infarct, pna (with or without parapneumonic effusion or empyema), ptx, collagen vascular disease, viral pleuritis, radiation pneumonitis

ACID-BASE DISORDERS

- O₂ in hypercapnic and hypoxic patients should be titrated gradually with goal of arterial O₂ saturation of 90-94%, or PaO₂ of 60-70mmHg (to avoid oxygen toxicity)
- Remember that increasing oxygen flow may improve oxygenation but not address impaired ventilation or elevated PaCO₂
- COPD airway obstruction 2/2 infectious/inflammatory mucosal edema, bronchial smooth muscle hypertrophy, and bronchial submucosal gland hyperplasia. largest risk factor = smoking.
- COPD can cause secondary pneumothorax (alveolar blebs rupture into pleural space)

pH < 7.4 is low
serum bicarb < 24mEq/L is low
PaCO₂ > 40mmHg is high
(50-80mmHg = alveolar hypoventilation)

DKA:
1° acidosis = pH < 7.35
HCO₃- < 24 w respiratory compensatory dec in PaCO₂ (kussmaul breathing)
inc anion gap from ketones = Na⁺ — (Cl⁻ + HCO₃⁻)

normal
pH = 7.35-7.45
HCO₃⁻ = 22-26 mEq/L
pCO₂ = 35-45mm
anion gap 6-12 mEq/L
pH = 6.1 + log ([HCO₃⁻] / [0.03 * PaCO₂])

Inc anion gap metabolic acidosis 2/2:

- ketoacidosis (alcoholic, diabetic, starvation)
- intoxications (methanol, salicylate, ethylene glycol, isoniazide, metformin)
- tissue hypoxia (ischemia, CO, cyanide)
- renal failure

Winter's formula for 1° metabolic acidosis:

Expected pCO₂ = 1.5 [HCO₃⁻] + 8 (+/-)
Non-gap acidosis 2/2: primary adrenal insufficiency (addison's).

(calculate urine anion gap to disting bw renal — RTA or CAhydrlnhib use, or intestinal bicarb loss — diarrhea)

Metabolic alkalosis 2/2 vomiting (hypokalemia, hypochloremic), hyperaldosteronism, cushing's syndrome, severe hypoK < 2 mEq/L, excessive volume contraction (eg thiazides, loops).

vomiting/diuretics = generation phase: H+ vomited/lost in urine, so w no gastric acid, HCO₃⁻ is not excreted by pancreas and instead retained in blood. maintenance phase: 2/2 volume loss in vomited volume -> dec ECV -> dec renal perfusion pressure -> RAAS activated -> aldosterone -> hypoK and contraction alkalosis. Rx then is IV NS and K.

urine chloride < 20 mEq/L (excess mineralocorticoid with H and K loss and inc Na retention causing inc extracellular volume)= saline responsive. >20 mEq/L (hypovolemia and hypochl) = saline resistant

Respiratory acidosis 2/2 impaired ventilation

Respiratory alkalosis 2/2 hyperventilation

PE = respiratory alkalosis 2/2 hyperventilation to overcome hypoxia and V/Q mismatch

post-ictal = apnea/hypopnea

lactic acidosis = metabolic acidosis

renal failure = metabolic acidosis 2/2 inadequate excretion of sulfates, phosphates

vomiting = metabolic alkalosis 2/2 loss of gastric acid

respiratory acidosis/alveolar hypoventilation =

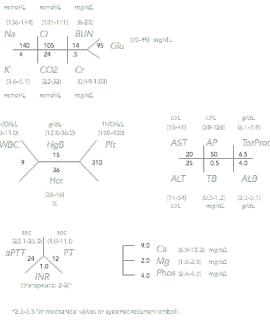
Pulm/Thoracic dz: copd, OSA, obesity hypoventilation, scoliosis

Neuromusc dz: myasthenia gravis, lambert-eaton syndrome, guillain-barre syndrome

drug-induced hypoventilation: anesthetics, narcotics, sedatives

primary CNS dysfxn: brain stem lesion, infection, stroke

—> see next page 'hypoxemia and rx' to calculate A-a gradient



Timecourse of hep B serologic markers

Testing for both HBsAg and anti-HBc offers the best screening for acute hepatitis B infection, as it won't miss the window period when HBsAg has disappeared but anti-HBs has not yet appeared in the serum.

HBsAg	Anti-HBc	HBeAg	Anti-HBs	Anti-HBc
first virological marker detected in serum after inoculation. Precedes both the elevation of serum aminotransferases and onset of clinical symptoms. Remains detectable during the entire symptomatic phase of acute hepatitis B and suggests infectivity.	Appearing in the serum shortly after the appearance of HBsAg, this marker remains detectable long after the patient recovers. The IgM fraction signals the acute phase of disease, whereas the IgG fraction signals recovery from the disease. Because IgM anti-HBc is present in the "window period," it is an important tool for diagnosis when HBsAg has been cleared and anti-HBs is not yet detectable. Thus IgM anti-HBc is the most specific marker for diagnosis of acute hepatitis B.	This antigen is detectable shortly after the appearance of HBsAg and indicates active viral replication and infectivity. It is associated with the presence of HBV DNA. HBeAg tends to disappear shortly after aminotransferase levels peak and before HBsAg is eliminated, and is followed by the appearance of anti-HBc. Should it persist for more than three months, there is an increased likelihood of chronic hepatitis B.	appearing in the serum after either successful HBV vaccination or the clearance of HBsAg, this marker remains detectable for life. It serves as an indicator of noninfectivity and immunity. However, there is a time lag between the disappearance of HBsAg and the appearance of anti-HBs in the serum, which is termed the "window period"	This maker suggests the cessation of active viral replication and low infectivity.

HBcAg = This marker is not detectable in serum as it is normally sequestered within the HBsAg coat.

VIRAL HEPATITIS - A,B,C,D,E

	hx	s/sx	dx	rx	prognosis
hep A					
hep B	infected blood, sexual contact			<p>rx if:</p> <ul style="list-style-type: none"> acute liver failure clinical complications of cirrhosis advanced cirrhosis with high serum HBV DNA no cirrhosis but HBeAg +, HBV DNA >20,000IU/mL and serum ALT > 2x upper limit of normal Prevent HBV reactivation during chemo or immunosuppression Interferon - short-term lamivudine - drug resistance is increasing entecavir - decompensated cirrhosis tenofovir - most potent 	<p>risk of chronic infection, cirrhosis, inc risk of hepatic cancer</p> <p>treatment of chronic HBV can reduce disease progression to chronic liver disease, prevent complications (cirrhosis/cancer) and decrease transmission to others</p>
hep C	exposure to infected blood IV drug use tattoos blood transfusions hi occurence in pts w mixed cryoglobulinemia			<p>pegylated interferon + ribavirin</p> <p>+ telaprevir if genotype 1</p>	
hep D					
hep E	fecally-contam water in endemic areas - India, Asia, Africa, Central America (unusual in U.S.)	<p>sudden onset - jaundice, malaise, anorexia, nausea, vomiting, abd pain, fever, hepatomegaly</p> <p>histo - focal necrosis, ballooned hepatocytes, acidophilic hepatocytic degen</p>	<p>detect HEV RNA by PCR of serum or feces or IgM Ab's to HEV</p>	<p>prevent: exposure</p>	<p>self-limited, no chronic carrier state, no cirrhosis, no hepatocellular carcinoma</p> <p>high rate of progression to fulminant hepatitis in pregnant female (esp 3rd trimester)</p>

