Clinical Pearls: Cardiology

Cardiology I

- In stable ischemic heart disease (not ACS), medical management with antianginal therapy should be the first step.
    - Antianginal medications in this space include beta blockers titrated to a goal HR of 55-60bpm, select calcium channel blockers, long-acting nitrates, and ranolazine.
    - Exceptions to this initial approach of medical therapy include: Large area of reversible ischemic myocardium (as identified on stress test imaging), high-risk criteria on stress testing (should be designated in the stress test report results), significant CAD with reduced LV function, and left main stenosis or equivalent (Lcx + LAD).
- ACS (acute coronary syndrome) is a spectrum of ischemia that ranges from unstable angina to NSTEMI to STEMI. Unless contraindicated, initial management should always include aspirin, p2y-12 inhibitor, oxygen, anticoagulation, beta-blocker, nitroglycerin and high dose statin.
    - The goal is to keep the patient chest pain free, hemodynamically stable and monitor for malignant arrythmias.
    - If there is a STEMI, or the 3 goals outlined are not met, the patient must go for left heart catheterization immediately. Otherwise, the decision for timing of catheterization depends on NSTEMI risk (eg TIMI score).

Cardiology II

- Pericarditis is a clinical diagnosis. There is no imaging that can rule in or rule out.
    - Risk factors and quality of chest pain should raise initial suspicion.
    - Findings on ECG as well as inflammatory markers on laboratory work can help to solidify the diagnosis.
    - High dose NSAID and colchicine therapy is the first line of treatment. Steroids should be avoided unless symptoms are truly recalcitrant.
- Cardiac tamponade physiology is a constellation of hemodynamic changes that occur when there is rapid accumulation of fluid in the pericardial space.

    - Chronic, slow pericardial fluid buildup in the pericardial space on the other hand is less likely to result in tamponade physiology.
    - An echocardiogram can help to assess for early tamponade features as well as be important for planning of pericardiocentesis, but the decision for pericardiocentesis is a clinical one that most importantly relies on a patient's hemodynamic stability.
- Mild valvular disease generally only requires TTE monitoring every 3-5 years. Moderate valvular disease a little more frequent with a TTE every 1-2 years, and severe valvular disease a TTE every 6-12 months.
    - Both valvular stenosis and regurgitation can be very hemodynamically dependent, therefore it is crucial to optimize a patient's blood pressure, heart rate, and volume status before obtaining these TTEs in order to assess the true degree of severity.

Cardiology III

- First degree AV block requires no intervention. It is simply a delay through the AV node, but not representative of heart block. Clinically it does not result in symptoms or hemodynamic consequences.
- In sick sinus syndrome (SSS), also known as sinus node dysfunction, the SA node fails to respond to physiologic demands.
    - In a patient with sinus bradycardia, one of the ways to assess for an aspect of SSS includes placing a pulse oximeter in office and having them walk to assess for adequate increase in heart rate (chronotropic competence).
    - Failure to increase heart rate appropriately may suggest underlying SSS.
- Both chemical and electrical cardioversion for atrial fibrillation or flutter result in an increased risk of stroke in the immediate 4 weeks following restoration of sinus rhythm. This is due to initial atrial stunning as well as synchronized atrial activity that may in theory dislodge a clot more readily.

Cardiology IV

- Unless contraindicated, patients with HFrEF should be started on goal-directed medical therapy if they have Stage B or higher HF. These medications should be titrated to their highest tolerated doses and include: ACE/ARB/ARNI, beta blockers (not initiated in acute decompensated states), aldosterone antagonists, and SGLT-2 inhibitors. Ivabradine and Isosorbide dinitrate-Hydralazine may also be initiated in certain patient populations.

    - Remember, loop diuretics, although they improve symptoms, have no mortality benefit.
- An ICD is indicated if after maximal goal directed medical therapy, a patients LV function remains <= 35% as this is high risk for malignant ventricular arrhythmias.
    - An ICD device provides a shock in the event VT/VF occur.
    - If there is also a LBBB with QRS >=120ms, a CRT-D may be considered. In addition to providing shocking capabilities, this device is also able to resynchronize the RV and LV such that both ventricles depolarize simultaneously rather than dyssynchronously as would be the case with LBBB.
- Diastolic dysfunction (DD) on an echocardiogram does not always mean clinical HFpEF. IF patients experience symptoms with diastolic dysfunction, then a clinical diagnosis of HFpEF can be made (generally seen with higher grades of DD).
    - The mainstays of therapy for HFpEF are reversing underlying causes as well as always maintaining blood pressure control and diuresis.

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Clinical Pearls: Critical Care Medicine

- ARDS is defined by acute onset (within 1 week) respiratory failure with hypoxemia featuring a P:F ≤300 and bilateral opacities on chest radiograph not due to cardiogenic edema.
    - Goals for mechanical ventilation should include ensuring low tidal volumes (4-8cc/kg IBW) and maintaining plateau pressures < 30mmHg .
- The pillars of sepsis treatment are early antibiotic administration, fluid resuscitation with 30cc/kg body weight (with first 3 hours), and ensuring adequate source control (i.e. removal or drainage of infected material).
    - For patients who develop septic shock (refractory hypotension despite the aforementioned), norepinephrine infusion is the optimal therapy to increase blood pressures to a target MAP of 65.
- Anaphylaxis is a life-threatening allergic reaction that presents relatively rapidly following allergen exposure (minutes to hours). Prompt recognition and treatment with IM epinephrine is essential.
    - Multiple systems can be involved in anaphylaxis including skin, mucosal tissue, respiratory and gastrointestinal tracts and the condition can result in rapid decline in blood pressure.
    - Treatment of persistent shock due to anaphylaxis is accomplished with epinephrine infusion.

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Clinical Pearls: Dermatology

Dermatology I

- Psoriasis, pityriasis rubra pilaris, toxic shock syndrome, and drug reactions may cause clinically indistinguishable erythroderma. History is key to making the diagnosis:
    - Personal or family history of psoriasis?
    - Recent illness?
    - Exposure to new medications?
    - Recent withdrawal of systemic glucocorticoids?
- First line treatment for atopic dermatitis involves emollients and topical corticosteroids; avoiding harsh soaps and known allergens is crucial for preventing flares.
- Dermatitis presents acutely with pruritic, erythematous, weeping or crusted plaques; chronic cases show lichenification and scaling.
    - Distribution guides diagnosis:
        - Atopic dermatitis – face and flexural areas (children/adults);
        - Dyshidrotic eczema – lateral fingers, palms, soles;
        - Seborrheic dermatitis – scalp, face (nasolabial folds, eyebrows).
        - Contact dermatitis (allergic/irritant) – areas of direct exposure;
            - Contact dermatitis is frequently identified by the pattern (morphology) and distribution of the eruption.
            - Recurrent or unclear cases of allergic contact dermatitis may benefit from patch testing.
    - Complications include secondary bacterial infection, especially *Staphylococcus aureus* (e.g., honey-colored crusts in atopic dermatitis).
        - Treatment includes emollients – cornerstone of maintenance; topical steroids – low potency for face/folds, higher potency for trunk/extremities;
        - Avoidance – known allergens/irritants; systemic therapy – for refractory cases (e.g., dupilumab for moderate-to-severe atopic dermatitis).
- Venous insufficiency may present with acute or chronic stasis dermatitis (typically bilateral, erythematous, scaling).
    - Complications include lipodermatosclerosis – indurated, fibrotic skin; venous ulcers – usually at the medial malleolus.