ACUTE DYSPNEA IN HOSPITALIZED PT

beta2 r's are in lungs
beta1 are in heart

Diff'l dx:

mechanism	risk factors	clinical features
arrythmia	cardiac disease electrolyte abnormalities	dizziness, palpitations tachycardia/bradycardia
bronchoconstriction	asthma medications (eg aspirin, beta blockers)	wheezing prolonged expiration
CHF/hypervolemia	cardiac disease chronic kidney disease iatrogenic (fluids, blood products)	crackles elevated jugular venous pressure (>8 cm H2O) lower-extremity edema
infection/pna/aspiration	chronic lung disease immunosuppression impaired mental status stroke/dysphagia	fever leukocytosis
pleural effusion	CHF CKD malignancy	decreased breath sounds dullness to percussion
pulmonary embolism	prolonged immobility surgery (eg hip/knee replacements)	tachycardia, tachypnea hypoxemia signs of DVT
anxiety	dementia chronic mental illness sleep deprivation	tachycardia, tachypnea normal oxygenation/lung exam

bronchoconstriction can be triggered by aspirin or beta blocker therapy in patients with asthma (esp if concurrent chronic rhinitis and nasal polyps). nonselective beta 1 and beta 2 - propanolol, nadolol, sotalol, timolol. less likely with cardioselective beta blockers (beta 1) - metoprolol, atenolol, bisoprolol, nebivolol

acute bronchitis = fever, SOB, productive cough

PE/DYSPNEA

	PE
dx	<p>modified wells criteria (use if clinical suspicion of possible PE): +3 pts = clinical signs of dvt alternate dx is less likely than PE</p> <p>+1.5pts = previous PE or DVT HR > 100 Recent surgery/immobilization</p> <p>+1pts = hemoptysis cancer — total = (some studies stratify into low/med/hi risk and others into low/high — see MDcalc)</p> <p>likely PE -> [start anticoagulation LMWH or unfractionated heparin, unless contraindicated] -> CTA to look for filling defect = dx</p> <p>unlikely PE -> Ddimer >500 = ctA <500 excluded.</p> <p>if anticoag is contraindicated, if dx testing finds +PE, consider IVC filter</p>
factors making more likely PE	OCP use, sickle cell trait, tachycardia
Sx (non diagnostic)	<p>(from most common): acute onset SOB - 73% pts with PE tachypnea - 70% pleuritic chest pain - 66% tachycardia - 30% leg sx <30% hemoptysis <20% low grade fever 15%</p> <p>calf swelling, virchow's triad (stasis, endothelial injury, hypercoagulable state) not always present</p>
labs/imaging (non dx)	<p>classic: ECG S1Q3T3 (or new onset RBBB) CXR - Hampton's hump, Westermark's sign</p>
Rx/Px	massive PE can lead to right-sided heart failure and hypotension
poor prognostic factors	low O2 sat, afib

>90% acute PE's from proximal deep veins (above knee) = iliac, femoral, popliteal

10% venous thromboemboli originate in deep veins of upper extremities (inc risk if indwelling catheters)

Diffi dx:

+risk factors DM, fam hx of MI, smoking = MI

same dyspnea/tachypnea/tachycardia +triad (jvd, hypotn,distant heart sounds) = cardiac tamponade

same dyspnea/tachypneatachycardia/lowO2sat +wheezing -pleuritic cp = bronchoconstriction

same acute SOB/pleuritic chest pain + tracheal dev, hypotn, unilat absence of breath sounds = TensPTX

chronic autoimmune hepatitis	young-to-middle age women	presents as acute or chronic hepatitis			very very ↑conj bili very↑aminotransferases >1000 U/L
sarcoidosis or TB (granulomas)					don't often cause massive transaminase
nonalcoholic fatty liver disease	middle-aged, obese, metabolic syndrome (central obesity, dm, hyperlipidemia, htn) histology: fatty liver disease vs nonalcoholic steatohepatitis	asymptomatic or fatigue, malaise, RUQ abd discomfort (etiology: periph insulin resistance -> inc peripheral lipolysis and TG synth -> hepatic uptake of fatty acids -> oxidation -> proinflammation -> inc fat accumulation and fibrosis/ cirrhosis)		u/s liver shows hyperechoic texture with diffuse fatty infiltration	AST/ALT ratio <1
ischemic hepatic injury/ shock liver	hypotension (septic shock, heart failure)				acute, massive increases in AST and ALT >1000 with milder asdd inc in total bilirubin and alk phos ex: tbili 1.2 mg/dL AST 2720 u/L ALT 2250 u/L ALP 162 meq/L typically return to normal within 1-2 wks if hypotension resolved

evidence of cirrhosis = spider angiomas, gynecomastia, asterixis. bx has regenerative nodules

viral hepatitis			inc bili and alk phos following inc in alt/ast			much higher, >25x normal AST and ALT (toxin induced - acetaminophen, ischemic, also this high) ALT>AST
drug-induced	direct toxic effect (dose dependent and short latent periods) <ul style="list-style-type: none">• carbon• tetrachloride,• acetaminophen,• tetracycline,• amanita phalloides mushroom vs idiosyncratic rxn (not dose dependent, variable latent periods) <ul style="list-style-type: none">• isoniazid• chlorpromazine,• halothane,• antiretroviral therapy	or group by morphology: cholestasis - <ul style="list-style-type: none">• chlorpromazine,• nitrofurantoin,• erythromycin,• anabolic steroids fatty liver - <ul style="list-style-type: none">• tetracycline,• valproate,• anti-retrovirals hepatitis - <ul style="list-style-type: none">• halothane,• phenytoin,• isoniazid,• alpha-methyldopa toxic/fulminant liver failure - <ul style="list-style-type: none">• carbon• tetrachloride,• acetaminophen granulomatous - <ul style="list-style-type: none">• allopurinol,• phenylbutazone			similar to viral hepatitis	
alcoholic hepatitis	heavy drinking history steatosis -> alcoholic hepatitis -> alcoholic fibrosis/cirrhosis	<ul style="list-style-type: none">• jaundice, anorexia, fever• RUQ +/- epigastric pain• abd distention 2/2 ascites• tender hepatomegaly• +/- hepatic encephalopathy	<ul style="list-style-type: none">↑ ggt↑ bili(↑ INR) leukocytosis (neutrophils) ↑ ferritin (acute phase reactant)	<ul style="list-style-type: none">+/- fatty liver on abd imaging Mallory bodies, infiltration by neutrophils, liver cell necrosis, perivenular distribution of inflammation	fatty liver, alcohol hepatitis, and early fibrosis are potentially reversible with cessation of etoh	AST:ALT ratio ≥ 2:1 usually < 300U/L, always <500 U/L ex: AST 200 ALT 100 (ggt inc, ferritin inc)

PULMONARY- DYSPNEA AND LUNG CAVITIES

	H.Flu is a colonizer of URtract	Legionella pneumophila	Primary TB	Pnemocystis pneumonia (CD4 <200 /uL)	Pnemococcus -- community acquired pneumonia (streptococcus pneumoniae)	Embolization 2/2 tricuspid endocarditis
	Typically causes upper respiratory tract infections, bronchitis (primarily in pts with COPD), and PNA	Via contaminated aerosolized water (cooling systems)	Slowly progressive sx of malaise, anorexia, wt loss, fever, and night sweats along with pulmonary findings.	Subacute respiratory sx	lobar	Fragments of vegetation embolies to the lungs
Dx	Usually presents with noncavitating infiltrates	Pts with chronic lung disease, cigarette smokers, and immunosuppressed pts are more predisposed	Chronic cough, not dyspnea, usually the most common pulm sx			
Organism						Staphylococcus aureus
CXR		Cavities more often found in immunosuppressed patients receiving corticosteroids		Diffuse infiltrates	Rarely causes cavitation	Characteristic nodular infiltrate w cavitation
Complications						

Curb65 for CAP empiric treatment based on what level treatment they need =

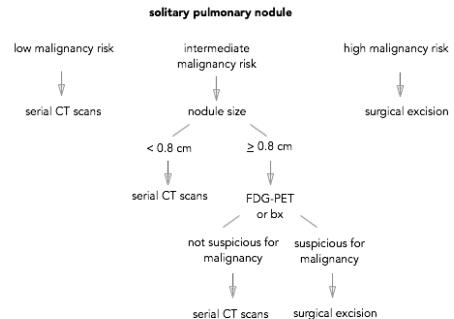
confusion
Uremia – bun>20
Tachypnea (rr >30/min)
Hypotension (BP <90/60)
Age > 65

2+ = inpatient
4+ = icu

2ndary bacterial superinfection/pna common in elderly most common strep pnemo, staph aureus, or hflu
Staph aureus can cause necrotizing broncopna with multiple nodular infiltrates
"pneumatocoeles" (cavitate to make small abscesses)

LUNG MASS ON RADIOLOGY

solitary pulm nodule = rounded opacity < 3 cm, completely surrounded by pulm parenchyma, without assd lymph node enlargement



type of tumor	incidence	location	clinical assn
adenocarcinoma	40-50%	peripheral	clubbing hypertrophic osteoarthropathy
squamous cell carcinoma	20-25%	central necrosis and cavitation	hypercalcemia
small cell carcinoma	10-15%	central	cushing syndrome SIADH Lambert-Eaton syndrome
large cell carcinoma	5-10%	peripheral	gynecomastia galactorrhea

Secondary malignancies most commonly in:

lung (esp smokers)
breast
thyroid
bone
GI (colorectal, esophageal, gastric tumors)

primary lung malignancy by distribution:
adenocarcinoma most common in smokers and non smokers

ABNORMAL LFT SYNDROMES

	hx/etiology	s/sx	dx	rx	prognosis	LFTs
Wilson's disease aka hepatole nticular degenera tion	rare autosomal recessive age 5-40yo = dec formation and secretion of ceruloplasmin → dec copper secretion into biliary system → copper causes oxidative/free radicals and accumulates in liver → injures hepatocytes → into blood and basal ganglia and cornea	• liver involvement: asx, chronic hepatitis, fulminant hepatitis, macronodular cirrhosis, or portal htn • neuropsych sx (hepatolenticular degeneration) • Kayser-Fleischer rings (brownish/gray-green rings of fine granular copper deposits in cornea)	low serum ceruloplasmin <20 mg/dL, with inc urine copper excretion gold std = liver bx → hepatic cu level >250 mcg/gram	d-penicillamine or trientine (copper chelators) +oral zinc (prevents cu absorption)	liver txpt for fulminant hepatic failure or decompensated liver disease that doesn't respond to meds	ex: tbili 4.5 mg/dL dbili 3.2 mg/dL ALP 40 u/L AST 276 U/L ALT 180 U/L PT 12.0 sec
hemochromatosis	autosomal recessive iron overload 2/2 abnormally high iron absorption → oxidative damage to liver, panc, lung, pit	liver dz "bronze diabetes" - DM, hyperpigmentation impotence arthropathy cardiac enlargement hypothyroid	first iron studies, then genetic confirmation nl or mildly ↑ bili and alk phos	long term serial phlebotomy	inc r/o cirrhosis and hepatocellular carcinoma	signif elevations of transaminases
primary biliary cirrhosis	autoimmune destruction of intrahepatic bile ducts and cholestasis middle-aged women, insidious onset assd with autoimmune: <ul style="list-style-type: none">Sjogren's syndromeRaynaud's syndromesclerodermaautoimmune thyroid, hypothyroidceliac disease	• pruritis is often earliest sx - severe, nighttime • fatigue • hepatosplenomegaly • xanthomas - eyelids, skin, tendons →> <ul style="list-style-type: none">jaundicesteatorrheaportal htnosteopeniawt loss	cholestasis (talk phos and cholesterol) serum AMA (anti-mitochondrial Abs)	ursodeoxycholic acid - slows disease progression and relieves sx lengthens transplant-free survival time	inc r/o hepatobiliary malignancy severe liver damage or cirrhosis → liver txpt with 1yr survival 85-90% = definitive treatment	

JAUNDICE

diff dx for jaundice:

normally 95% of circulating bilirubin is in unconjugated form.

predom elevated: (from looking at urine dipstick)	can be due to:	examples	LFTs
indirect/unconjugated bili (water insoluble, tightly bound to albumin)	inc bili production	hemolysis - 2/2 <ul style="list-style-type: none"> • rbc membrane defects • hemoglobinopathies • thalassemias • erythrocyte enzymatic defects • immune destruction (paroxysmal nocturnal hemoglobinuria) • mechanical injury • hypersplenism 	
	dec bili uptake by liver	portosystemic shunt	
	abnormal bili conjugation	Crigler-Najjar = absent UDP-glucuronyl transferase - early death Gilbert's syndrome = mild def (usually asx)	
direct/conjugated bili (water soluble, loosely bound to albumin, excreted in urine)	hepatocellular injury/intrinsic liver dz	viral hepatitis, hemochromatosis, sarcoidosis, hepatic malignancy	predom elevated transaminases with normal alk phos
	dec bili excretion in bile canalliculi	Dubin-Johnson syndrome,	normal AST, ALT, and Alk Phos
	defect of hepatic storage of conj bili	Rotor syndrome	
	intrahepatic cholestasis	primary biliary cirrhosis	elevated alk phos out of proportion to transaminases
	extrahepatic cholestasis from biliary obstruction	malignancy - cholangiocarcinoma, pancreatic, hepatocellular, metastatic (colon, gastric)	

start with doing u/s?

Other tumors/masses:

sarcoid = bilateral hilar adenopathy

aspergilloma = mobile mass that moves w/ position

carcinoid tumors = centrally located

apical lung/SVC syndrome = sm cell lung cancer, NHL

can include sinus imaging, pft's, hi res ct, or empiric sequential therapy for gerd, cough-variant asthma, chronic sinusitis

1st gen antihistamine = chlorpheniramine

combined antihist-decongestant = brompheniramine and pseudoephedrine

	imaging shows:	what it is	sx
fungus ball (aspergilloma)	mobile, intracavitary mass with air crescent in periphery	is fungal hyphae, inflamamtory cells, fibrin, tissue debris collecting in preexisting cavity	
		2/2 cavity (ex from tb, sarcoid, bronchial cysts, neoplasm)	
pulm TB	apical cavitary lesions		prod fever/night sweats, cough, hemoptysis, wt loss
radiation fibrosis	volume loss with coarse opacities	2/2 lung field radiation	dyspnea, nonproductive cough, chest pain 4-24 mo after therapy
secondary malignancy		2/2 radiation/chemo therapy for Hodgkin lymphoma.	