    - Management includes compression therapy – mainstay of treatment; topical steroids – for stasis dermatitis;Vascular procedures – for refractory cases.
- Leg ulcer differential diagnosis:
    - Venous – medial malleolus, shallow, less painful;
    - Arterial – lateral malleolus/pressure points, sharply demarcated, painful;
    - Neuropathic – plantar surface, painless, often in diabetics.
- Drug reactions:
    - Low-risk drug reactions include morbilliform, urticarial, fixed drug eruption, and AGEP (acute generalized exanthematous pustulosis).
    - More severe or systemic reactions include DIHS/DRESS (drug-induced hypersensitivity syndrome) and SJS/TEN (Stevens-Johnson syndrome/toxic epidermal necrolysis).
    - Common triggers for all these reactions include antibiotics (e.g., sulfonamides, penicillins) and anticonvulsants (e.g., carbamazepine, lamotrigine).
    - Management involves discontinuing the offending drug for all reactions; mild reactions are treated with antihistamines and topical steroids, while severe reactions may require systemic corticosteroids (for DIHS/DRESS) and ICU/burn unit care (for SJS/TEN).
- Acute urticaria presents as transient (<24 hours), pruritic, edematous wheals and is managed with H1 antihistamines.
    - Acne includes comedonal (open and closed) and inflammatory lesions (papules, pustules, nodules), and is treated with topical retinoids, benzoyl peroxide, topical/oral antibiotics, spironolactone (in females), and isotretinoin for severe or scarring cases.
    - Rosacea subtypes include erythematotelangiectatic (facial flushing triggered by heat, sunlight, spicy foods), papulopustular (resembles acne but lacks comedones), ocular (gritty or dry eye sensation), and phymatous (thickened, oily skin, often on the nose).

Dermatology II

- Seborrheic keratoses are benign, waxy, “stuck-on” appearing lesions that do not require any treatment unless there is diagnostic uncertainty.
- Squamous cell carcinomas that are greater than 2 cm in size, involve named larger diameter nerves, and occur in immunocompromised individuals are more likely to metastasize.

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- While topical antifungals are often sufficient for infections on the hands and feet, *tinea capitis* usually requires systemic antifungal agents such as griseofulvin to achieve clearance.
- The most common form of psoriasis is plaque psoriasis – well-demarcated, erythematous, scaly plaques on the scalp, extensor surfaces, and lower back.
    - Other variants include inverse (intertriginous areas), guttate (small, drop-like lesions after group A *streptococcal* infection), and erythrodermic (generalized erythema, after recent systemic steroids).
    - Systemic associations include psoriatic arthritis, cardiovascular disease, and metabolic syndrome.
    - Treatment options range from topical agents (steroids, vitamin D analogs), phototherapy, and non-biologic systemics (e.g., methotrexate), to biologic therapies (e.g., TNF-α, IL-17, IL-23 inhibitors) for moderate-to-severe disease.
- Dermatophyte infections are classified by location: tinea pedis (feet), tinea cruris (groin), tinea capitis (scalp), and tinea manuum (hands). They typically present as pruritic, scaly, annular plaques with central clearing. Treatment involves topical or oral antifungals, primarily azoles and allylamines (e.g., terbinafine).
- Common benign cutaneous neoplasms include warts (HPV-related), corns (pressure-induced hyperkeratosis), skin tags (body fold areas), and seborrheic keratoses (waxy, stuck-on appearance).
    - First-line treatments typically involve cryotherapy or surgical removal, depending on symptoms and patient preference.
- Ultraviolet (UV) exposure is the primary risk factor for actinic keratoses (precancerous, gritty erythematous papules) and skin cancers, including:
    - Squamous cell carcinoma (SCC – firm, pink, ulcerated, crater-like papulonodules);
    - Basal cell carcinoma (BCC – pearly papule with rolled borders and telangiectasias); and
    - Melanoma (typically presents as an asymmetric plaque with irregular borders and color variation).
        - Melanoma subtypes include superficial spreading (most common), nodular, acral lentiginous (main subtype in darkly pigmented skin), and lentigo maligna/lentigo maligna melanoma (usually chronically sun-exposed skin).
    - For suspected skin cancers, biopsy is the first step and guides management (e.g., Breslow depth for melanoma), which may include ED&C, excision, or Mohs surgery, depending on the skin cancer type/features.

Clinical Pearls: Ethics and Patient Safety

- Physicians are morally and legally obligated to maintain confidentiality of patient information. The only exceptions are if a patient is at imminent risk of harming themselves or others; instances of suspected child and/or elder abuse; reporting of communicable diseases; and reporting of information regarding minors to their legal guardian(s).
- Capacity to make an informed decision requires the ability to understand relevant information, appreciate the situation and its applicability to oneself, demonstrate reasoning regarding the proposed intervention, and communicate a choice.
    - Although cognitive impairment and psychiatric illness are risk factors for incapacity, a diagnosis of neurocognitive disorders and/or psychiatric disease does not equate to automatic incompetence.
- The Plan-Do-Study-Act (PDSA) cycle is a continuous quality improvement strategy aimed at enhancing patient safety and outcomes by setting specific goals, planning and implementing targeted interventions, measuring and evaluating changes, and refining interventions based on results for iterative improvement.
- "Competence", or global incapacity, is a legal determination that is made by a judge. "Capacity" is the ability to make a decision related to a current medical situation; determination of capacity can be made by any clinician. To have decision-making capacity, patients must be able to understand the relevant information required to make a medical decision, reason about treatment options with appreciation for the various consequences and communicate a choice.
- Withdrawing life-sustaining treatment (e.g. extubation) and withholding life-sustaining treatment (e.g. "do not attempt intubation" or DNAR orders) are ethically equivalent. All patients with decision-making capacity may decline recommended treatment, even if there is a high likelihood of morbidity or mortality.
    - Physicians are obligated to provide symptomatic management even if curative (disease-directed) treatment is declined.

- When a patient lacks capacity, a surrogate decision-maker may be identified based on a written health care power of attorney.
    - If this is not available, state laws and institutional policies inform the hierarchy of surrogate decision makers, including potentially a state-appointed guardian if no capable family or friends are identified.
    - Surrogate decision makers should make decisions based on a patient's documented preferences (i.e. in an advanced directive) if possible, otherwise they should use "substituted judgment" to make a decision in line with the patient's views on life and attitudes towards sickness. Only if they are unable to use substituted judgment should they turn to the "best interest standard", whereas they make a decision in the patient's best interest.

Clinical Pearls: Hematology

Hematology I

- Ferritin is a measure of iron stores and Total Iron Binding Capacity (TIBC) measures the capacity to accept more iron. In patients with anemia of inflammation, iron stores frequently are sufficient but sequestered making the ferritin level rise. This corresponds to a low TIBC. These are the hallmark labs used to differentiate between anemia of inflammation and iron deficiency anemia.
- The presence of neurologic symptoms including is specific to B12 deficiency when differentiating it from folate deficiency. A methylmalonic acid level may be helpful for uncovering true B12 deficiency in patients with borderline low B12 level.
- Thrombotic thrombocytopenic purpura can present with fevers, thrombocytopenia, microangiopathic hemolytic anemia (MAHA), neurologic symptoms, and renal dysfunction but only rarely with all 5 concurrently.
    - The presence of a MAHA is required for diagnosis and is most frequently associated with thrombocytopenia. Low ADAMTS13 levels are the gold standard for diagnosis but treatment should be as soon as there is clinical suspicion for TTP give the risk of complications.
- In performing an initial evaluation in a patient referred for anemia, the importance of obtaining a reticulocyte count cannot be understated.
- In evaluating patients for microangiopathic hemolytic anemia, it is rare that all five parameters in the classic pentad of fever, anemia, renal insufficiency, thrombocytopenia, and neurologic changes are present. ADAMTS13 testing should be obtained as soon as the diagnosis is suspected but prompt initiation of plasma exchange should never be delayed when the clinical suspicion for TTP is high.
- A decreased serum erythropoietin level is highly specific for a diagnosis of polycythemia vera and JAK2 V617F mutations are present in approximately 97% of patients with PV.