BRONCHOGENIC CARCINOMA

+cough, sputum production, progressive dyspnea

by location/feature:

	etiology	sx/findings
unilat w large pleural effusion on CXR	bronchogenic carcinoma 2/2 asbestos (more commonly than malig pleural mesothelioma)	
pleural plaques	malignant pleural mesothelioma 2/2 asbestos	bilateral pleural thickening + bibasilar reticulonodular infiltrates, honeycombing (cystic areas surrounded by interstitial infiltrates) +hi res CT - subpleural linear densities, parenchymal fibrosis, 50% have pleural plaques
pancoast tumor	SCLC NHL	compression of brachial plexus ulnar distribution (C8 and T1 nerve invasion) = Pancoast syndrome compression of sympathetic trunk = Horner syndrome compression of right recurrent laryngeal nerve = hoarse voice, and compression of superior vena cava = SVC syndrome.

digital clubbing = megakaryocytes not fragmented in pulm circulation -> get stuck in distal fingertips -> release PDFGG and VEGF -> connective tissue hypertrophy and permeability and inc vascularity
most common = lung malignancy, cf, and right-to-left cardiac shunts

COPD alone does not

diff dx of clubbing:

intrathoracic neoplasms	bronchogenic carcinoma metastatic cancers malignant mesothelioma lymphoma
intrathoracic suppurative diseases	lung abscess empyema bronchiectasis cystic fibrosis chronic cavitary infections (eg fungal, mycobacterial)
lung disease	idiopathic pulmonary fibrosis asbestosis pulmonary arterio-venous malformations
cardiovascular disease	cyanotic congenital heart disease

chronic cholecystitis	2/2 chronic inflammation/irritation from gallstones complication: can cause ileus if gallstone enters intesting 2/2 fistula bw gallbladder and sm intestine (see air in biliary tract)		CT - "porcelain gallbladder" - intramural calcium rim	11-33% eventually develop gallbladder (adeno)carcinoma, so surgical resection
acute choledocholithiasis		acute onset RUQ or epigastric pain labs: ↑conj bili ↑alk phos		
malignant biliary obstruction	2/2: • cholangiocarcinoma • pancreatic adenocarcinoma • hepatocellular carcinoma • metastatic (colon, gastric)	painless jaundice fatigue, wt loss pruritis, acholic stools w dark urine RUQ mass, tenderness, or hepatomegaly labs: ↑direct(conj) bili ↑alk phos & ggt nl or ↑AST, ALT	abd u/s or CT if nondx, MRcholangiopancreatogram or ERCP	
stricture of pancreatic portion of bile duct	chronic pancreatitis -> fibrosis -> stricture	↑conj bili ↑alk phos		

GALLBLADDER/RUQ/ABNORMAL BILI

	hx/etiology	s/sx	dx	rx
acute ascending cholangitis	infection of common bile duct, commonly 2/2 obstruction of common bile duct by stone or stricture	Charcot's triad: fever severe jaundice RUQ abd pain very ill/acute distress leukocytosis		supportive care broad spectrum abx if persistent sx, high fever, hypotension, abd pain, confusion → urgent biliary decompression/drainage by ERCP - sphincterotomy w/ stone removal and/or stent insertion
cholelithiasis	"fat, fertile, female, forty" also predisposed: <ul style="list-style-type: none">• Native American• DM• Obesity• rapid wt loss• OCPs/pregnancy (estrogen inc cholesterol secretion and progesterone dec bile acid secretion -> bile has inc chol saturation)• on TPN or prolonged fasting (CCK stimulus is absent -> biliary stasis)• clofibrate, octreotide, ceftriaxone	+/- occasional RUQ abd pain bloating and dyspepsia after eating fatty foods	abd u/s - 95% sensitive cholesterol or mixed = radiolucent. majority. calcium-bilirubinate = least common.	if symptomatic, laparoscopic cholecystectomy medical rx: reduce cholesterol content of bile by dec hepatic secretion nad intestinal reabsorption of cholesterol - usodeoxycholic acid. 50% recur
acute cholecystitis	' above + fever can be precipitated by ingestion of fatty foods	RUQ abd pain that radiates to right shoulder - Murphy's sign n/v/fever/leukocytosis	abd u/s - thickened gallbladder wall with edema if u/s unclear, HIDA (better and esp for acalculous cholecystitis) alk phos might be nl	can manage conservatively w cholecystectomy within 72 hrs
acalculous cholecystitis	critically ill patients, need high degree of clinical suspicion		clinical suspicion and confirm w imaging - gallbladder wall thickening and distension and pericholecystic fluid.	abx and percutaneous cholecystostomy once medical condition improves, cholecystectomy w drainage of any associated abscesses is definitive therapy

ASTHMA

		rx	alternative/adjunctive rx
intermittent	≤ 2 episodes / week ≤ 2 nighttime no limitation on daily activities	short-acting bronchodilator (eg albuterol) PRN	
mild persistent	2+ episodes / week 3-4 nighttime / month minor limitation on activities normal PFTs	+ daily low-dose inhaled corticosteroid (as controller medication)	daily oral theophylline
moderate persistent	daily sx weekly nighttime awakenings FEV1 60-80% predicted	+ long-acting inhaled beta 2 agonist	daily oral theophylline
severe persistent	continuous daytime sx frequent nighttime sx extremely limited activity FEV1 <60% predicted	albuterol inhaler PRN high-dose inhaled corticosteroid long-acting inhaled beta 2 agonist +/- daily oral steroids (pred)	daily oral theophylline

bronchoconstriction can be triggered by aspirin or beta blocker therapy in patients with asthma (esp if concurrent chronic rhinitis and nasal polyps). = sudden worsening of asthma and nasal congestion 30m to 3hr after ingestion of nsaid's

SUBACUTE/CHRONIC COUGH

subacute 3-8wks	chronic >8wks
post nasal drip / gerd / asthma = 90% if pt on ACEinh → stop ACEinh if persistent cough, purulent sputum, smoker, or immunocompromised, or hx/phyx suggest pulm parenchyma dz or unknown etiology → get CXR. If normal CXR in s/o purulent sputum, smoker, immunocomp, consider rx with empiric abx. if normal CXR in s/o possible PND/asthma/GERD/pulm parenchyma dz → consider rx for PND w empiric oral 1st gen antihistamine +/- nasal steroid or nasal antihistamine if abnl CXR, treat underlying cause	

INTERSTITIAL LUNG DISEASE

defn - excessive collagen deposition in extracellular matrix around alveoli -> scarring -> reduced total lung capacity, functional residual capacity, and residual volume.