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Hematology II

- Inheritance of the Duffy null red blood cell type may be associated with mild neutropenia <1500 micro/L that does not increase the risk for infectious complications or cytopenias in other cell lines.
    - For patients with persistent, isolated neutropenia on complete blood count testing, the diagnosis may be confirmed using Duffy antigen phenotype testing of the peripheral blood.
- Primary immune thrombocytopenic purpura remains a clinical diagnosis. Platelet-associated antibody testing does not predict outcomes and is not routinely ordered. Evaluation with a bone marrow biopsy is only necessary if there is clinical concern for an alternative marrow disorder.
- In evaluating patients for a leukocytosis, the differential on the WBC, the presence of any co-existing cytopenias, and the clinical appearance of the patient are key in deciding upon the urgency of the evaluation and determining the appropriate testing to be obtained.
- Determining the 4T score is essential in any patient for which heparin induced thrombocytopenia is considered. Additional diagnostic testing and treatment for suspected HIT should be based upon the results of the 4T score
- In patients diagnosed with the antiphospholipid syndrome, warfarin is typically preferred over novel oral anticoagulants, especially in high-risk situations such as patients with triple positive APS .
- For patients being evaluated for heparin induced thrombocytopenia (HIT), a positive immunoassay should result in holding further heparin-based products and initiation of an alternative anticoagulant. Indeterminate assays that are paired with a high pre-test probability require functional testing to confirm the diagnosis of HIT.
    - Warfarin should not be initiated until normalization of the platelet count to avoid temporarily increasing the risk of thrombosis due to more immediate depletion of protein C and State.

Infectious Disease I

- Necrotizing fasciitis is a clinical diagnosis in a patient presenting with a soft tissue infection who displays signs of sepsis/septic shock. Although CT scan can be supportive, definitive diagnosis/treatment requires surgical exploration/debridement, which should not be delayed for radiographic imaging results.
- Toxic shock syndrome is a medical emergency resulting in rapidly progressive multisystem organ failure due to toxin production by staph aureus or group A *streptococci*.
    - While group A *streptococcus* toxic shock syndrome is usually associated with a necrotizing soft tissue infection, the only clue to the diagnosis of staph toxic shock syndrome might be a history of nasal packing after ENT surgery or tampon usage in women.
- Since treatment of osteomyelitis generally requires prolonged courses of antibiotics (4-8 weeks), whenever possible having a surgical biopsy and bone debridement procedure is the best way to achieve source control, confirm a pathologic diagnosis of osteomyelitis, and identify a microbiologic etiology and susceptibility testing results, all of which will increase the likelihood of cure and limit antibiotic toxicity or inappropriate antibiotic usage.
- Bacterial meningitis is a medical emergency that requires immediate antibiotic therapy. The pace of the illness (hours for bacterial meningitis versus days for viral) can be an aid in helping to distinguish them.
    - Empiric antibiotic therapy should not be delayed by diagnostic testing including lumbar puncture or head CT.
- Herpes encephalitis, due to HSV-1 presents with fever altered mental status (usually with bizarre behavior because of frontotemporal lobe involvement) and often focal neurologic findings (such as a seizure). MRI imaging will frequently show abnormalities of the frontotemporal lobe.
    - Empiric IV acyclovir is essential pending the results of CSF HSV PCR (or brain biopsy) to decrease the severe morbidity and mortality associated with untreated infection.

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- For patients with suspected cellulitis or infected wounds who are not responding to antibiotic therapy as expected, it is important to consider alternative diagnoses.
    - These include pyoderma gangrenosum, which presents with ulcerative skin lesions, lipodermatosclerosis, which is panniculitis occurring in the setting of chronic venous insufficiency, venous stasis dermatitis, and others.
- In patients with suspected toxic shock syndrome (TSS), while desquamation is included in the CDC case definition, it typically occurs one to two weeks initial presentation - usually after the patient improves.
    - The diagnosis of TSS should be based on clinical manifestations present at the time and laboratory evidence of organ dysfunction, even in the absence of desquamation.
    - Corticosteroids are not used in the treatment of toxic shock.
- For patients with suspected West Nile neuroinvasive disease, cerebrospinal fluid (CSF) testing for immunoglobulin M (IgM) antibodies against the West Nile virus should be sent as the preferred test.
    - The IgM antibodies typically do not cross the blood brain barrier, therefore finding IgM in the CSF is indicative of neuroinvasive disease.
    - Testing for other arboviruses should also be considered in patients being tested for WN virus.

Infectious Disease II

- Before starting therapy for latent tuberculosis, it is important to review potential exposures/risks for tuberculosis, status of the patient's immune system, and any symptoms or radiographic findings which might be suggestive of active tuberculosis, since treatment courses are different.
- The presence of a zoster vesical on the tip of the nose should raise high concern for eye involvement (herpes zoster ophthalmicus) because the tip of the nose is inactivated by the nasocilliary branch of the trigeminal nerve which also supplies the eye and can lead to vision loss without prompt evaluation and treatment by an ophthalmologist.
- For the diagnosis of pneumonia, a chest CT is typically not necessary.
    - Treatment for CAP is 5 days in outpatients.
- Neither the TB skin test (TST) nor the interferon-γ release assay (IGRA) can distinguish between latent and active tuberculosis.
    - For patients with active or latent TB, it is important to also check for HIV infection.

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- HSV 1 or 2 antibody test positivity only indicates previous infection (some of which may have been asymptomatic) and is not useful for diagnosis.

Infectious Disease III

- For patients receiving pre-exposure prophylaxis for HIV infection (PrEP) HIV testing should be performed every 2-3 months, depending upon which therapy is utilized.
    - This is essential to prevent the development of viral resistance should HIV transmission occur.
    - Patients need to be made aware of the signs and symptoms of acute HIV infection (acute retroviral infection) and to seek immediate testing (HIV 1 RNA PCR quantitative, viral load) should that occur.
- For patients at risk for sexually transmitted infections routine periodic testing, even without symptoms, is important because many sexually transmitted infections are asymptomatic.
- Although urinary catheters are risk factors for UTI, the presence of bacteria in the urine in the setting of an indwelling catheter is not sufficient for a diagnosis of urinary tract infection.
    - Diagnosis of urinary tract infection requires symptoms. The only groups who receive treatment for asymptomatic bacteriuria are pregnant women and those undergoing invasive urologic procedures.
- Pre-Exposure Prophylaxis (PrEP) for prevention of HIV is indicated for persons who are at risk of HIV from injection drug use (particularly those who share equipment or have an injection partner with HIV) in addition to those with sexual risk factors (sex partner with HIV, bacterial STI within 6 months, or inconsistent condom use).
- Although most commonly *Neisseria gonorrhoeae* causes symptoms which localize to the genitourinary system it can cause systemic infection and cause symptoms including migratory polyarthralgia, skin lesions, and even septic arthritis.
    - It is important to obtain samples for evaluation from any suspected involved sites as genitourinary testing does not reliably determine presence or absence of gonorrhea infection at extra-genital sites.

Infectious Disease IV

- Evaluation of fever in a returning traveler requires knowledge of the pre-travel vaccinations and preventative measures/medications taken, as well as the itinerary/potential exposures and pace of the illness. While many of the illnesses require only supportive care, it is critical to identify and empirically treat life-threatening infections like *falciparum* malaria and typhoid fever while awaiting test results.

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- Individuals with anatomic or functional asplenia are at increased risk for infection with encapsulated organisms; therefore, in addition to the standard recommended vaccinations for adults, these patients are specifically indicated to receive immunizations against pneumococcus, Meningitis (ACWY), Meningitis B, and Hib.
- Patients who develop signs or symptoms of pneumonia while in the hospital are at higher risk for infection with a healthcare associated pathogen which can be more resistant to antibiotics.
    - Empiric treatment for HAP and VAP should include antibiotics effective against MRSA and Pseudomonas and other gram-negative organisms. Cultures should also always be sought to help guide appropriate therapy.
- In the setting where there are symptoms concerning for botulism, it is important to consider wounds as a potential source of the toxin.
    - In addition to occurring after inhalation or ingestion of the botulinum toxin, botulism can also occur as a complication of wounds if the wound is contaminated with Clostridium botulinum which can then produce the toxin.

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Clinical Pearls:
Mental and Behavioral Health

- SSRI's can cause not only Serotonin Syndrome, but also QTc prolongation, SIADH and increase bleeding risk. Benefit vs risk analysis is advised when using them in the context of increased such risks.
- Bupropion should be avoided for patients with seizure disorder, eating disorder/poor oral intake.
    - Alcoholism or Benzo use disorder should be ruled out before selecting Bupropion as it can increase seizure/withdrawal risk for those at risk of withdrawal.
    - Bupropion should be immediately discontinued when the patient is showing signs or symptoms of CNS depressant withdrawal.
- PHQ2 or PHQ9 does not rule out Bipolar Spectrum Disorder. Many patients diagnosed with depression do have Bipolar Spectrum Disorder.
    - One should be very careful when prescribing an antidepressant for those who present with/complain of depressive symptoms only.
- It is recommended to screen all adults with depression. PHQ-2 is a validated screening tool and PHQ-9 can be used to further assess severity, with a score of 5 and above consistent with depression.
    - The treatment goal for MDD is to achieve a PHQ-9 of less than 5.
- For patients with alcohol use disorder, naltrexone is considered first-line treatment but is contraindicated for severe liver disease.
    - Acamprosate is an alternative agent which can be used in patients with severe liver disease, however this should be avoided in CKD (eGFR ≤30 mL/min/1.73 m2).
    - Disulfiram is considered second line treatment.
- Prescribe intranasal naloxone in patients who are at high risk for opioid overdose. This includes patients taking >50 mg morphine equivalents (MME)/day, concurrent benzodiazepine use, respiratory disorders, illicit drug use, and opioid use disorder.

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Clinical Pearls:
Musculoskeletal Problems

- Rotator cuff pathology is a very common cause of shoulder pain and does not usually require imaging to diagnose; a painful arc and positive empty can test without evidence of weakness (negative drop arm test) clinches the diagnosis.
    - PT is the first line of therapy.
- Labral tears in the shoulder or hip joints both can be acute or insidious, usually occur in athletes, and often the patient notes a painful clicking or catching. While some will be treated conservatively, referral to orthopedics is appropriate for all labral tears to determine severity and the best plan of action.
- Olecranon bursitis should not be aspirated if it is not inflamed as this may seed the bursa and lead to a septic bursitis, however if it is red, hot, or the patient have fever or cellulitis, aspiration to rule out a septic bursa or crystalline disease is warranted.
- Assessing both active and passive range of motion and strength testing is essential and helpful to clarify the nature of shoulder injury/complaint.
    - In a patient with active loss of range of motion and strength rotator cuff pathology, specifically tear, should be ruled out. This can be done via advanced imaging, with MRI being more beneficial than U/S.
    - Patients with painful but intact active range of motion and strength, rotator cuff tendinopathy or tear are more likely.
- A fall on an outstretched hand (or FOOSH) injury should be evaluated for fracture with X-rays.
    - High clinical index of suspicion should be for scaphoid fracture, especially if tenderness at/near the snuff box, as x-rays are often negative/inconclusive. If any concern, the patient should be placed immobilized in a thumb spica splint and referred for follow up.
    - Stress fractures should be considered in patients with risk factors for poor bone health and/or change in activity with insidious onset of pain. While x-rays should be performed, these can often be negative and advanced imaging with MRI is indicated. Patients should be treated for suspected stress fracture (cessation of activities or non-weight bearing depending on location) until ruled out by imaging.

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Clinical Pearls: Oncology

Oncology I

- In advanced stage lung cancer, treatment is based upon the histology, presence of driver mutations, and PDL1 status.
    - Molecular targeted therapy is typically preferred in patients with driver mutations.
    - In the absence of driver mutations, chemoimmunotherapy or immunotherapy alone are pursued in patients with an acceptable functional status.
- Adjuvant therapy for early-stage breast cancer is based upon not only the stage but the status of the ER/PR/Her 2 receptors.
- Adjuvant chemotherapy is typically recommended for all patients with Stage III colon cancer.
    - Adjuvant therapy is considered for patients with Stage II colon cancer when certain high-risk features (less than 12 LN removed at the time of surgery, poorly differentiated lesion, T4 disease, presence of lymphovascular or perineural invasion) are present.
- Immunotherapy is becoming more prevalent in the management of multiple malignancies including common cancers such as lung and breast cancer in both early and later stages.
    - Recognizing the side effects of immunotherapy quickly is important, as early initiation of systemic therapy with steroids can help quickly reverse sometimes life-threatening effects.
    - Immunotherapy can cause inflammation in almost any organ, manifested as pneumonitis, transaminitis, colitis, myocarditis, encephalitis.
- Molecularly targeted therapy has revolutionized the treatment of many cancers and making sure appropriate testing is done as early as possible is important to guide treatment and help with prognosis.
    - For example, patients with lung cancers containing Anaplastic lymphoma kinase (ALK) rearrangements, even with metastatic disease, patients can live longer than most patients historically with non-small cell lung cancer.
        - A recent study of one of the available ALK inhibitors showed the majority of patients hadn't progressed after 5 years of treatment.

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Oncology II

- For patients with advanced stage indolent variants of B cell Non-Hodgkin Lymphoma, observation without active treatment may be appropriate for many patients.
    - Indications for therapy typically include symptomatic disease, bulky lymphadenopathy, or cytopenias related to the disease.
- In patients for which there is a concern regarding spinal cord compression, MRI of the entire spine is indicated and prompt initiation of steroids as well as consultation with radiation oncology and neurosurgery is paramount.
- In patients with febrile neutropenia related either to antineoplastic therapy or because of the underlying malignancy, prompt acquisition of blood/urine cultures, obtaining appropriate imaging, and initiating broad spectrum antibiotics with potential infectious disease consultation is key.
- Early utilization of palliative care in oncology patients has been shown to improve quality of life and mood and may even prolong survival.
    - Specialty palliative care services are covered by most insurance companies even while patients are undergoing active treatment and can help manage unaddressed physical, psychosocial, or spiritual distress.

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Clinical Pearls: Cancer Screening

- For average risk patients, breast cancer screening should start at age 40 and continue through age 74.
    - For patient who are considered high risk (>20% lifetime risk) start earlier and order breast MRI in addition to yearly mammogram in order to increase sensitivity.
    - Whole breast ultrasound is not recommended for breast cancer screening.
- Lung cancer screening with annual low-dose CT should be offered to patients ages 50-80 with a ≥20-pack-year smoking history who are current smokers or quit within the last 15 years.
    - This increases early detection of lung cancer and is associated with decreased lung cancer mortality.
    - Chest x-ray should not be used for lung cancer screening.
- Prostate cancer screening should be offered to men ages 55 through 69 through shared decision making.
    - If agreeable, a PSA is recommended, and patients should be referred to urology if PSA is 4 or greater.
- All cancers have much better survival and are more treatable at an early stage.
    - Although there are many different and often disparate guidelines out there, be familiar with the ACP and US Preventative Task Force recommendations for all major common cancers (breast, lung, cervical, colon, prostate).
- Patients at increased risk for any reason (Family history/heredity, exposures, prior personal history) need earlier and more frequent screens.
    - Know the factors associated with increased risk.