etiologies	s/sx	pfts	imaging/labs	dx
• sarcoidosis, amyloidosis, alveolar proteinosis	progressively worsening exertional dyspnea +/- persistent dry cough, fine crackles during mid-late inspiration, +/- clubbing	restrictive pattern: FEV1 and FVC decreased FEV1/FVC normal or increased reduced diffusion capacity and inc A-a gradient dec TLC, dec RV	CXR - reticular or nodular opacities hi res chest CT - fibrosis, honeycombing, or traction bronchiectasis	clinical features, pft, and radiographic +/- lung biopsy if unclear
• vasculitis (eg granulomatosis with polyangiitis)	>50% have sig smoking hx	abg @rest can be normal/mild hypoxemia		
• infections (eg fungal, tb, viral pneumonia)	pulmonary findings due to other underlying conditions (eg silicosis, connective tissue disease)	exertion usually causes significant hypoxemia due to V/Q mismatch		
• occupational & environmental agents (eg silicosis, hypersensitivity pneumonitis)				
• connective tissue disease (eg systemic lupus erythematosus, scleroderma)				
• idiopathic pulmonary fibrosis, interstitial pneumonia				
• cryptogenic organizing pneumonia				

Pulm Fibrosis

2/2

Hypersensitivity pneumonitis (alveolar inflammation 2/2 inhaled antigen - ex aerosolized bird droppings ('bird fancier's lung' or molds 'farmer's lung')

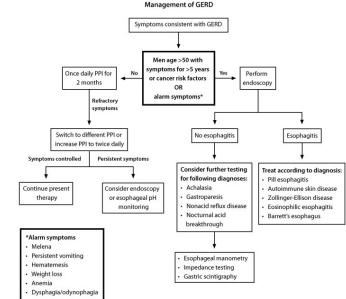
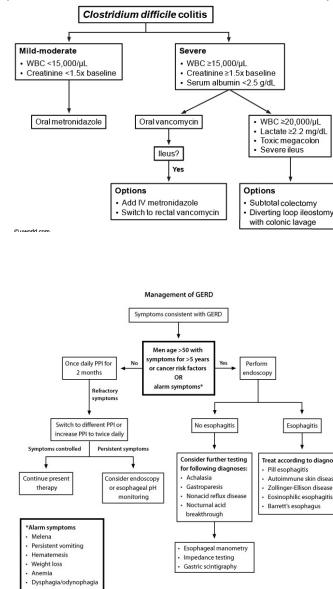
acute episodes = 4-6 hrs after exposure, cough, breathlessness, fever, malaise
restrictive pattern on pft, haziness/groundglass opacities of lower lung fields on cxr
rx - avoid exposure -> remission

LOWER QUADRANT ABD PAIN

		hx	s/sx	dx	rx
	appendicitis		guarding rigidity or rebound tenderness initial vague periumbilical pain that localizes to right lower quadrant		
	psoas abscess	2/2 contiguous spread (ex: bone, bowel, spinal tb/potts, hematogenous spread). s.aureus is most common.	pain on deep abd palpation, or lower abd pain or back pain. leukocytosis	CT if neg, and suspicion is high, exploratory laparoscopy or percutaneous drainage tube	
colon	diverticulitis				
	crohn disease				
	perforation carcinoma of cecum				
	yersiniosis				
	c diff colitis	fluoroquin, penicillin, cephalosporins, clindamycin have suspicion with unexplained leukocytosis even without diarrhea	mild-modL wbc <15,000/uL, creat <1.5x baseline severe: wbc ?>15,000/uL, creat >1.5x baseline serum albumin <2.5 g/dL	send stool studies (PCR for c.diff toxin)	empiric metronidazole severe: oral vancomycin +/- IV metronidazole

pancreatic ca	can present with obstructive jaundice or vague abd pain inc risk if: hereditary - 1st deg relative smoking obesity chronic pancreatitis	wt loss, abd pain (usually epigastric - more chronic and worse in supine position and at night) and jaundice Courvoisier's sign - head of panc - steatorrhea, wt loss, jaundice body or tail - pain and wt loss ct scan w contrast dx - sens 85-90%, spec 90-95% if nondx, ERCP	surgical resection. mortality <1yr otherwise can monitor response to chemo with CA19-9
mesenteric ischemia	older risk factors: diffuse atherosclerosis, valvular abnormality, cardiac arrhythmias or recent MI hypercoagulable d/o's	severe acute periumbilical abd pain out of proportion to phys exam hematochezia (late) leukocytosis inc lactate, amylase, phosphate metabolic acidosis (not often true in peptic ulcer perf)	early mesenteric angiography or CTangiogram resuscitative rx broad spectrum abx NG tube - decompression Surgery for bowel infarct/perf
other	ACS, aortic dissection		

prefer abd ct w contrast over u/s for epigastric pain + wt loss without jaundice



ARDS

	ards	periop MI
defn	1. new/worsening resp sx during past 1 or within 1wk of known clinical insult 2. bilat lung opacities (pulm edema) 3. no cardiac failure or fluid overload 4. echo to definitely exclude hydrostatic pulm edema 5. PaO ₂ /FiO ₂ ratio < 300 mmHg with pEEP > 5 cm H ₂ O - mild = 200-300 - moderate = 100-200 - severe <100mm	
etiology	2/2 pancreatitis (leak of pancreatic enzymes from serum across capillaries and damage surfactant in alveoli)	
sx	diffuse crackles, respiratory distress	new S3 gallop, peripheral edema, JVD
dx	dx of exclusion	

CAUSES OF POST-OP FEVER (5W'S)

Wind	Pulmonary embolus PNA Aspiration
Wound	Surgical site infection
Water	UTI
Walk	DVT
Wonder drugs/products	Drug fever Blood products IV lines

TRAUMA

diaphragmatic rupture = more common on left side bc right side is protected by liver. risk of mortality 2/2 injury and strangulation of bowel. sx = n/v, or resp distress if larger rupture

PULMONARY EFFUSION

Light's criteria = (exudate has ≥ 1 of the following):

- >0.5 Pleural fluid protein/serum protein ratio
- >0.6 Pleural fluid LDH/serum LDH ratio
- Pleural fluid LDH = $>2/3$ upper limit of normal serum LDH

Causes of exudative (2/2 inflammation and inc capillary and pleural membrane permeability or impaired lymphatic draining of pleural space)

- infection - pna, tb
- malignancy - +/- hemorrhagic effusions, insidious accumulation, 30% have <60 mg/dL low glucose
- PE - hemorrhagic effusion is common (suggests pulm tissue infarction), can occasionally cause transudative pleural effusion
- connective tissues disease
- iatrogenic

PULM INFECTIONS IN IMMUNOSUPP

+ late complication in post-BMT presenting with pneumonitis and colitis = CMV

+ immediate post-transplant period but no diarrhea = PCP

+ lung but no diarrhea = mycoplasma and aspergillus

+ diarrhea but no lung involvement = cryptosporidium

+ skin rash +/- intestine, liver +/- lung involvement (bronchiolitis obliterans) in chronic = GVHD