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Clinical Pearls: Common Symptoms

- While acute cough (< 3 weeks duration) when infectious is usually viral, remember to consider Bordetella pertussis early since treatment is indicated if it's within 2-3 weeks after symptom onset.
    - Look for "paroxysmal cough" -defined as recurrent prolonged coughing episodes with an inability to breathe during coughing spells. This feature has high sensitivity for pertussis. Additionally, the absence of fever suggests this diagnosis as pertussis is not commonly associated with fever.
    - Although traditionally associated with cases in children, more than half of cases now occur in adolescents and adults and symptoms may be less severe than the “whooping cough” usually associated with infection in children.
- The most common cause of chronic cough in adults (lasting >8 weeks) is upper airway cough syndrome (UACS). Formerly known as “post-nasal drip syndrome.”,
    - UACS can include cough, nasal discharge, sensation of postnasal drip, and throat clearing with or without cough.
    - Allergic-rhinitis related UACS is optimally treated with intranasal corticosteroids whereas if it is non-allergic it responds best to first generation antihistamines and decongestants.
- DSM5 criteria for chronic insomnia include sleep symptoms that have occurred at least 3 nights per week for at least 3 months, along with the absence of another sleep, medical, or mental disorder that could be causing insomnia.
    - Guidelines recommend CBT-I as first-line treatment for chronic insomnia. CBT-I typically includes sleep hygiene teaching; behavioral interventions, such as sleep restriction and stimulus control; and cognitive therapy aimed at anxiety and catastrophic thinking around insomnia.

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Clinical Pearls: Nephrology

Nephrology I

- The Aldosterone Renin Ratio screen for primary hyperaldosteronism requires both an elevated ratio and aldosterone.
    - The plasma renin activity may be very low (< 0.5) and this may drive a high ratio even if the aldosterone is not high < 10.
- Non-dipping or paradoxical nocturnal increase in sleep blood pressure on 24 hr ambulatory blood pressure monitoring may be sign of OSA.

Nephrology II

- Most patients with checkpoint inhibitor acute interstitial nephritis (AIN) are also on another medication that is associated with AIN, most commonly proton pump inhibitors (PPI's).
- Alport syndrome (Autosomal Dominant) is being found more often because of genetic testing.
    - Most have microscopic hematuria, some will have proteinuria and CKD.

Nephrology III

- Osmotic diuresis is a cause of polyuria and hypernatremia in hospitalized patients in a catabolic state.
    - Patients will have a urine osm > 300.
- Give 3% saline as 100 ml boluses as opposed to continuous infusion.
    - The rate of correction of 4-6 per 24 hours does not need to be spread out (i.e. 1 every 4-6 hours).
    - If it happens initially within the 1st 6 hours suspend further correction for the remainder of the 1st 24 hours by using DDAVP.
- Risk of overcorrection occurs in patients who gave transient stimulus for ADH (hypovolemia +/- thiazide) that is corrected with volume/sodium. These patients may develop a free water diuresis that is difficult to match with d5w and should get DDAVP.

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Clinical Pearls: Neurology

- Time Is Brain: Always Know “Last Known Well”
  - It dictates eligibility for thrombolysis and thrombectomy.
  - Ask, “When was the patient last seen at their baseline?”—not just when symptoms were noticed.

- Facial Droop: Upper vs. Lower Motor Neuron Matters
  - Upper motor neuron lesions (e.g., stroke) spare the forehead—patient can raise both eyebrows.
  - Lower motor neuron lesions (e.g., Bell’s palsy) affect the whole face on one side—including inability to raise eyebrow or close the eye.

- Headache + Papilledema = Imaging Before Lumbar Puncture
  - If a patient has signs of increased intracranial pressure (e.g., papilledema, focal deficits, altered mental status), always get a head CT or MRI before LP to avoid risk of herniation.
- Worsening Neurologic Symptoms with Heat? Think MS
  - Patients with multiple sclerosis (MS) often have Uhthoff’s phenomenon—transient worsening of neurologic symptoms (e.g., vision loss, weakness) with heat or exertion.
- "Rule of the Hand" in Sensory Loss
  - Sensory symptoms that stop objectively exactly at an anatomic region (whole hand sensory loss or whole foot) often suggest a non-neurologic (functional or psychogenic) cause.
  - True neurologic lesions usually do not respect precise anatomic boundaries.
  - The patient may describe the whole hand or foot sensory loss but in neurological lesions only a portion of the limb is affected on sensory testing

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Clinical Pearls: Ethics and Patient Safety

- Physicians are morally and legally obligated to maintain confidentiality of patient information. The only exceptions are if a patient is at imminent risk of harming themselves or others; instances of suspected child and/or elder abuse; reporting of communicable diseases; and reporting of information regarding minors to their legal guardian(s).
- Capacity to make an informed decision requires the ability to understand relevant information, appreciate the situation and its applicability to oneself, demonstrate reasoning regarding the proposed intervention, and communicate a choice.
    - Although cognitive impairment and psychiatric illness are risk factors for incapacity, a diagnosis of neurocognitive disorders and/or psychiatric disease does not equate to automatic incompetence.
- The Plan-Do-Study-Act (PDSA) cycle is a continuous quality improvement strategy aimed at enhancing patient safety and outcomes by setting specific goals, planning and implementing targeted interventions, measuring and evaluating changes, and refining interventions based on results for iterative improvement.
- "Competence", or global incapacity, is a legal determination that is made by a judge. "Capacity" is the ability to make a decision related to a current medical situation; determination of capacity can be made by any clinician. To have decision-making capacity, patients must be able to understand the relevant information required to make a medical decision, reason about treatment options with appreciation for the various consequences and communicate a choice.
- Withdrawing life-sustaining treatment (e.g. extubation) and withholding life-sustaining treatment (e.g. "do not attempt intubation" or DNAR orders) are ethically equivalent. All patients with decision-making capacity may decline recommended treatment, even if there is a high likelihood of morbidity or mortality.
    - Physicians are obligated to provide symptomatic management even if curative (disease-directed) treatment is declined.

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- When a patient lacks capacity, a surrogate decision-maker may be identified based on a written health care power of attorney.
    - If this is not available, state laws and institutional policies inform the hierarchy of surrogate decision makers, including potentially a state-appointed guardian if no capable family or friends are identified.
    - Surrogate decision makers should make decisions based on a patient's documented preferences (i.e. in an advanced directive) if possible, otherwise they should use "substituted judgment" to make a decision in line with the patient's views on life and attitudes towards sickness. Only if they are unable to use substituted judgment should they turn to the "best interest standard", whereas they make a decision in the patient's best interest.

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Clinical Pearls:
Eye, Ear, Nose, and Throat Disorders

- Conjunctivitis can be from various conditions and history and exam are important to determine the diagnosis, especially between viral and allergic which can present similarly. It is crucial to also determine if patients are contact wearers as this affects potential diagnosis and treatment.
- Uveitis or iritis needs to be considered and ruled out in any patient with red eye with pain and ciliary flush or circumferential redness at the junction of the cornea and sclera.
    - These patients need to be referred to ophthalmology urgently and seen within 24 hours with workup to determine etiology and treatment to treat symptoms and inflammation.
- In most cases acute sinusitis is viral in nature and antibiotics should only be considered if prolonged symptoms or worsening symptoms after improvement.
    - Regardless, symptomatic treatment with nasal saline rinse, intra-nasal steroids, and possibly antihistamines and/or decongestants should be used.
- Treatment for acute otitis externa is topical antibiotic with or without topical glucocorticoid (ear drops).
- Chronic sinusitis is diagnosed by either nasal endoscopy or CT scan of the sinuses.
- The most effective initial treatment of allergic rhinitis is an intranasal glucocorticoid.
- *Fusobacterium Necrophorum* is the cause of septic thrombosis of the internal jugular vein (Lemierre syndrome).

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Clinical Pearls: Gastroenterology

Gastroenterology I

- In the setting of a patient presenting with dysphagia, despite a normal barium swallow evaluation, endoscopy is still warranted as the studies are considered complimentary and upper endoscopy can identify cancers and mucosal diseases not identified on radiographic evaluation of the esophagus.
- Ambulatory reflux (pH) testing (wire based or capsule based sensor) is indicated among patients presenting with typical reflux symptoms not responsive to proton pump inhibitor therapy.

Gastroenterology II

- When evaluating a young patient with diarrhea, without alarm symptoms, testing for celiac disease and inflammatory bowel disease (with C-reactive protein testing and fecal calprotectin testing) is adequate to establish a diagnosis of irritable bowel syndrome with diarrhea.
- Among patients with uncomplicated diverticulitis (no abscess formation, perforation or large phlegmon formation), careful patient observation is sufficient over antibiotics with respect to resolution of pain and clinical symptoms of diverticulitis.

Gastroenterology III

- In a patient presenting to the emergency room with abdominal pain, two of three criteria are necessary for the diagnosis of acute pancreatitis to include epigastric pain, serum amylase an/or lipase three times the upper limit of normal and/or cross-sectional imaging demonstrating peripancreatic edema with fat stranding. Outside of strictly meeting these criteria, alternative etiologies of abdominal pain should be considered.
- In a patient presenting with acute pancreatitis and adequately resuscitated with early, moderate intravenous hydration, without clinical improvement at 72 hours, repeated cross-sectional imaging should be performed to assess for complications of acute pancreatitis to include the development of pancreatic necrosis or peripancreatic fluid collection.

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- In a patient with acute pancreatitis, early enteral nutrition was not found to be superior to oral nutrition at 72 hours. Patients should be fed orally, early, and within 24 hours of presentation when clinically the patient is hungry, not requiring intravenous opiate medications and when the patient has a benign clinical exam (soft abdomen with presence of bowel sounds).
    - If not meeting criteria for oral nutrition, the patient should be reassessed daily for oral nutrition. Enteral nutrition should be considered after 72 hours if the patient is intolerant to oral nutrition.

Gastroenterology IV

- In a patient with MASLD, statin use is the only therapy defined to have a mortality benefit, due to the concurrent comorbid conditions and prevention of heart disease mortality.
- In a patient presenting with an acute elevation in serum transaminases, in concern for acute liver failure, the single most important laboratory assay is an international normalized ratio (INR) in order to assess for preserved hepatic synthetic function.

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Clinical Pearls: Geriatric Medicine

Geriatric Medicine I

- Falls usually have a multifactorial etiology, thus generally are best addressed by multifactorial treatments, especially those involving home modifications. In fact, two thirds of falls in older adults involve some sort of home hazard, so evaluation and modifications of the home are high-yield interventions to reduce the risk of future falls.
- Either a PHQ-9 (patient health questionnaire) or a GDS (geriatric depression scale) is an appropriate tool for assessing depression in older adults. Both have a sensitivity for depression of over 80%. PHQ-9 has better specificity (92%) than GDS (70-85%), but the GDS is simpler to use for people with cognitive impairment.
- Hip fractures are incredibly dangerous and potentially life-changing events for older adults with approximately 25% mortality in the first year after fracture.
    - Fractures related to osteoporosis usually occur in the femoral neck or intertrochanteric area; a subtrochanteric fracture is considered an "atypical fracture" and concern for bisphosphonate-related atypical fracture, usually in a host who has taken this medication for more than 5-7 years.
- Pressure injuries progress through stages of increasing severity: Stage 1 involves non-blanchable erythema of intact skin, Stage 2 involves partial-thickness skin loss, Stage 3 extends to subcutaneous fat, and Stage 4 exposes bone, muscle, and/or tendon. Unstageable injuries are obscured by slough or eschar.
    - Management includes prevention strategies for Stage 1, occlusive dressings for Stage 2, and comprehensive care involving interdisciplinary teams, possible surgical debridement, and infection control for Stages 3 and 4.
- Urinary Incontinence is categorized by underlying mechanism; stress incontinence is triggered by increased intra-abdominal pressure, urge incontinence is due to detrusor overactivity, overflow incontinence results from incomplete bladder emptying, functional incontinence involves a physical and/or cognitive inability to reach the toilet, and mixed incontinence is due to a combination of stress and urge pathologies.

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- B12 deficiency is common in older adults and may co-occur with folate deficiency. Folate and vitamin B12 are both involved in the metabolic pathway that converts homocysteine to methionine. A deficiency in either can lead to elevated homocysteine levels. However, methylmalonic acid (MMA) levels are specifically elevated in vitamin B12 deficiency because MMA is converted to succinyl-CoA in a B12-dependent reaction. Folate is not involved in this conversion, so folate deficiency does not affect MMA levels.
    - This is why in cases of folate deficiency, only homocysteine levels are elevated, while in vitamin B12 deficiency, both MMA and homocysteine levels are elevated.

Geriatric Medicine II

- There is no high-quality evidence to support the use of opioids in the treatment of chronic pain. However, if used, they should be prescribed at the lowest effective dose for the shortest duration possible and should not be administered with benzodiazepines to reduce risk adverse effects.
    - Specific caution is advised for certain medications: Morphine is contraindicated in kidney failure, transdermal fentanyl should only be prescribed to opioid-tolerant patients, methadone requires complex dosing regimens and monitoring for side effects, and meperidine and tramadol are discouraged due to toxic metabolites and significant adverse interactions and effects. Partial-opioid agonists (e.g., buprenorphine) may be a safer option but still carry significant risk of adverse events.
- In managing anorexia-cachexia in terminal illness, focus on treating reversible causes, e.g. stopping medications leading to dry mouth (xerostomia), and aggressively treating nausea.
    - Pharmacologic benefit must consider both potential benefit and substantial risk of adverse events. Megestrol acetate can stimulate appetite and induce weight gain but may not improve quality of life and is associated with risks like edema and VTE; Cannabinoids lack sufficient evidence for use in older adults.
    - Dexamethasone can be effective for improving appetite and related symptoms in patients with anorexia-cachexia in terminal states, particularly in advanced cancer. However, its use should be limited to short-term periods to minimize the risk of adverse effects.

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    - Low dose Olanzapine has been shown to improve weight gain and appetite. The majority of evidence involves patients with lung or gastrointestinal malignancies.
    - Enteral or parenteral nutrition should be avoided due to minimal impact on outcomes and potential complications including increased terminal secretions and edema.
- It is critical to screen for depression in patients with cancer as its prevalence ranges as high as 25%.
    - While cancer patients can experience many of the neurovegetative symptoms of depression due to their cancer alone, the presence of helplessness, hopelessness and worthlessness remain diagnostic of this disorder.
    - It is also important to remember that if a patient's life expectancy is likely less than the time required for a traditional antidepressant to take effect, one can consider a psychostimulant such as methylphenidate.

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Clinical Pearls: Pulmonary Medicine

Pulmonary Medicine I

Obstructive Lung Disease

- Asthma is characterized by reversible airflow obstruction which can be captured following administration of inhaled bronchodilator, with change in spirometry over time, or with bronchoprovocation testing (methacholine challenge testing).
    - The mainstay of treatment is inhaled corticosteroid with beta-agonist which can be used on an as needed basis or as a daily controller medication. Biologic therapies should be considered for patients with frequent exacerbations or severe symptoms despite optimal inhaler therapy.
- Treatments for COPD are aimed at reducing symptoms and frequency of exacerbations. Pulmonary rehabilitation can reduce symptom burden, reduce risk of rehospitalization and improve exercise capacity for patients with COPD.
    - Those with advanced disease should be evaluated for hypoxemia and hypercapnia and treated with oxygen and NPPV, respectively, if present.

Pulmonary Medicine II

Nonobstructive Lung Disease

- Obstructive sleep apnea is diagnosed when apnea hypopnea index is >/= 5 on polysomnography in a patient with appropriate signs, symptoms and risk factors for OSA. Patients with high pretest probability of OSA and low suspicion for concomitant hypoventilatory disorders can be evaluated with a home sleep apnea test rather than an in-lab study.
    - Patients at risk for hypoventilatory disorders or those who may require device titration at the time of diagnosis should be referred for in-lab sleep studies.
- Pleural effusions that are large enough to safely sample should be evaluated with thoracentesis and pleural fluid testing. Distinguishing between transudative and exudative effusions using Light's criteria clarifies the cause of the effusion.
    - Pleural fluid cultures, Gram stain, glucose levels and pH can help identify the presence of an infection in the pleural space.
    - If there is concern for pleural infection or empyema, prompt drainage by way of placement of a pleural catheter and/or surgical exploration and drainage of the space with Thoracic Surgery should be pursued.