EPIGASTRIC PAIN/ABD PAIN

	hx	s/sx	dx	rx
peptic ulcer		sudden onset n/v/hematemesis peritoneal signs - guarding, rigidity, rebound tenderness	sx CXR - free air under diaphragm	
esophageal perforation	<ul style="list-style-type: none"> • spontaneous - boerhaave • instrumentation (endoscopy) • esophagitis (infectious, pills, caustic) • esophageal ulcer 	<ul style="list-style-type: none"> sudden onset, severe pain - retrosternal, neck, back, abdomen, chest, and/or epigastric fever Hamman sign - subcut emphysema in neck - crunching sound on chest auscultation 2/2 mediastinal emphysema CXR - widened mediastinum (2/2 air = pneumomediastinum) 	gastrografin-contrast (water soluble. NOT barium) esophagram, or CT esophagogram	Abx and supportive surgical repair for sig leakage with sirs
acute pancreatitis	<ul style="list-style-type: none"> • chronic etoh use • gallstones • hyperlipidemia (types I, IV, V) • drugs - didanosine, azathioprine, valproic acid, thiazide diuretics • infxn - cmv, legionella, aspergillus • trauma • iatrogenic (post-ERCP) 	dx = 2 of following: <ul style="list-style-type: none"> • acute constant epigastric abd pain +/- radiating to back • amylase/lipase $>3x$ normal limit (ex: amylase 2066, lipase 1800) • abd imaging: CT w/ contrast - focal or diffuse pancreatic enlargement w/ heterogenous enhancement. U/S - diffusely enlarged and hypoechoic pancreas 	supportive for episode, usually self-limited 4-7d - IV fluids, NPO, analgesics (eg meperidine, fentanyl)	
		other: <ul style="list-style-type: none"> • n/vomiting • improved pain with sitting up or leaning forward, worse with walking and lying supine 		if severe biliary pancreatitis, ERCP for sphincterotomy/stone removal
		vitals/labs <ul style="list-style-type: none"> • fever, tachypnea, hypoxemia, hypot • \uparrowWBC • ALT > 150 - biliary pancreatitis 		treat underlying cause (ex gallstones/cholecystectomy)
		complications: <ul style="list-style-type: none"> • +/-CXR - left-sided pleural effusion • ileus • ARDS • renal failure • necrotic pancreatic tissue can form abscess - persistent fever and leukocytosis. rx = drain. • 1-2wks after episode, can have infection of necrotic pancreas. gravely ill - spiking fevers, leukocytosis, shock...rx surgical debridement • hemorrhagic pancreatitis - severe, lifethreatening retroperitoneal hemorrhage and pancreatic necrosis, bluish discoloration of flanks (Grey Turner sign), periumbilical (Cullen sign) 	Px: <ul style="list-style-type: none"> • Can subsequently develop pseudocyst - fibrous capsule of inflamm fluid (amylase, lipase, enterokinase), can leak and elevate amylase in serum. dx by u/s, resolves spontaneously or drain if >6wks, >5cm, or infected. • chronic pancreatitis = recurrent bouts of epigastric abd pain 	
				fat malabsorption with steatorrhea, diarrhea dm, wt loss, nl LFTs. calcifications on CT or xray is dx. can lead to fibrosis -> stricture of intrapancreatic portion of bile duct -> inc bili and alk phos

GI/ENT

CF (VERSUS)

	CF	primary ciliary dyskinesia (immotile cilia syndrome)	acute lymphoblastic leukemia	
	autosomal recessive	autosomal recessive d/o of mucociliary clearance		
dx	gold std = quantitative pilocarpine iontophoresis + measurement of sweat chloride concentration	much more rare than CF		
etiology of recurrent pulm infxn	accumulation of inspissated mucus allow bacteria to proliferate -> rec rhinosinusitis	same <-		
clinical features by organ system	<p>respiratory:</p> <ul style="list-style-type: none"> • obxt lung dz - bronchiectasis • recurrent pna • chronic rhinosinusitis <p>GI:</p> <ul style="list-style-type: none"> • obxtn - meconium ileus, distal obxtn • pancreatic - exocrine insuff, CF-related diabetes <p>repro:</p> <ul style="list-style-type: none"> • infertility <p>msk:</p> <ul style="list-style-type: none"> • osteopenia - fractures • kyphoscoliosis • digital clubbing 			
sx, PhyEx	<p>nasal polyps - further obstruct and exacerbate sinusitis</p> <p>bilat diffuse rales</p> <p>digital clubbing</p>	<p>also has nasal polyps</p> <p>also digital clubbing</p>	<p>wt loss, recurr infections</p> <p>hepatosplenomeg</p> <p>lyphadenopathy</p> <p>petechiae</p>	
rx	intranasal glucocorticoids can provide sx relief +/- surgical resection of polyps			

Renal

CONGENITAL KIDNEY DISEASE

	sx	complications	dx	rx
ADPKD - autosomal dominant polycystic kidney disease	<p>most asx hematuria intermittent bilat flank pain (nephrolithiasis, infection, cyst rupture, hemorrhage) nocturia HTN palpable kidney/abd mass on exam, us. bilat (right is lower than left and easier to palpate) proteinuria CKD</p>	<p>pain 2/2: multiple renal cysts/ rupture UTIs nephroithiasis hemorrhage</p> <p>rupture of brain aneurysm and abd aorta aneurysms</p> <p>extra-renal features: cerebral aneurysms hepatic and pancreatic cysts cardiac valve disorders (mitral valve prolapse, aortic regurg) colonic diverticulosis ventral and inguinal hernias</p>	abd u/s (or CT/MRI) - enlarged kidneys w multiple cysts	htn: ACEis control BP and renal fxn control CV risk factors (ex HTN) dialysis, renal transplant for ESRD
horseshoe kidney	complications: uretopelvic junction obstrxn renal stones vesicoureteric reflux chronic urinary tract infection			

Characteristics of renal cysts

simple renal cyst	malignant cystic mass
<ul style="list-style-type: none"> • thin, smooth, regular wall • unilocular • no septae • homogenous content • CT/MRI - absence of contrast enhancement • usually asx • no f/u needed 	<ul style="list-style-type: none"> • thick, irregular wall • multilocular • multiple septae, occ thick and calcified • heterogenous content (solid and cystic) • CT/MRI - presence of contrast enhancement • may cause pain, hematuria, or HTN • requires f/u imaging and urological evaluation for malignancy

ELECTROLYTE ABNORMALITIES

	hx/etiology	sx		rx
hypocalcemia	post surgical (thyroidectomy) autoimmune parathyroid destruction	asx, or nonspecific - fatigue, anxiety, depression involuntary contractions/tetany - lips, face, extremities severe - seizures	ekg - QT prolongation	
hypercalcemia	can be 2/2 overprod of calcitriol aka vit D 2/2 granulomatous diseases or lymphoma	"moans groans psychic overtones" kidney stones abd pain anorexia constipation malaise, back pain polyuria, polydipsia —> severe>14: weakness, confusion, lethargy, stupor, coma	shortened QT interval <u>if mod-severe, >12-14 mg/dL or sx:</u> immediate= IV NS + calcitonin (acts w/in 4-6hrs) Long-term = bisphosphonate (zoledronate) if mild, avoid thiazides, lithium, adequate volume.	
hypoK	Cushing's syndrome - cortisol w mineralocorticoid activity causing potassium wasting. also hyperNa			