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Clinical Pearls: Rheumatology

Rheumatology I

- Rheumatoid arthritis and osteoarthritis are the most prevalent polyarticular joint diseases that present to internal medicine physicians, and distinguishing between them is important, as rheumatoid arthritis has many immune-based treatment options.
- Diagnosis of rheumatoid arthritis depends, in large part, on the history of persistent pain and swelling in the small joints of the hands and wrists and physical examination findings of pain and swelling in those joints.
    - The hand joint exam can be helpful in distinguishing: RA involves the wrists and MCPs, whereas OA involves the 1st CMC and DIPs.
    - Laboratory tests for rheumatoid factor and anti-CCP antibody can be helpful, but radiographs are often normal at the time of diagnosis.
- The management of acute gout is different from, but should not interrupt, the management of chronic gout. Treatment of acute and chronic gout depends on number of joints involved and comorbid conditions.
    - NSAIDs, colchicine, and oral or intra-articular steroids may be used to treat an acute gout attack but urate lowering medications, such as allopurinol, should not be stopped when an acute gout attack occurs.
    - Monoarticular gout involvement ideally is treated with corticosteroid injections; gout patients with significant renal insufficiency should avoid NSAIDs.
- Septic arthritis can mimic crystal arthritis and also occurs in immunosuppressed patients and in patients with prosthetic joints. Joint aspiration with gram stain/culture is key in scenarios where there other reasons for inflammatory joint pain.

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Rheumatology II

- It is increasingly recognized that disordered pain perception and CNS processing with resultant central sensitization is the mechanism for widespread pain in fibromyalgia. Central pain (fibromyalgia) has an evidence-based approach to treatment. While fibromyalgia is not an autoimmune disease, it can be seen at increased frequency in patients with rheumatoid arthritis, lupus and psoriatic arthritis.
    - Pain management in such patients should include appropriate nonpharmacologic interventions in addition to appropriate immunosuppressive medications.
    - First line therapy involves validation, CBT, and a supervised aerobic exercise program. Subsequently, medications (such as NSRIs and alpha-2-calcium channel delta ligands) can be offered.
- Hydroxychloroquine is a critically important baseline management of systemic lupus erythematosus. It prevents disease mortality, disease flares, and manages mucocutaneous, arthritic, and vascular symptoms/morbidities.
- When vasculitis is being considered as an etiology for multiorgan dysfunction, appraisal for large/medium/small vessel involvement is appropriate, as they present very differently.
    - If small vessel organ involvement is present, distinguishing between immune-complex vs pauci-immune involvement will guide treatment.
- The presentation of lupus is variable and virtually never includes all of the so-called “Classification Criteria”.
    - In assessing the patient, it is important to consider the symptoms, examination findings and laboratory test results that the patient has and whether or not they go for or against the diagnosis of lupus, rather than starting with the “Classification Criteria” list and seeing if the patient “checks the boxes”.

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- Negative ultrasound or a normal mammogram in a patient with a discrete breast mass does not rule out malignancy; approximately 10% to 20% of palpable breast cancers are not detected by mammography or ultrasonography.
    - A patient with a palpable, firm breast mass but negative imaging results should undergo palpation-guided core needle biopsy. Core needle biopsy provides excellent tissue sampling for pathology and, if malignant, for hormone receptor status.
- Transvaginal ultrasonography can have a role in evaluation of postmenopausal bleeding to assess for endometrial thickness, a sign of endometrial hyperplasia, but it is not useful in assess bleeding in premenopausal women because of significant variations in endometrial thickness due to hormonal fluctuation throughout the menstrual cycle.
    - It therefore is not used routinely for evaluating premenopausal bleeding, unless a structural uterine abnormality is suspected.
- Benign prostatic hypertrophy (BPH) is the most common cause of lower urinary tract symptoms (LUTS) in men. However, the persistence of symptoms after treatment in the absence of bladder outlet obstruction on urodynamic testing and presence of irritative symptoms points to overactive bladder (OAB) as the diagnosis.
- The most common cause of lower urinary tract symptoms (LUTS) in men is benign prostatic hypertrophy. To evaluate BPH, the American Urological Association (AUA) recommends clinicians take a history, conduct a physical examination, use the AUA Symptom Index (AUA-SI)/International Prostate Symptom Score (IPSS) to quantify symptoms, and do a UA. The AUA-SI assesses symptoms, including incomplete emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia during the past month.
    - Blood work and imaging are not first line.

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- Any abnormal vaginal bleeding occurring in peri- and postmenopausal women warrants evaluation to rule out malignancy, usually with endometrial biopsy.
    - Patients do not need to be entirely postmenopausal to have increased risk.
    - Women with prolonged anovulation are exposed to unopposed estrogen without the normal endometrial protective effect of progesterone. This increases the risk for endometrial hyperplasia and malignancy, all of which can also occur in the peri-menopausal time as well.
- For women with severe vasomotor symptoms and vulvovaginal atrophy in menopause, first line treatment is a combination of oral estradiol and progestin.
    - Topical vaginal estrogen can help genitourinary syndrome of menopause, characterized by vaginal symptoms, such as vaginal burning or irritation; sexual symptoms, such as dyspareunia or sexual dysfunction; or urinary symptoms, such as dysuria or recurrent urinary infections, but will not address vasomotor symptoms.

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Endocrinology I

- A thyroid scan can differentiate between causes of thyrotoxicosis. Beta blockers can treat adrenergic symptoms in all forms of thyrotoxicosis while anti-thyroid drugs are used to treat hyperthyroidism from toxic nodules or Grave's disease.
    - Prompt treatment is important to reduce the risk of thyroid storm which has a high mortality rate.
- Overt hypothyroidism is treated with oral levothyroxine 1.6 ug/kg/day in younger healthy adults while lower doses can be initiated in older adults or those with increased cardiovascular risk. Thyroid hormone should be taken 60 minutes before a meal or 4 hours after the last meal and separated from substances that may interfere with absorption. Thyroid nodule evaluation includes measurement of thyroid function and uptake scan for evaluation of a hot nodule only if TSH is suppressed. In the setting of a thyroid nodule with normal thyroid function, ultrasonography should guide decision on thyroid nodule FNA.
- In the evaluation of thyrotoxicosis, thyroid uptake and scan is the best diagnostic test to determine etiology. High uptake is consistent with true hyperthyroidism (thyroid hormone overproduction) while low uptake is consistent with excess thyroid hormone from thyroid inflammation/destruction and/or nonthyroidal sources (e.g., exogenous thyroid hormone administration).
    - The scan portion of the test will help differentiate between high uptake causes like Graves' (diffuse uptake), toxic adenoma (single focused area of uptake), and toxic multinodular goiter (patchy uptake).
- Women with preexisting hypothyroidism who learn they are require an immediate dose increase in thyroid hormone (30-50%) when pregnancy is confirmed. This helps ensure high enough T4 levels to help avoid neonatal hypothyroidism and counteracts the notable increase in thyroxine-binding globulin caused by the high-estrogen state of pregnancy.

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- Adrenal incidentalomas are common. Hormone evaluation should include a 1mg-dexamethasone suppression test, plasma or urine metanephrines and catecholamines if Houndsfield Unit score is ≥10 and aldosterone concentration/plasma renin activity if hypertension or hypokalemia. Adrenalectomy should be considered if size ≥ 4cm, suspicious radiographic features or functioning tumor.
    - Patients with a lipid-rich adrenal incidentaloma (low Hounsfield units, e.g., <10 HU) do not require screening for pheochromocytoma. Pheochromocytomas will always have much higher HU.

Endocrinology II

- Ninety percent of type 1 diabetes is related to autoimmune destruction of b cells and is associated with autoantibodies to b cells (insulin antibodies, IA-2, GAD-65 and ZnT8 autoantibodies) and insulin dependence.
    - Diabetic ketoacidosis (DKA) can result when insulin is omitted or in the setting of a precipitating factor such as infection and often presents with nausea, vomiting, abdominal pain and deep respirations but can progress rapidly and lead to hypotension and shock if not treated promptly with insulin and fluids.
    - Potassium requires close monitoring and replacement in DKA
- Diagnosis of diabetes is established by clinical symptoms of hyperglycemia with random glucose >200mg/dL, or in the absence of symptoms, two of the following abnormal tests: fasting glucose levels >126mg/dL, 2-hour plasma glucose during OGTT >200mg/dL, Hba1c >6.5%. I
    - A single glucose 200mg/dL or higher in the presence of classic hyperglycemic symptoms or hyperglycemic crisis (DKA or HHS) is sufficient for diagnosis and does not require confirmatory testing. All other diagnostic tests (fasting glucose, HbA1c, and 2-hour OGTT) require confirmation.
- Initial therapy for type 2 diabetes is metformin if GFR is >45 with additional agents based on ASCVD risk and CKD with GLP-1RA and SGLT-2 inhibitor usually being preferred if no contraindications.
- Screening for microvascular complications (retinopathy, neuropathy, nephropathy) of diabetes should occur 5 years after the diagnosis of type 1 diabetes and then yearly and at the time of diagnosis for type 2 diabetes and then yearly.

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    - Optimization of glucose control reduces the risk of microvascular complications. Macrovascular complications are reduced through weight loss, Mediterranean diet, smoking cessation, lipid management, increased physical activity and blood pressure control.
- Moderate intensity statin is indicated in patients with diabetes between the age of 40-75 years. GLP1-RA and SGLT-2 inhibitors can reduce cardiovascular risk in patients with type 2 diabetes. Patients with diabetic ketoacidosis require potassium supplementation starting when the potassium level is NORMAL - although they can present with hyperkalemia, they are total-body potassium-depleted, and the initiation of insulin will rapidly drive extracellular potassium intracellularly and will rapidly drive down serum potassium levels.
- In choosing medications for patients with type 2 diabetes mellitus, a comorbidity-driven approach is now common. For example, patients with congestive heart failure and/or diabetic chronic kidney disease may benefit most from an SGLT2-inhibitor. Patients with ASCVD and/or diabetic chronic kidney disease may benefit most from a GLP-1 receptor agonist.

Endocrinology III

- Evaluation of hypercalcemia requires confirmation of hypercalcemia and measurement of PTH to determine if PTH-mediated or non-PTH mediated. Treatment of severe hypercalcemia requires IV normal saline, bisphosphonate therapy and calcitonin to bridge to the effect of bisphosphonate (48 hours). Other treatments are based on the cause of hypercalcemia (i.e., steroids for increased 1-a hydroxylase) and the response to therapy (densoumab for refractory hypercalcemia). Patients with hyperparathyryoidism should undergo surgery if serum calcium is 1mg/dL above ULN, skeletal involvement, kidney involvement, age <50 years and symptoms.
- Women $\geq$ 65 should be screened for osteoporosis or <65 if risk factors. First line therapy for the management of osteoporosis (defined by a T score < -2.5 or a fragility fracture) is bisphosphonate therapy. Denosumab, PTH/PTHrp analogues and romosozumab are second line treatment options. More aggressive first line therapy (denosumab or PTH/PTHrp analogue) is indicated in glucocorticoid induced osteoporosis for those >40 years with high risk of fracture.

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- A morning cortisol <3ug/dL is diagnostic of adrenal insufficiency while a cortisol >15-18ug/dL rules out adrenal insufficiency. A cosyntropin stimulation test is necessary to rule out adrenal insufficiency in those with indeterminate morning cortisol values (3-15ug/dL). ACTH levels differentiate between primary and secondary adrenal insufficiency.
- Patients with primary adrenal insufficiency require glucocorticoid and mineralocorticoid replacement while those with secondary adrenal insufficiency require only glucocorticoid replacement.
- LH levels measured with testosterone can help differentiate between primary and secondary hypogonadism. Evaluation of secondary hypogonadism includes serum prolactin, medication review, iron studies, OSA screen and MRI in those with serum testosterone <150ng/dL, other pituitary deficiencies or elevated prolactin.
    - Acute gynecomastia requires work up in men including LH, FSH, estradiol, testosterone, TSH, FT4, prolactin, hCG. An elevated estradiol or hCG should prompt imaging to rule out malignancy.
- In generally well outpatients, primary hyperparathyroidism is far and away the most common cause of hypercalcemia. If you confirm high calcium and high PTH (or even high-normal PTH) on multiple occasions, substantial testing for other etiologies becomes unnecessary.
    - Besides primary hyperparathyroidism, the only other diagnosis that will give you a pattern of high PTH and high calcium is the rare genetic disorder, familial hypocalciuric hypercalcemia (FHH).
    - Primary hyperparathyroidism (normal to high urinary calcium excretion) can be distinguished from FHH (very low urinary calcium excretion) in most cases with a 24-hour urine calcium measurement.
- Secondary hyperparathyroidism, in which PTH is high but the calcium is normal or low, is NOT treated with parathyroidectomy. Rather, the approach should be to identify the underlying cause (e.g., what is stimulating PTH, such as dietary calcium deficiency or malabsorption or progressive CKD with loss of renal activation of vitamin D) and treat that.
- The diagnosis of osteoporosis can be made with bone densitometry if the patient has suffered a fragility fracture, including hip or vertebral body fractures suffered from low or no trauma (e.g., less than or equal to fall from standing height).
    - Bone densitometry should still be performed to assess the severity and guide treatment, and to serve as a treatment baseline, but obtaining this should not substantially delay treatment, as all patients who have suffered a fragility fracture are at high to very high risk of subsequent fractures.

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Endocrinology IV

- Low HDL is not linked to increased risk of ASCVD and should not be treated with medication to raise HDL.
- Despite the prevalence and success of weight loss medications, ALL patients with obesity should receive comprehensive lifestyle modification efforts, including calorie restriction (>500 kcal per day reduction), moderate intensity exercise (at least 150 minutes per week), and behavioral counseling.
    - All FDA-approved weight loss medications are contraindicated in pregnancy. For non-pregnant adults, the choice of medication class can be made by balancing adverse effect profile and contraindications, route of administration, cost, and degree of weight loss desired. For example, while GLP-1 receptor agonists tend to result in the greatest weight loss, injections may be less desirable for certain patients, these medications may be more costly than others, and others and may are contraindicated in those patients at risk for pancreatitis or medullary thyroid cancer.
    - Bariatric surgery is indicated for BMI ^{3}>35 or ^{3}>30 with diabetes.
- It is recommended to screen all people age 40-75 for ASCVD risk calculation. Treatment includes non-pharmacologic measures such as dietary modification, exercise (150 minutes/week), weight loss and smoking cessation in addition to pharmacologic therapy.
    - Those at intermediate risk or diabetes age 40-75 years should receive moderate intensity statin. Those with high-risk, LDL >190 mg/dL, or diabetes with multiple ASCVD risk factors should receive high intensity statin (ACC/AHA recommendations).
- Treatment of hypertriglyceridemia includes lifestyle interventions, treatment of reversible causes, statin if 10-year ASCVD risk >7.5%. When Triglycerides are >500mg/dL, treatment should be a very low-fat diet, omega-3 fatty acid consumption, and avoidance of carbohydrates and alcohol. Medication treatment options include isocapent ethyl and fenofibrate.

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