ACUTE RENAL FAILURE/AKI

	causes	mechanism	s/sx	Rx
intrinsinc	contrast-induced nephropathy	vasoconstriction and tubular injury inc risk for pts with hx of DM or chronic renal insuff	spike in Cr within 24 hrs of contrast administration with return to nl renal fxn within 5 days +/- acetylcysteine is also protective: vasodilation and antioxidant properties	pre-CT IV hydration to prevent. (prior to and few hours after procedure) also helps to discontinue NSAIDS (cause renal vasoconstriction) prior to contrast administration
	crystal-induced (direct renal tubular toxicity)	IV acyclovir (rarely oral) -- less often causes ATN or AIN sulfonamides methotretate ethylene glycol protease inhibitors	usually asx, or nonspec n/v, flank/abd pain elevated Cr 24-48hrs (up to 1-7days) after starting drug UA - hematuria, pyuria, crystals	concurrent vol repletion can prevent AKI discontinue drug, volume repletion
	Acute interstitial nephritis	meds like beta lactams, PPI, aminoglycosides	7-10 days after drug exposure. skin rash, eosinophilia, eosinophiluria, pyuria	
	Glomerular injury	glomerulonephritis 2/2 post-strep	UA: proteinuria, hematuria, rbc casts	
	post-renal AKI	obstruction at bladder neck (BPH, prostate cancer)	obstructive voiding sx (post void dribbling, dec urinary stream, hesitancy, urgency, nocturia, urinary retention) signs - hi post-void urinary resid volume when foley catheter inserted	
	prerenal azotemia	volume depletion --> hypoperfusion to kidneys	BUN:Cr > 20:1 FeNa < 2%	avoid nephrotoxic meds to prevent further injury (ex metformin can cause lactic acidosis in AKI, liver failure, and sepsis) check foley, then fluid challenge - iv NS

Notes: renally dosed meds - nafcillin, vancomycin, levoflox. azithromycin is renally cleared.

OLIGURIA

oliguria < 400cc or <6cc/kg per day
 oliguria + AKI is due to [prerenal], [intrinsic] and [postrenal] causes

urinary retention on bedside bladder scan?	causes	rx
1. YES	BPH malignancy	decompress with urethral catheter consult urology —> rx cause
2. NO based on serum/urine biochemistry +/- imaging:	Pre-renal: hypovolemia sepsis low cardiac output (eg HF) Renal: ATN interstitial nephritis glomerular disease	Fluids Rx cause

HYPERNATREMIA

hypernatremia + hypovolemic + sx —> rx with NS (0.9%) == basically restoring isotonic volume depletion
 hypernatremia + hypovolemia - sx —> rx with 5% dextrose (or 0.45% half normal saline) == basically restoring free water loss/dehydration
 hypernatremia + euvolemic —> free water supplementation. can test for central v nephrotic DI with water deprivation test.

goal to correct serum sodium by 0.5 mEq/dL/hr without exceeding 12 mEq/dL/24hr

OTHER ELECTROLYTES

hypoMag causes hypoCalcemia by inducing PTH resistance and decreasing PTH secretion (so = variable PTH levels).
 serum phosphate levels are normal or low

DIABETES INSIPIDUS VS POLYDIPSIA

All have polyuria and dilute urine

	primary polydipsia	central DI	nephrogenic DI
mechanism	inc water intake	dec ADH secretion from pituitary = impaired thirst mechanism.	renal ADH resistance; normal ADH levels = intact thirst mechanism and usually compensate for renal water loss.
labs	urine osmolality < 1/2 serum osmolality, or <100 mOsm/kg hyponatremia < 137 mEq/L	significant hypernatremia >150 mEq/L	Na ~145.
etiology	antipsychotics anxious, middle-aged women central hypothalamic lesion	idiopathic trauma pituitary surgery ischemic encephalopathy	chronic lithium use hypercalcemia hereditary (AVPR2 mutations)
rx		intranasal (or oral) desmopressin	HCTZ - causes mild volume depletion that increases proximal water and Na resorption

Dx algorithm to distinguish b/w them.

(1. water deprivation test, 2. administer desmopressin. compare changes in urine and serum osmolality):

Results of <u>test</u>	Primary polydipsia	DI
1. water deprivation	urine osmolality > 600 mOsm/kg and plasma osmolality > 295 mOsm/kg or plasma Na > 145 mEq/L	urine osmolality stable on 2- consecutive hourly measurements
2. administer desmopressin	Central: inc urine osmolality 50-100%	Nephrogenic: small or no inc in urine osmolality



NEPHROTIC/NEPHRITIC SYNDROME

		s/sx	dx/labs/imaging	Rx
nephrotic syndrome	FSGS (most common) - AA/hispanic, HIV pts, heroin use, obesity, heavy proteinuria with rapid renal failure basic path: altered permeability of glom membrane for proteins	hypercoagulability (art and ven - most often renal vein thrombosis) 2/2: <ul style="list-style-type: none">inc urinary loss of antithrombin 3altered levels of prot C & Sinc platelet aggregationhyperfibrinogenemia (inc hepatic synthesis)impaired fibrinolysis + accelerated atherosclerosis ---> risk of MI	<ul style="list-style-type: none">proteinuria >3.5g/dayhypalbuminemiaedemahyperlipidemia and lipiduriafatty casts normal Cr does not exclude	aggressive management to prevent MI or stroke - statins may lose vit D in urine
	membranous nephropathy - hepB, adenocarcinoma (breast, lung, colon, prostate), NSAIDs, SLE			
	mesangiocapillary glomerulonephritis			
	diffuse(membrano) proliferative glomerulonephritis - hep B and C, chronic infx (eg endocarditis)	complications: <ul style="list-style-type: none">protein malnutritiontransferrin loss > iron-resistant microcytic hypochromic anemiacholecalciferol-binding protein -> vit D defthyroxine binding globulin -> dec thyroxin levelsAb loss -> inc suscept to infxn		
	minimal change (children) - NSAIDs, lymphoma (ex hodgkin)	igA nephropathy - URI		
nephritic syndrome	Goodpasture's dz			
	Granulomatosis with polyangiitis (GPA, Wegener's)			
	crescentic - autoimmune glomerulonephritis		<ul style="list-style-type: none">proteinuriahematuria - rbc castsedemahypertension	

SIADH -
causes: meds, bronchogenic carcinoma
labs: marked hyponatremia, low plasma osmolality with inappropriately elevated urine osmolality and urine sodium concentration.
rx: remove cause, fluid restriction <800ml/day. if severe and sx or resistant, give hypertonic saline. if fail, demeclocycline acts at renal collecting tubule to dec responsiveness to ADH (but can be nephrotoxic).

HEMATURIA

	type	causes:	etiology (2/2)	sx	urine studies
glomerular cause	microscopic hematuria	glomerulonephritis	igA nephropathy (most common GN)	hematuria and proteinuria within 5 days of URI or pharyngeal illness	proteinuria dysmorphic rbc or rbc casts
	proteinuria				
	dysmorphic rbc or rbc casts	basement membrane disease (eg Alport syndrome)			
	nephritic syndrome - HTN, oliguria, inc Cr				
non-glomerular hematuria (more common)	gross hematuria	renal tumor/ malignancies	ex: renal cell ca of interstitium	<ul style="list-style-type: none"> classic triad: hematuria, flank pain, palpable abd renal mass scrotal varicoceles (usually left-sided) night sweats, fatigue, wt loss paraneoplastic symptoms: <ul style="list-style-type: none"> anemia or erythrocytosis thrombocytosis fever hypercalcemia cachexia 	no proteinuria CT abd is most sensitive and specific
	no proteinuria				
	normal RBC morphology				
	dysuria or obstxn sx - flank pain, renal/ureteral colic, anuria				
	nephrolithiasis				
	papillary necrosis	"NSAID" <ul style="list-style-type: none"> 1/1 long-term acetaminophen abuse (NSAID) Sickle cell disease Analgesic abuse Infection (pyelonephritis) Diabetes mellitus 			
	ATN	hypotensive or nephrotoxic injury (acute azotemia)	dark or cola-colored urine	muddy brown granular casts (sens not spec) Urine Na > 20 mEq/L FeNa 2%	

UTI, CYSTITIS +/- PYELONEPHRITIS

Leuk esterase +. (nitrites + is more specific, released by bacteria)
 pyuria = wbc > 10/hpf

	sx	dx	rx
uncomplicated cystitis	dysuria, urgency	UA	oral nitrofurantoin 5 days
		Ucx only if initial rx fails	TIMP/SMX for 3 days fosfomycin single dose
complicated cystitis: • DM, CKD, pregnancy, immunocompromised • urinary tract obstruction • hospital-acquired infection • assd with procedure (eg cystoscopy) • indwelling foreign body (eg catheter, stent)			do not use fluoroquinolones in pregnancy - consider nitrofurantoin, amox, and cephalexin
uncomplicated pyelonephritis	UTI + fever and flank pain/tenderness	UCx prior to initiating rx	oral fluoroq (cipro, levo) or trimeth-sulfamx severe: IV, fluoroq cipro/levo, ceftriaxone, TMP-SMX, ampicillin + gentamicin
complicated pyelo	indwelling urinary catheter, obstruction, or retention, recent urol procedure, hosp-aq infxn, underlying renal impairment, immunsupp and comorbid diabetes		total 10-14days treatment mild mod: IV ceftriaxone, cefepime, fluoroq (cipro, levo) severe: amp-sulb, pip-tazo, meropenem, aztreonam +/- gent pregnant: no fluoroquin; IV ceftriaxone +/- gentamicin, aztreonam can usually switch to oral abx within 48-72hrs

gentamicin added for patients with severe infection or risk of drug-resistant organisms (hospital acquired infections)

primary polydipsia vs.	diabetes insipidus
	+mucopurulent urethral discharge, ur freq —> gonococcal or chlamydial urethritis (dx cx of discharge and urine, or first catch urine nucleic acid amplification testing for chlamyd). Rx ceftriaxone for gonocc. azithromycin

central nephrogenic for doxy for chlamyd

NEPHROLITHIASIS

Based on sx and referred pain/presentation (abd pain radiation to perineum +/- n/v) —> Dx with noncontrast spiral CT abd/pelvis - very sens and spec for small/non-calcium stones
U/S if pregnant (hard to see distal ureter and uretovesical junctio small hard to see)

if + dysuria or fever —> c/f infection

type of stone	etiology	mechanism
oxalate	Crohn's disease patients (or other small intestinal fat malabsorption) are predisposed to hyperoxaluria .	2/2 inc oxalate absorption in gut (bc normally ca binds oxalate in gut and prevents its absorption...but if fat malabsorption, fat preferentially binds ca and oxalate is free to be absorbed. also bc inadequate bile salt reabsorption damages colonic mucosa and increases oxalate absorption).
calcium	hypercalciuria: idiopathic hyperPTH excessive ca/vitD ingestion dehydration or prolonged immobilization	r
struvite	recurrent UTI, particularly by Proteus species	
uric acid stones	radiolucent. dx by CT abdomen can cause secondary ileus due to vagal reaction to ureteral colic.	

tubulointerstitial nephritis	certain abx (cephalosporins, pen, sulfonamides) NSAIDs diuretics rifampin phenytoin allopurinol	fever, rash, arthalgias peripheral eosinophilia	variable proteinuria (even up to nephrotic range proteinuria in severe cases) WBC casts early polyuria, sterile pyuria +/- wbc casts and eosinophiluria -> renal papilla sloughing -> microscopic hematuria and renal colic
bladder tumor/ cancer, or cystitis	smoking is risk factor		
PCKD			

Muddy brown granular casts = acute tubular necrosis

RBC casts = glomerulonephritis - glomerular disease or vasculitis

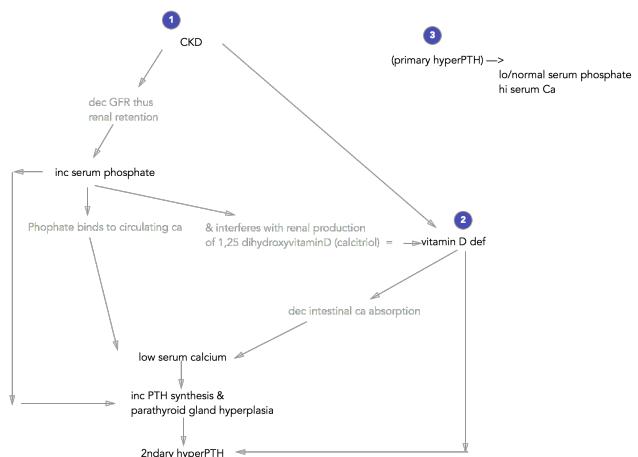
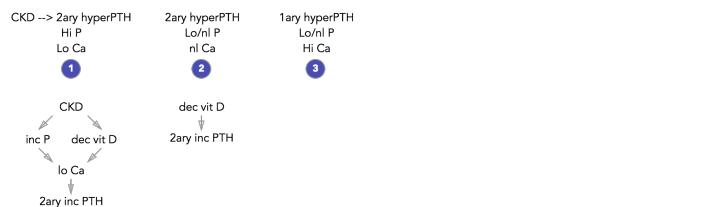
WBC casts = interstitial nephritis and pyelonephritis - urinary wbcs originate in the kidney

Fatty casts = nephrotic syndrome - hyaline casts are composed almost entirely of protein and pass unchanged along urinary tract. pts may be asx, also seen in pre-renal azotemia.

Broad and waxy casts = chronic renal failure - arise in the dilated tubules of enlarged nephrons that have undergone compensatory hypertrophy in response to the reduced renal mass.

ESRD/DIALYSIS PATIENTS

- Anemia
- hyperPhos (from dec GFR and dec renal P excretion. also binds to circulating Ca and interferes with renal production of 1,25 dihydroxyvitamin D (calcitriol))
- Inc PTH
- inc homocysteine levels (impaired metabolism and decreased removal)
- accelerated atherogenesis - more oxidant stress due to uremia replacement therapies
- supplemental ca to correct hyperphos —> enhances coronary artery calcification
- inhibition of NO -> vasoconstriction and hypertension AEIOU



indications for dialysis:

- A - acidosis (refractory met acidosis pH < 7.2)
- E - electrolytes (refractory hyperK)
- I - coagulopathy, i?
- O - volume Overload or pulm edema not responding to diuretics
- U - uremia (pericarditis, encephalopathy, or neuropathy)

URINARY RETENTION/INCONTINENCE

Diff dx retention:

- obstruction (BPH, prostate ca)
- neurogenic bladder (can lead to overflow incontinence. 2/2 Multiple sclerosis, anesthetic blocks, drugs like anticholinergics)
- detrusor muscle underactivity

Diff dx incontinence:

+dec rectal tone, lower extremity weakness, inc lower extremity DTR: spinal cord lesion with compression in lumbar region